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# THE DEVELOPMENT OF A MINE IN PRETORIA ON THE WESTERN SIDE OF KRAUSEVILLE AH WITHIN THE CITY OF TSHWANE METROPOLITAN MUNICIPALITY, GAUTENG PROVINCE

## TRAFFIC IMPACT ASSESSMENT REPORT

FINAL REPORT  
REVISION 01

**OCTOBER 2024**

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|                                  |                                                                                       |                                             |  |

## RECORD OF REVISIONS

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## EXECUTIVE SUMMARY

Delta Built Environment Consultants (Delta BEC) was appointed to conduct a Traffic Impact Assessment of the proposed Bundu Mine in accordance with the *Manual of Traffic Impact Studies* published by the Department of Transport, 1995 and *Technical Methods for Highways* published by the Committee of Transport and Land Officials (COTO), TMH16 and THM17. The proposed development is approximately 58 ha in size.

The area is currently predominantly rural, with existing agricultural and mining activities around/within close vicinity of the proposed mine location. The development traffic demand was analysed in this report and is indicated below:

### Weekday AM Trip Generation

|                  | IN | OUT |
|------------------|----|-----|
| Trucks           | 50 | 0   |
| Private Vehicles | 10 | 0   |
| Total            | 60 | 0   |

### Weekday PM Trip Generation

|                  | IN | OUT |
|------------------|----|-----|
| Trucks           | 0  | 50  |
| Private Vehicles | 0  | 10  |
| Total            | 0  | 60  |

This report focuses mainly on the traffic operations and requirements of the road network and intersections surrounding the site. A detailed description of the traffic findings and the current operations and movements are discussed. Weekday traffic counts were conducted at four critical road intersections that act as main feeders in and out of the study area. The following intersections will be discussed in detail within this report:

- Intersection of R514 and Charl Avenue
- Intersection of R514 and Unnamed
- Intersection of R514 and Gilia Road
- Intersection of R514 and Balderjan Road

The traffic analysis was conducted for the base year (2024) and was predicted to grow at a rate of 1.5%. The growth rate factor of 1.5% was applied for the year 2029 traffic volumes at the proposed site location. The analysis for future traffic with and without development was conducted over a five-year horizon (2029). The trip distribution split from the mine was indicated to be 5% to the west and 95% to the east from the access or intersection 2.

The following scenarios were considered during the traffic analysis:

| SCENARIO | TRAFFIC SCENARIO                                                              | ROAD NETWORK                |
|----------|-------------------------------------------------------------------------------|-----------------------------|
| 1        | Existing 2024 peak hour                                                       | Existing 2024 road geometry |
| 2        | Horizon 2029 peak hour with background traffic growth                         | Existing 2024 road geometry |
| 3        | Horizon 2029 peak hour background traffic growth and the proposed development | Existing 2024 road geometry |

The findings were reported in relation to the level of service (LOS), which represents metrics of roadway performance determined by intersection delay. All four intersections showed satisfactory LOS across all scenarios and did not require any mitigation measures.

Public transportation amenities, including laybys and bus stops, are not available in the vicinity of the mine. No significant non-motorised transport (NMT) activity was observed within 800 m of the proposed access point, suggesting limited current demand. The NMT facility upgrades are however not deemed critical for this development as all site employees will access the site by private vehicles and site vehicles.

During the traffic impact assessment, a thorough investigation was conducted to identify typical hazards and assess potential environmental impacts. Additionally, risk assessments were carried out, and targeted safety improvement strategies were proposed based on the findings.

In conclusion, Delta BEC, therefore, recommends that the proposed development situated under the City of Tshwane Metropolitan Municipality be approved.



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## **GLOSSARY OF TERMS AND ABBREVIATIONS**

|           |                                     |
|-----------|-------------------------------------|
| COTO      | Committee of Transport Officials    |
| Delta BEC | Delta Built Environment Consultants |
| ha        | Hectare                             |
| LOS       | Level of Service                    |
| TIA       | Traffic Impact Assessment           |

# **1 INTRODUCTION**

## **1.1 BACKGROUND**

Bundu Mine is a sand mine being proposed in rural Pretoria on the western side of Krauseville AH, on the portion of erf 91, 94, 95 and R/18 of the farm Uitzicht Alias Rietvalei 314-JR. At peak production, trucks will be moving off-site with approximately 37 500 tonnes of sand and aggregates per month (roughly 1 000 truckloads).

## **1.2 PURPOSE OF REPORT**

This report investigates the impact of the traffic redistributed by the proposed mine on the immediate surrounding road network. It also determines whether it is necessary to implement any road and/or intersection improvements. Traffic counts have been undertaken at the key intersections in the study area to quantify and assess the traffic flow operations and the current traffic conditions.

The study also investigates and reviews the proposed site access points regarding current traffic operations and infrastructure. The internal and external accessibility of these points was analysed to ensure sustainable and efficient access to the proposed development.

## **1.3 DESIGN CRITERIA AND GUIDELINES**

The study regarding the traffic conditions within and surrounding the site has been conducted, taking the requirements and guidelines as set out in the following documents into account:

- TMH 16 Volume 1 (South African Traffic Impact and Site Traffic Assessment Manual), COTO, Version 1.0, August 2012
- TMH 16 Volume 2 (South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual), COTO, Version 1.01, February 2014
- TMH 17 (South African Trip Data Manual), COTO, Version 1.01, September 2013
- TRH 26 (South African Road Classification and Access Management Manual), COTO, Version 1.0, August 2012.

The manuals recommend that any change of land use or material change of circumstances to existing land use or transportation infrastructure that is likely to generate significant or changed levels of traffic activity be evaluated so that the incremental impact on surrounding roads and intersections can be determined, including the assessment of mitigating measures.

## 1.4 STRUCTURE OF REPORT

The report comprises the following sections:

- Section 2: Approach
- Section 3: Development Particulars
- Section 4: Site Investigation
- Section 5: Traffic Counts and Flow Data
- Section 6: Trip Generation, Distribution and Assignment
- Section 7: Traffic Flow Analysis and Mitigation Measures
- Section 8: Public Transport and Pedestrian Facilities
- Section 9: Typical Hazards and Environmental Impact
- Section 10: Risk Assessment
- Section 11: Strategies to Improve Safety
- Section 12: Conclusion
- Section 13: References
- Appendices.

## 2 APPROACH

### 2.1 METHODOLOGY

The TIA for the development was conducted based on the total traffic demand for the proposed development. A five-year horizon year (2029) for the site was identified to conclude if the current transport infrastructure for the site and surrounding network will be able to accommodate the redistributed traffic. The following methodology was used in compiling the TIA report:

- 1) Information regarding the proposed change in land use was obtained to identify the site location and to set up site investigations.
- 2) The critical road intersections that act as main feeders in and out of the study area were assessed to determine current road and traffic safety conditions and the base year traffic volumes.
- 3) A five-year horizon was used at a growth rate of 1.5% for the background traffic, as proposed in the South African Trip Data Manual (TMH 17, 2013). The existing intersection operation conditions were determined using the SIDRA software design package.

The following scenarios were analysed using SIDRA software design:

**Table 2-1: Traffic Scenarios**

| SCENARIOS | TRAFFIC SCENARIO                                                              | ROAD NETWORK                |
|-----------|-------------------------------------------------------------------------------|-----------------------------|
| 1         | Existing 2024 peak hour traffic                                               | Existing 2024 road geometry |
| 2         | Horizon 2029 peak hour with background traffic growth                         | Existing 2024 road geometry |
| 3         | Horizon 2029 peak hour background traffic growth and the proposed development | Existing 2024 road geometry |

### 3 DEVELOPMENT PARTICULARS

#### 3.1 STUDY AREA

The proposed mining right application project is located on portions erf 91, 94, 95 and R/18 of the farm Uitzicht Alias Rietvalei 314-JR under the City of Tshwane Metropolitan Municipality. The site is situated approximately 12 km West of Pretoria and approximately 4 km away from the Gauteng/North West border, with centre coordinates of 25°44'4.67 "S 28° 0'19.59" E. The locality of the property is indicated in **Figure 3-1**.



Figure 3-1: Project Location.

#### 3.2 LAND USE

The proposed project entails the mining of sand and aggregates. The proposed project area is 58 Hectares (ha).

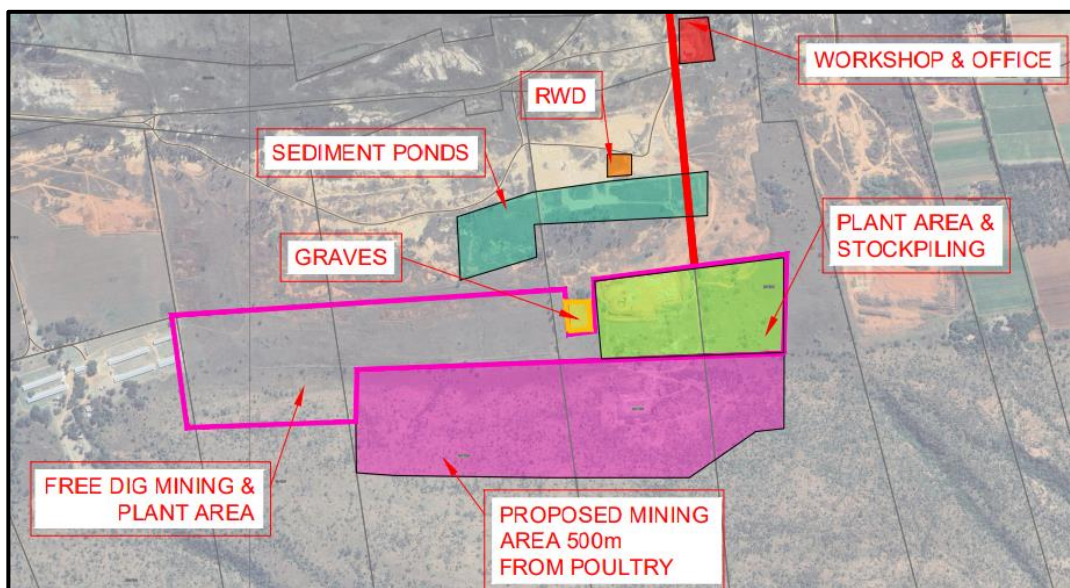


Figure 3-2: Proposed Bundu Mine



### 3.3 ACCESSIBILITY

This surrounding road network that provides regional access to the site includes several local and regional roads. These roads include:

- R514/Van Der Hoff Road
- Unnamed Road

The unnamed road will serve as the main route of accessibility to the site. Direct access to the site is obtained from the intersection of the unnamed road and the R514. **Figure 3-3** illustrates the accessibility of the site.

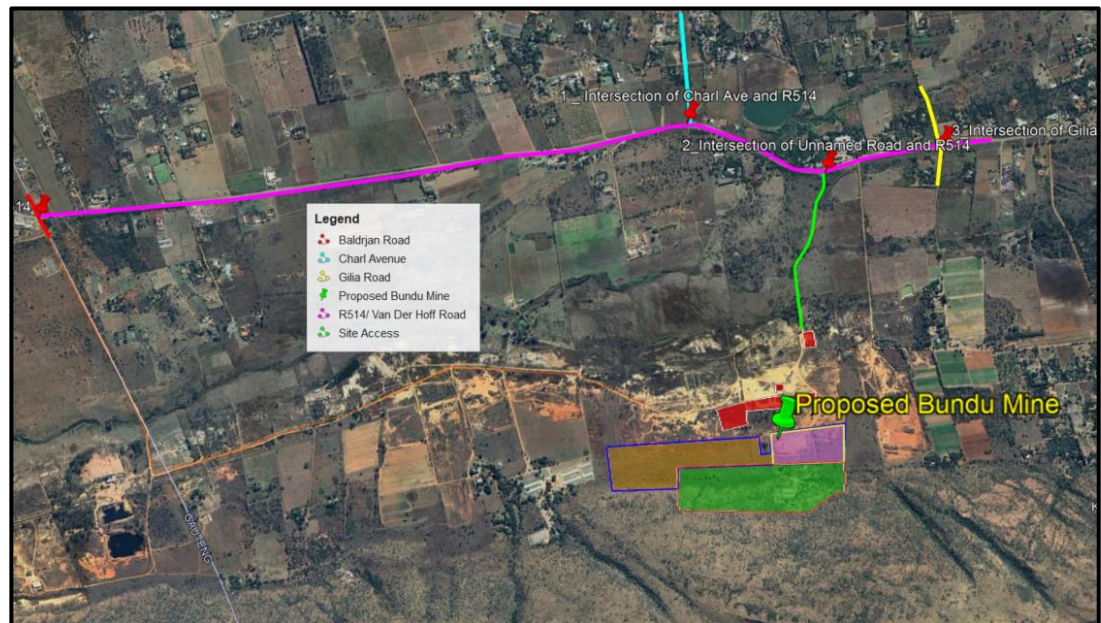


Figure 3-3: Site Accessibility

### 3.4 SITE ACCESS

The current proposal for site access features one entry and exit point. The existing intersection will serve as both the entry and exit point, connecting with the proposed mine.

### 3.5 PROVINCIAL ROADS PLANNING

Latent rights and proposed future road planning were taken into consideration. **Figure 3-4** below shows that the site will not be affected by any future provincial road or intersection upgrades.

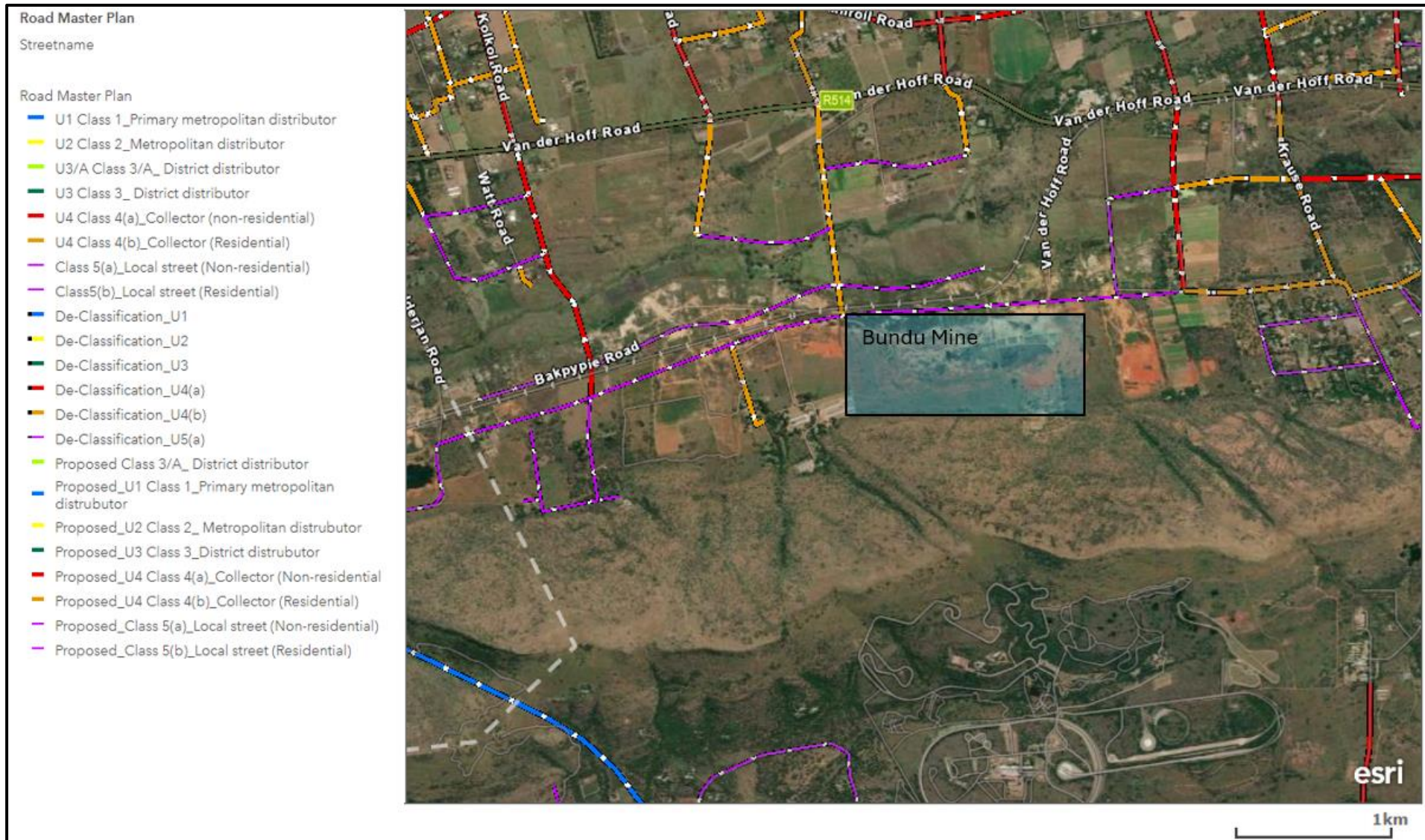


Figure 3-4: City of Tshwane Roads Master Plan.



## 4 SITE INVESTIGATION

A site investigation was conducted on 02 September 2024 to obtain a better understanding of the project area. During the investigation, four intersections were identified that are to be analysed in support of the traffic impact assessment report.

### 4.1 ROAD DETAILS

Details regarding the intersections identified during the site visit, as well as the surrounding road networks that were observed, are provided in Table 4-1. The table presents the roads that would be affected by the proposed mining development. The road classification was conducted using the *City of Tshwane Roads Master Plan*.

**Table 4-1: Road classification details**

| ROAD/STREET NAMES             | DESCRIPTION                                         | CLASS        | ROAD RESERVE | CONDITION       |
|-------------------------------|-----------------------------------------------------|--------------|--------------|-----------------|
| <b>R514/Van Der Hoff Road</b> | Single carriageway with one lane in each direction. | U3 Class 3   | 32 – 40 m    | Good            |
| <b>Charl Avenue</b>           | Single carriageway with one lane in each direction. | U4 (a)       | 25 m         | Unpaved/ gravel |
| <b>Unnamed</b>                | Single carriageway, two-way unpaved road.           | Unclassified | Approx. 10 m | Good            |
| <b>Gilia Road</b>             | Single carriageway, two-way unpaved road.           | U4 (a)       | 25 m         | Good            |
| <b>Balderjan Road</b>         | Single carriageway, two-way unpaved road.           | Unclassified | Approx. 10 m | Unpaved/ gravel |

### 4.2 CRITICAL INTERSECTIONS

Four intersections within 1 200 m of the proposed development were identified and listed below. The locations of these intersections are illustrated in Figure 4-1:

- 1) Intersection of R514 and Charl Avenue
- 2) Intersection of R514 and Unnamed Road
- 3) Intersection of R514 and Gilia Road
- 4) Intersection of R514 and Balderjan Road.

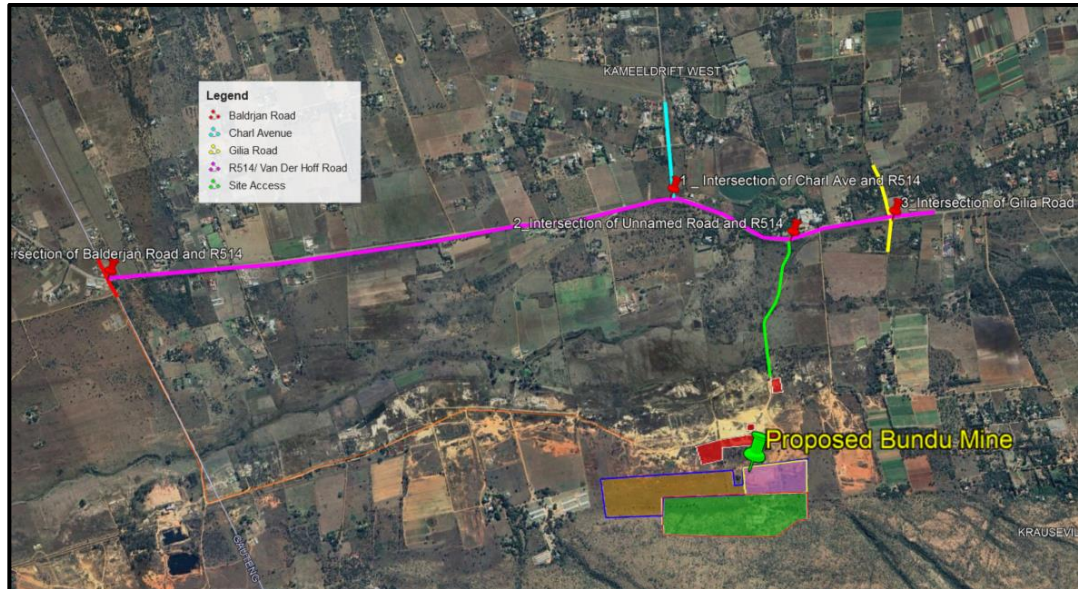


Figure 4-1: Critical intersections

### 4.3 ROAD SAFETY CONDITIONS

A basic road condition and road safety assessment of the road sections were conducted according to the requirements of the *South African Road Safety Audit Manual*. Note that no guarantee is made that every deficiency has been identified. In addition, should all the deficiencies identified during this assessment not be addressed, or should none of the recommendations be adopted for implementation, this would not imply or confirm that the road is safe. However, addressing the deficiencies and adopting the recommendations should improve the level of safety of the roads. The intersections discussed below and listed in **section 4.2** were inspected during the site visit.

#### 4.3.1 INTERSECTION 1 – R514 AND CHARL AVENUE

The intersection of R514 and Charl Avenue is a T-junction intersection with a stop control along the northern leg or Charl Avenue. Figure 4-2 shows the existing geometry and the condition of this intersection.

- R514 consists of a single carriageway with one lane in each direction.
- Charl Avenue consists of a single carriageway with one lane in each direction.
- The speed limit along R514 and Charl Avenue is 70 km/h and 50 km/h, respectively.
- The road markings are partially visible.
- The intersection does not provide pedestrian crossings.



Figure 4-2: Intersection 1

#### 4.3.2 INTERSECTION 2 - R514 AND UNNAMED ROAD

The intersection of R514 and Unnamed Road is a T-junction intersection with a stop control along the southern leg or unnamed road. Figure 4-3 shows the existing geometry and the condition of this intersection.

- R514 consists of a single carriageway with one lane in each direction.
- Unnamed road is a two-way unpaved road.
- The speed limit along R514 is 70 km/h.
- The road markings are visible.
- The road surface does not indicate any failures.
- There is no road signage at this intersection.
- The intersection does not provide pedestrian crossings.





Figure 4-3: Intersection 2

#### 4.3.3 INTERSECTION 3 - R514 AND GILIA ROAD

The intersection of R514 and Gilia Road is a 4-legged intersection with a stop control along the northern and southern legs of Gilia Road. Figure 4-4 shows the existing geometry and the condition of this intersection.

- R514 consists of a single carriageway with one lane in each direction.
- Gilia Road is an unpaved two-way road.
- The speed limit along R514 and Charl Avenue is 70 km/h and 50 km/h, respectively.
- The road markings are visible on the R514.
- The intersection does not provide pedestrian crossings.



Figure 4-4: Intersection 3

#### 4.3.4 INTERSECTION 4 - R514 AND BALDERJAN ROAD

The intersection of R514 and Balderjan Road is a 4-legged intersection with a stop control along the northern and southern legs of Balderjan Road. Figure 4-5 shows the existing geometry and the condition of this intersection.

- R514 consists of a single carriageway with one lane in each direction.
- Balderjan Road is an unpaved two-way road.
- The speed limit along R514 is 70 km/h.
- The road markings are visible on the R514.
- The intersection does not provide pedestrian crossings.



**Figure 4-5: Intersection 4**



## 5 TRAFFIC COUNTS AND FLOW DATA

Traffic counts were conducted on Tuesday, 27 August 2024, at the intersections identified in Section 4.2.

### 5.1 BASE YEAR VOLUMES (2024)

AM and PM peak hours were identified once the traffic counts were completed and the data was analysed. According to *TMH 16 Volume 2, The South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual*, the peak hour should be a single period of one hour, assuming that the peak 15-minute traffic volume occurs over the duration of the full hour.

12-hour counting sessions were conducted for each identified critical intersection to ensure accurate traffic capacity calculations. Light vehicles, taxis and heavy vehicle data were obtained during the count.

#### 5.1.1 BASE YEAR AM PEAK HOUR

The AM peak hour for the existing traffic flow for each identified intersection differed and can be observed in **Table 5-1**.

**Table 5-1: Base year (2024) AM peak hours.**

| INTERSECTION                            | AM PEAK HOUR – TIME PERIOD |
|-----------------------------------------|----------------------------|
| Intersection of R514 and Charl Avenue   | 06:15 – 07:15              |
| Intersection of R514 and Unnamed        | 06:15 – 07:15              |
| Intersection of R514 and Gilia Road     | 06:15 – 07:15              |
| Intersection of R514 and Balderjan Road | 06:15 – 07:15              |

#### 5.1.2 BASE YEAR PM PEAK HOUR

The PM peak hour for the existing traffic flow for each identified intersection differed and can be observed in **Table 5-2**.

**Table 5-2: Base year (2024) PM peak hours.**

| INTERSECTION                            | AM PEAK HOUR – TIME PERIOD |
|-----------------------------------------|----------------------------|
| Intersection of R514 and Charl Avenue   | 16:30 – 17:30              |
| Intersection of R514 and Unnamed        | 16:30 – 17:30              |
| Intersection of R514 and Gilia Road     | 16:30 – 17:30              |
| Intersection of R514 and Balderjan Road | 16:30 – 17:30              |

## 5.2 HORIZON YEAR VOLUMES

The *Manual for Traffic Impact Studies (TRH 16, Vol. 1)* states that transportation improvements must be designed for a five-year horizon. Therefore, it was decided to use a five-year horizon for the development.

The *TMH 17 (South African Trip Data Manual)* specifies that the typical growth rate for an area with an expected above-average traffic growth falls within a range of 0% to 3%. To make provision for traffic growth on the affected provisional roads, it was considered appropriate to apply a **1.5 %** per annum growth factor.

### 5.2.1 HORIZON YEAR (2029) AM & PM PEAK HOUR

The horizon year (2029) volumes were calculated according to the peak hour traffic volumes in Section 5.1. A **1.5%** annual traffic growth rate was applied over a 5-year period to the existing traffic volumes to estimate the 2029 background volumes, which can be observed in Appendix A:

## 6 TRIP GENERATION, DISTRIBUTION AND ASSIGNMENT

The traffic demand as a result of the change in land use for the proposed mine development was calculated using *TMH 17, South African Trip Data Manual*. This section of the report illustrates the effect the change in land use will have on the surrounding road network.

### 6.1 DEVELOPMENT TRIP GENERATION

The trip generation for the proposed mine is shown in Table 6-1 and Table 6-2.

**Table 6-1: Weekday AM Trip Generation**

|                         | IN        | OUT      |
|-------------------------|-----------|----------|
| <b>Trucks</b>           | 50        | 0        |
| <b>Private Vehicles</b> | 10        | 0        |
| <b>Total</b>            | <b>60</b> | <b>0</b> |

**Table 6-2: Weekday PM Trip Generation**

|                         | IN       | OUT       |
|-------------------------|----------|-----------|
| <b>Trucks</b>           | 0        | 50        |
| <b>Private Vehicles</b> | 0        | 10        |
| <b>Total</b>            | <b>0</b> | <b>60</b> |

The bulk of the development's traffic will consist of haulage operations serving the mine, with trucks accounting for approximately 83% of the total traffic generated.

### 6.2 DEVELOPMENT TRIP SPLIT

As mentioned in section 3.3, the proposed development will have one entry and exit point. It is expected that 95% of the traffic will head east towards Pretoria, while 5% will travel west towards Hartbeespoort. **Figure 6-1** below shows the development trip split.

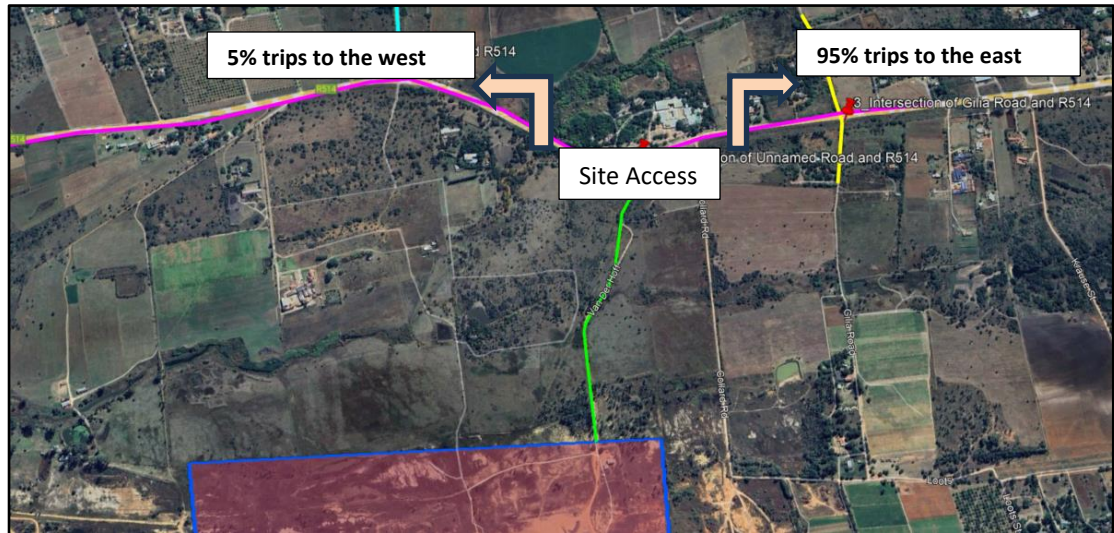


Figure 6-1: Development trip split.

### 6.3 HORIZON YEAR (2029) PEAK VOLUMES WITH DEVELOPMENT

The traffic volumes generated by the development, as well as the traffic flow between the two key intersections, are illustrated in Appendix A:.



## 7 TRAFFIC FLOW ANALYSIS AND MITIGATION MEASURES

SIDRA Intersection 9.1.2.202 software package was used to determine the level of service (LOS), V/C ratios and the total delay experienced at the analysed intersections. The analysis was performed based on the method dictated in the *Highway Capacity Manual (2010)*. The minimum required Level of Service (LOS) for an intersection is D, according to *The South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual*.

During the traffic analysis, three scenarios were tested. Table 7-1 below illustrates the LOS outcome for each of the two key intersections for each scenario.

A detailed lane summary for the 2024 base year peak hour traffic on the existing 2024 road network can be observed in Appendix C:.

A detailed lane summary for the 2029 background traffic with growth peak hours on the existing 2024 road network can be observed in Appendix D:.

A detailed lane summary for the 2029 background growth traffic and the development demand peak hour on the 2024 road network can be observed in Appendix E:.

Table 7-1: Intersections traffic analysis summary

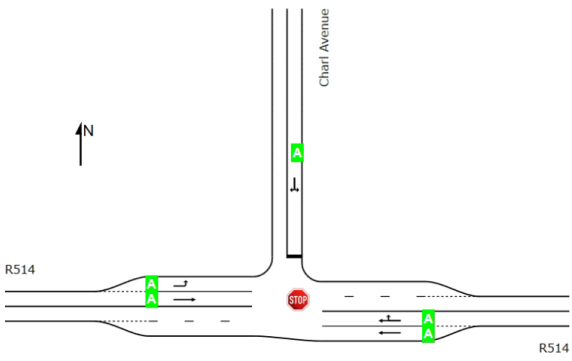
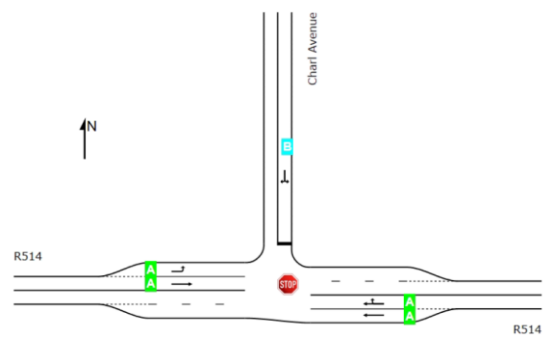
| SCENARIO | TRAFFIC SCENARIO                                                                             | ROAD NETWORK                | INTERSECTION     |    |    |    |    |    |    |    |
|----------|----------------------------------------------------------------------------------------------|-----------------------------|------------------|----|----|----|----|----|----|----|
|          |                                                                                              |                             | 1                |    | 2  |    | 3  |    | 4  |    |
|          |                                                                                              |                             | LEVEL OF SERVICE |    |    |    |    |    |    |    |
|          |                                                                                              |                             | AM               | PM | AM | PM | AM | PM | AM | PM |
| 1        | Existing 2024 peak hour                                                                      | Existing 2024 road geometry | A                | B  | A  | A  | A  | A  | A  | A  |
| 2        | Horizon 2029 peak hour with growth in background traffic                                     | Existing 2024 road geometry | B                | B  | A  | A  | A  | A  | A  | A  |
| 3        | Horizon 2029 peak hour with growth in background traffic and the proposed development demand | Existing 2024 road geometry | B                | B  | A  | A  | A  | A  | A  | A  |

### 7.1 TRAFFIC ANALYSIS SUMMARY AND MITIGATION MEASURES

Each critical intersection indicated different results for the various scenarios and is summarised below. According to the results of the intersection analysis, all intersections have an **acceptable LOS** for the development. Therefore, there are **no required upgrades** on Intersections 1, 2, 3 and 4. The intersection lane analysis summaries can be observed in Table 7-2 to Table 7-5.

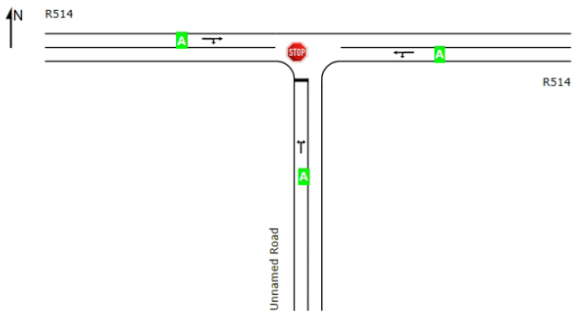
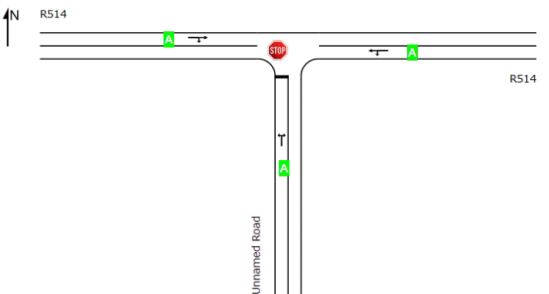
### 7.1.1 INTERSECTION 1 – TRAFFIC ANALYSIS SUMMARY

Table 7-2: Intersection 1 Traffic analysis summary

| 2024 EXISTING INTERSECTION LAYOUT                                                 | 2029 DEVELOPMENT TRAFFIC MITIGATION MEASURES                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  <p><b>Upgrade:</b> The existing road geometry layout can accommodate the background and development traffic. No mitigation measures are required for this intersection.</p> |

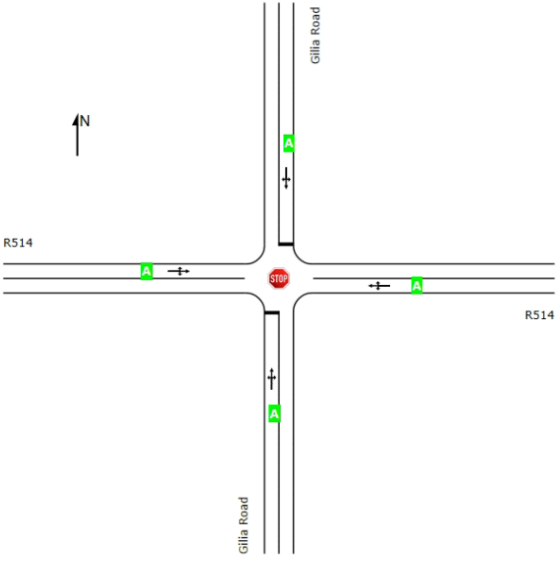
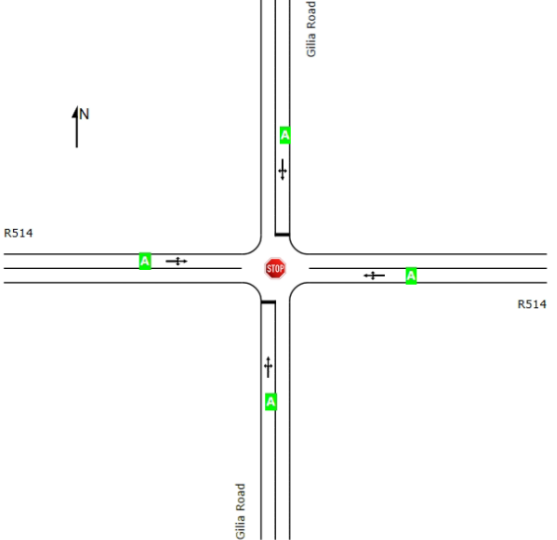
### 7.1.2 INTERSECTION 2 – TRAFFIC ANALYSIS SUMMARY

Table 7-3: Intersection 2 Traffic analysis summary

| 2024 EXISTING INTERSECTION LAYOUT                                                   | 2029 DEVELOPMENT TRAFFIC MITIGATION MEASURES                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  <p><b>Upgrade:</b> The existing road geometry layout can accommodate the background and development traffic. No mitigation measures are required for this intersection.</p> |

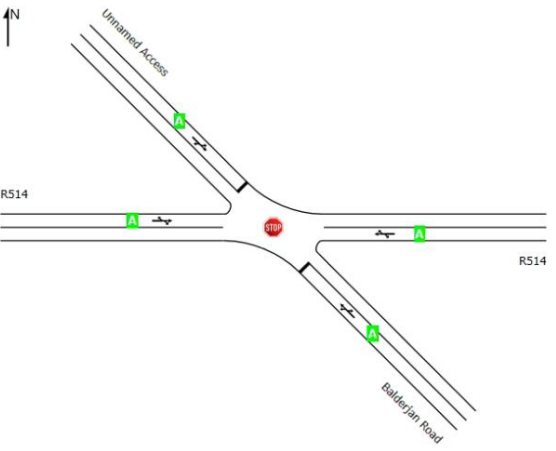
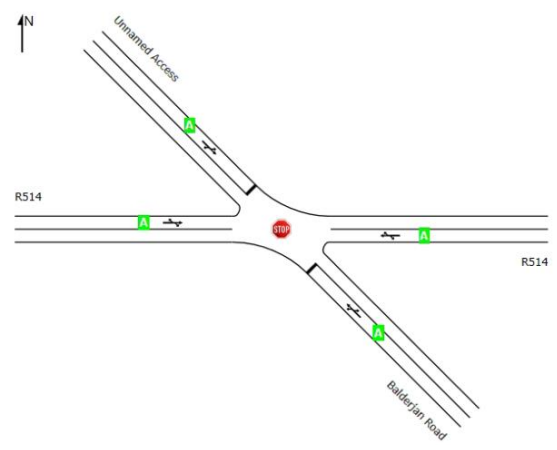
### 7.1.3 INTERSECTION 3– TRAFFIC ANALYSIS SUMMARY

Table 7-4: Intersection 3 Traffic analysis summary

| 2024 EXISTING INTERSECTION LAYOUT                                                  | 2029 DEVELOPMENT TRAFFIC MITIGATION MEASURES                                                                                                                                                                                                                   |
|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  <p><b>Upgrade:</b> The existing road geometry layout can accommodate the background and development traffic. No mitigation measures are required for this intersection.</p> |

### 7.1.4 INTERSECTION 4 – TRAFFIC ANALYSIS SUMMARY

Table 7-5: Intersection 4 Traffic analysis summary

| 2024 EXISTING INTERSECTION LAYOUT                                                   | 2029 DEVELOPMENT TRAFFIC MITIGATION MEASURES                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  <p><b>Upgrade:</b> The existing road geometry layout can accommodate the background and development traffic. No mitigation measures are required for this intersection.</p> |

## 8 PUBLIC TRANSPORT AND PEDESTRIAN FACILITIES

According to *TMH 16, Traffic Impact Assessment Study Manual, Volume 2*, 'Public transport stops should be located within an acceptable walking distance from generators, attractors, and modal transfer facilities.' There are currently no pedestrian facilities within 800 m of the proposed access point. There are no formal public transport stops or shelters.

No notable non-motorised transport (NMT) activity has been observed within an 800 m radius of the proposed access point, indicating a lack of current demand for NMT facilities in the area. The mine will not bring in additional foot traffic to the local area as all employees will travel using private and company vehicles. Therefore, the NMT facilities upgrades are not required for this development.

## **9 TYPICAL HAZARDS AND ENVIRONMENTAL IMPACT**

This section outlines typical road hazards and environmental conditions, based on the data collected and stakeholder engagement, that may present a safety risk and lead to an incident occurring within the mine vicinity and along the export route. The risks identified in this chapter apply to the conditions that could be expected not only at the mine but along the entire export corridor.

### **9.1 POTHOLES**

Potholes may lead to vehicle damage. Potholes may contribute to poor road conditions and road rideability. This may reduce the capacity of the road.

### **9.2 VEHICLE FAILURE**

Vehicle failure may lead to delays in the movement of heavy vehicles along the route. This may also lead to congestion caused by stationary heavy vehicles along the road.

### **9.3 DRIVER FATIGUE**

Driver fatigue may lead to drowsiness. This poses the risk of drivers falling asleep while driving. This may lead to crash incidents, which may lead to injury, damage to the vehicle, and/or loss of goods.

### **9.4 CATTLE/STRAY ANIMALS**

The route passes through predominantly agricultural areas. Therefore, drivers need to take caution as they travel through communities. It is also important that they are aware of stray animals from the populated areas. Wild animals are common sightings in such areas, especially at night.

### **9.5 PEDESTRIAN AND/OR SCHOOL CROSSINGS**

Since the route passes through communities, it is important to ensure there are adequate safe pedestrian crossings within populated areas. This helps drivers to be aware of pedestrian movements along the roads.

Drivers must be aware of the school crossings along the route, especially during the morning and afternoon peak periods. It is common for children to run across the road, which poses a hazard as heavy vehicles pass through communities.

### **9.6 POOR ROAD CONDITIONS**

Poor road conditions may reduce the capacity of the road. This may lead to increased journey times and delays in the delivery of transported goods. Poor road conditions may also lead to vehicular wear and tear and vehicle failure.



## **9.7 ROAD GEOMETRY AND TERRAIN**

The stretch of road between the proposed mine location is characterised by flat terrain and gentle curves.

## **9.8 DUST**

The export route is paved. However, the dust generated along the route can create dangerous conditions, including low visibility and loss of traction. Dust also has a significant impact on the environment adjacent to the access road and can cause damage to farming activities, animal health, and plants.

## 10 RISK ASSESSMENT

All the risks and hazards along the route mentioned in the previous chapter are assessed and classified based on the matrix in Table 10-1 below. The matrix focuses on the severity of the consequence along with the level of certainty of occurrence. As such, an incident with an almost certain probability of occurring and catastrophic consequences will be rated as very high on the matrix. Likewise, an incident with a rare likelihood of occurring and an insignificant consequence will be rated as low on the matrix.

**Table 10-1: Risk Likelihood and Consequence Matrix**

| Likelihood         | CONSEQUENCE       |           |              |              |                  |
|--------------------|-------------------|-----------|--------------|--------------|------------------|
|                    | Insignificant (1) | Minor (2) | Moderate (3) | Major (4)    | Catastrophic (5) |
| Almost certain (A) | Low 5             | High 10   | High 15      | Very High 20 | Very High 25     |
| Likely (B)         | Low 4             | Medium 8  | High 12      | Very High 16 | Very High 20     |
| Possible (C)       | Low 3             | Low 6     | Medium 9     | High 12      | High 15          |
| Unlikely (D)       | Low 2             | Low 4     | Low 6        | Medium 8     | High 10          |
| Rare (E)           | Low 1             | Low 2     | Low 3        | Low 4        | Medium 7         |

The Operational Safety and Health qualitative measures of consequence or impact are outlined in Table 10-2. They are classified in ascending order of severity, with Level 1 being insignificant and Level 5 being catastrophic. It is important to avoid major or catastrophic consequences during the duration of this project.

**Table 10-2: OHS Qualitative Measures of Consequence or Impact**

| LEVEL | CONSEQUENCE   | DESCRIPTION                                                       |
|-------|---------------|-------------------------------------------------------------------|
| 1     | Insignificant | No treatment required                                             |
| 2     | Minor         | First aid treatment required                                      |
| 3     | Moderate      | Medical treatment required or Lost Time Injury                    |
| 4     | Major         | Single fatality or major injuries or severe permanent disablement |
| 5     | Catastrophic  | Multiple fatalities.                                              |

The qualitative measures of likelihood are outlined in Table 10-3 below. They are classified in descending order of occurrence, with Level A being the most likely to occur and Level E being the least likely to occur (rare).

**Table 10-3: Qualitative Measures of Likelihood**

| LEVEL    | LIKELIHOOD     | DESCRIPTION                                                                                                                                                                      |
|----------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A</b> | Almost certain | The event or hazard:<br>is expected to occur in most circumstances, will probably occur with a frequency in excess of 10 times per year.                                         |
| <b>B</b> | Likely         | The event or hazard:<br>Will probably occur in most circumstances, will probably occur with a frequency of between 1 and 10 times per year.                                      |
| <b>C</b> | Possible       | The event or hazard:<br>might occur at some time, will probably occur with a frequency of 0.1 to 1 times per year (i.e. once in 1 to 10 years).                                  |
| <b>D</b> | Unlikely       | The event or hazard:<br>could occur at some time, will probably occur with a frequency of 0.02 to 0.1 times per year (i.e. once in 10 to 50 years).                              |
| <b>E</b> | Rare           | The event or hazard:<br>may occur only in exceptional circumstances and will probably occur with a frequency of less than 0.02 times per year (i.e. less than once in 50 years). |

**IMPORTANT NOTE:** The likelihood of an event or hazard occurring shall first be assessed over the duration of the activity (i.e. “period of exposure”). For risk assessment purposes, the assessed likelihood shall then be proportioned for a “period of exposure” of one year.

Example: An activity has a duration of 6 weeks (i.e. “period of exposure” = 6 weeks). The event or hazard being considered is assessed as likely to occur once every 20 times the activity occurs (i.e. likelihood or frequency = 1 event/20 times activity occurs = 0.05 times per activity). Assessed annual likelihood or frequency = 0.05 times per activity x 52 weeks/6 weeks = 0.4 times per year. Assessed likelihood = Possible.

**Table 10-4: Residual Risk and Required Treatment**

| RESIDUAL RISK RATING | REQUIRED TREATMENT                                                                                                                         |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Very High</b>     | Unacceptable risk. <b>HOLD POINT.</b> Work cannot proceed until risk has been reduced.                                                     |
| <b>High</b>          | High priority, Bundu Mine Manager must review the risk assessment, approve the treatment and endorse the TGS prior to its implementation.  |
| <b>Medium</b>        | Medium Risk, standard traffic control and work practices are subject to review by accredited Bundu mine personnel prior to implementation. |
| <b>Low</b>           | Managed in accordance with the approved management procedures and traffic control practices.                                               |

The likelihood and consequence of each of the identified potential hazards mentioned in Section 9 are shown in Table 10-5 below. The corresponding risk level per risk was also identified based on the risk likelihood and consequence matrix.

**Table 10-5: Risks in Mine Vicinity and Along Export Route**

| RISK                                 | DESCRIPTION                                                                              | LIKELIHOOD | CONSEQUENCE   | RISK LEVEL |
|--------------------------------------|------------------------------------------------------------------------------------------|------------|---------------|------------|
| <b>Potholes</b>                      | Pavement deformation along the road                                                      | Rare       | Insignificant | Low 1      |
| <b>Vehicle Failure</b>               | Mechanical failure of the vehicle leading to a breakdown                                 | Rare       | Minor         | Low 2      |
| <b>Driver Fatigue</b>                | Driver tiredness due to lack of rest                                                     | Rare       | Moderate      | Low 3      |
| <b>Cattle/Stray Animals</b>          | The presence of unmonitored animals along the road                                       | Possible   | Moderate      | Medium 9   |
| <b>Pedestrian / School Crossings</b> | The presence of scholar crossings in sections where the route passes through communities | Rare       | Minor         | Low 2      |
| <b>Poor Road Conditions</b>          | Road deformation and disintegration along the routes.                                    | Rare       | Minor         | Low 2      |
| <b>Road Geometry and Terrain</b>     | The presence of steep terrain and sharp curves along the route                           | Possible   | Insignificant | Low 3      |
| <b>Dust</b>                          | Dust in the air along the route                                                          | Possible   | Minor         | Low 6      |

Based on Table 10-5, most of the risks along the route have a low-risk level. Strategies were developed to mitigate the risks. The developed strategies are described in detail in the following section.

## 11 STRATEGIES TO IMPROVE SAFETY

The table below highlights the mitigatory strategies proposed in the Traffic Impact Assessment (TIA) to address the risks identified within the proposed mine vicinity and along the export route.

**Table 11-1: Strategies to Mitigate Risk**

| RISK IDENTIFIED                    | RISK RATING (LOW/ MED OR HIGH) | MITIGATION                                                                                                                                                                                                                                                                                                                   |
|------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Potholes</b>                    | Low                            | <ul style="list-style-type: none"> <li>• Reduce speed.</li> <li>• Avoid driving over potholes.</li> </ul>                                                                                                                                                                                                                    |
| <b>Vehicle Failure</b>             | Low                            | <ul style="list-style-type: none"> <li>• Ensure regular inspections and maintenance of vehicles.</li> <li>• Drivers should call the operator for assistance as soon as they experience vehicle failure.</li> <li>• Have emergency response vehicles on hand to respond to vehicle breakdowns as soon as possible.</li> </ul> |
| <b>Driver Fatigue</b>              | Low                            | <ul style="list-style-type: none"> <li>• Drivers should avoid driving for long periods of time without rest.</li> <li>• Drivers should find a safe parking area along the route to rest when tired.</li> </ul>                                                                                                               |
| <b>Cattle/Stray Animals</b>        | Medium                         | <ul style="list-style-type: none"> <li>• Drivers to avoid travelling at night.</li> <li>• Drivers to lower speed in stray animal hotspot areas and areas around livestock farms.</li> </ul>                                                                                                                                  |
| <b>School and pedestrian zones</b> | Low                            | <ul style="list-style-type: none"> <li>• Drivers to reduce speed and be aware of pedestrian crossings.</li> </ul>                                                                                                                                                                                                            |
| <b>Poor Road Conditions</b>        | Low                            | <ul style="list-style-type: none"> <li>• Where road conditions are poor, drivers should reduce speed.</li> </ul>                                                                                                                                                                                                             |
| <b>Road Geometry and Terrain</b>   | Low                            | <ul style="list-style-type: none"> <li>• Drivers to reduce speed and exercise caution in sections where the terrain is gentle, and the road geometry is flat.</li> </ul>                                                                                                                                                     |
| <b>Dust</b>                        | Low                            | <ul style="list-style-type: none"> <li>• Drivers should reduce speed along gravel roads.</li> <li>• Dust suppressant methods to be implemented along gravel roads within the mine vicinity.</li> <li>• If visibility is very low, drivers should stop the vehicle in a safe area and report to the operator.</li> </ul>      |



## 12 CONCLUSION

The report discusses the approach used for the traffic impact assessment and the outcomes of the site investigations and traffic operations. The following conclusions were made during the study:

- The findings were reported in relation to the level of service (LOS), which represents metrics of roadway performance determined by intersection delay. All four intersections showed satisfactory LOS across all scenarios and did not require any mitigation measures.
- No significant non-motorised transport (NMT) activity was observed within 800 m of the proposed access point, suggesting limited current demand. The mine will not bring in additional foot traffic to the local area. Therefore, the NMT facilities upgrade are not required for this development.
- During the traffic impact assessment, a thorough investigation was conducted to identify typical hazards and assess potential environmental impacts. Additionally, risk assessments were carried out, and targeted safety improvement strategies were proposed based on the findings.

In conclusion, Delta BEC thus recommends that the proposed development situated under the City of Tshwane Metropolitan Municipality be approved.

## 13 REFERENCES

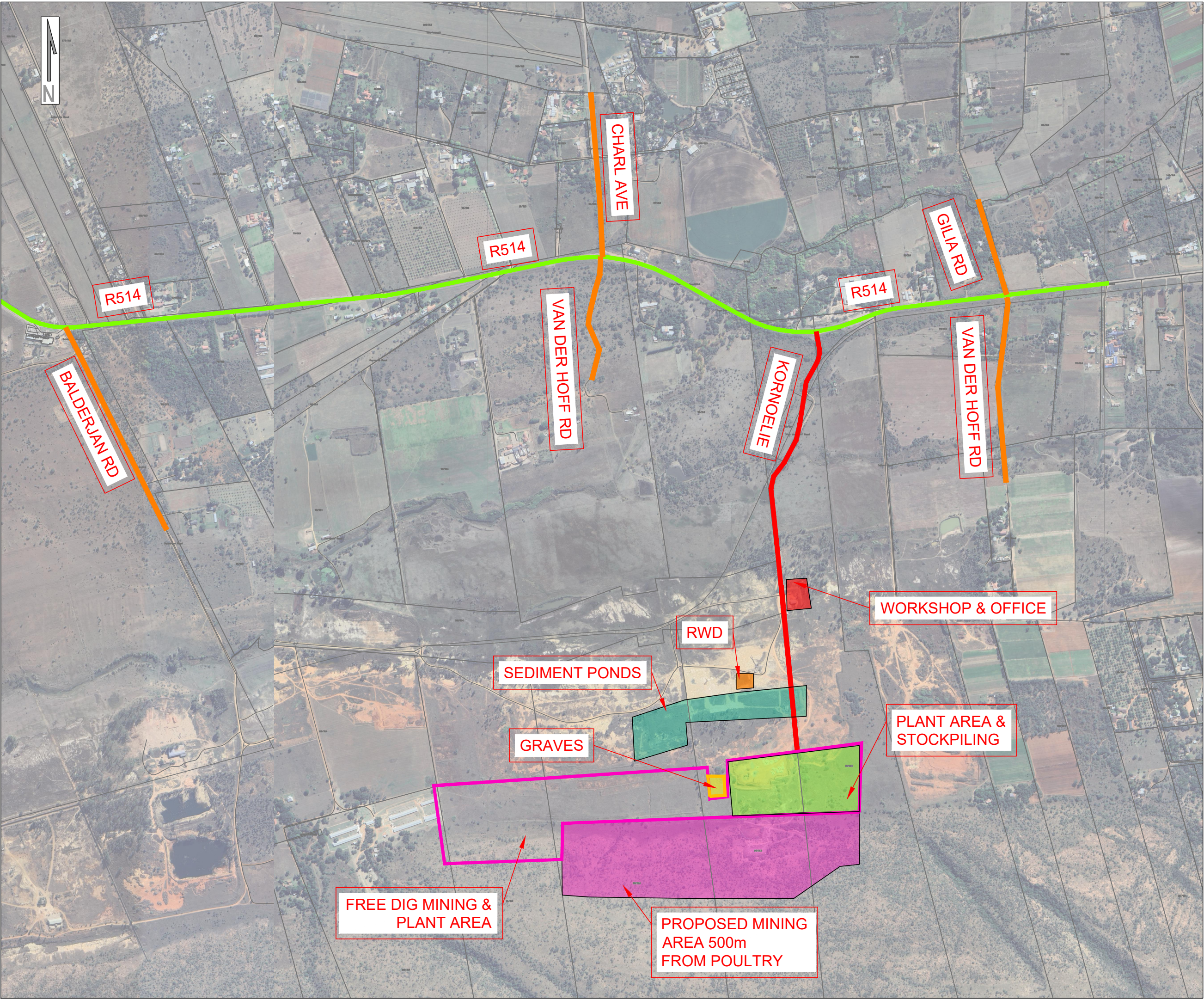
COTO, *TMH 16 Volume 1, South African Traffic Impact and Site Traffic Assessment Manual*, Version 1.0, August 2012.

COTO, *TMH 17, South African Trip Data Manual*, Version 1.01, September 2013.

COTO, *TRH 26, South African Road Classification and Access Management Manual*, Version 1.0, August 2012.

## **APPENDIX A: SITE DEVELOPMENT PLAN**





LEGEND:

- R514
- SIDE ROADS
- SITE ACCESS ROAD
- WORKSHOP & OFFICE
- GRAVES
- PLANT AREA & STOCKPILING
- PROPOSED MINING AREA 500m FROM POULTRY
- SEDIMENT PONDS
- RWD
- FREE DIG MINING & PLANT AREA

LOCALITY PLAN

| Rev | Date       | Description of changes | By  |
|-----|------------|------------------------|-----|
| 1   | 2024-09-12 | ISSUED FOR INFORMATION | EDP |
|     |            |                        |     |
|     |            |                        |     |
|     |            |                        |     |
|     |            |                        |     |
|     |            |                        |     |
|     |            |                        |     |

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SIGNATURE: E DU PREEZ DATE: 2024-09-12

Project

GOMES-BUNDU TIA

Project Description

GOMES-BUNDU TIA

Drawing Title

LOCALITY PLAN

Drawing Units METRES Drawing Size A1

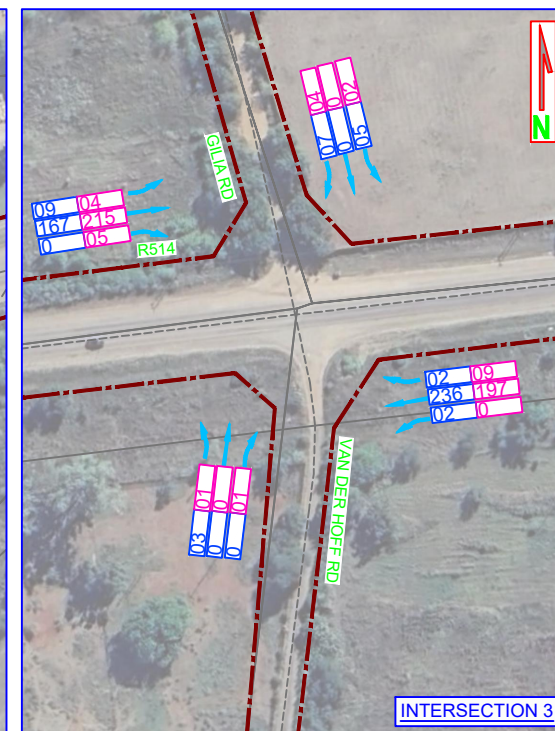
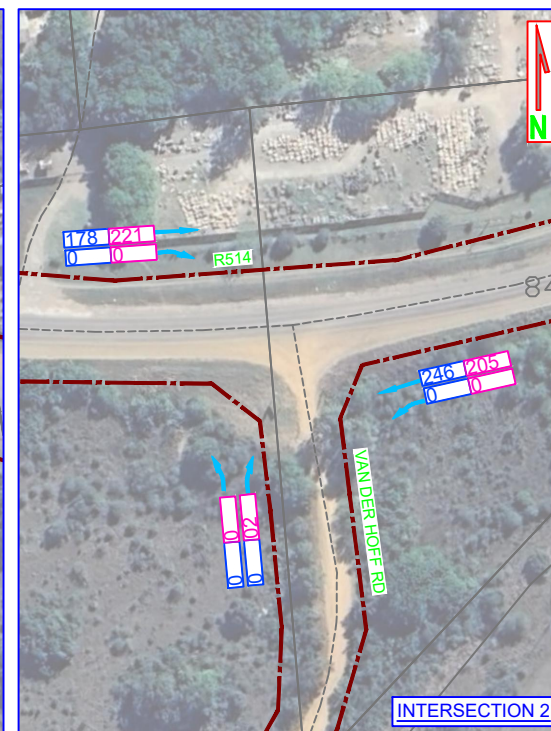
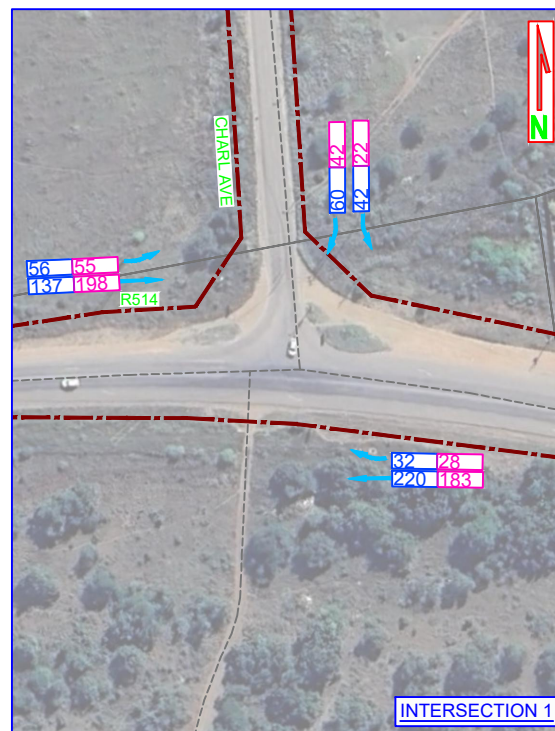
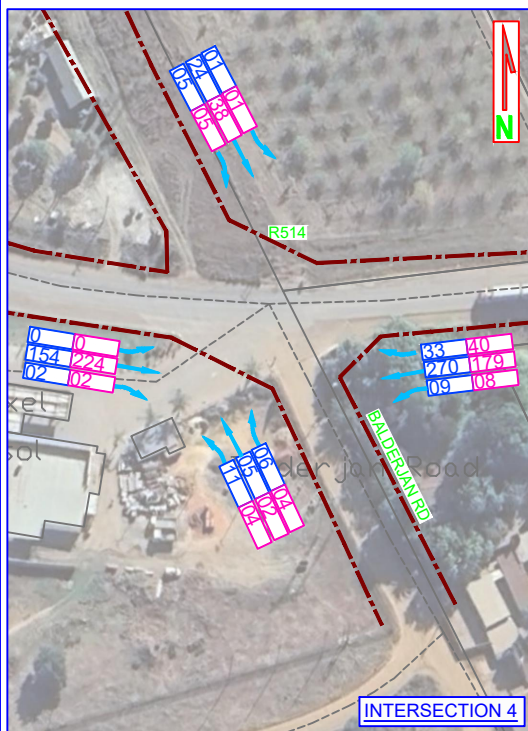
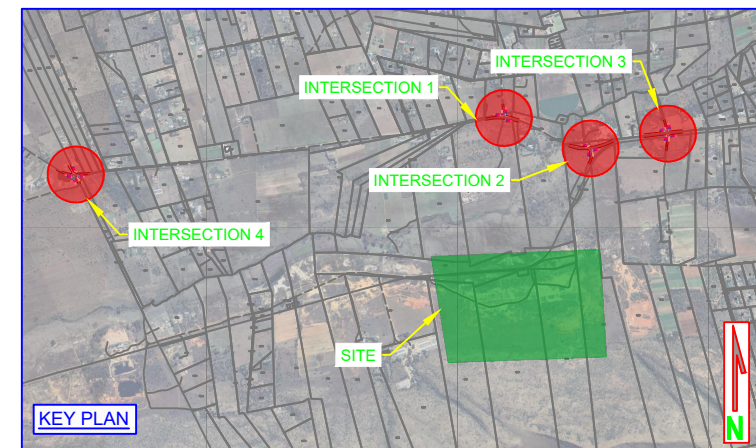
Date SEPTEMBER 2024 Scale 1:300 Designed By N CHULE

Checked By L VUMBUNU Drawn By M ALLI Approved By E DU PREEZ

Drawing No. LP-02-TF-001 Rev 1



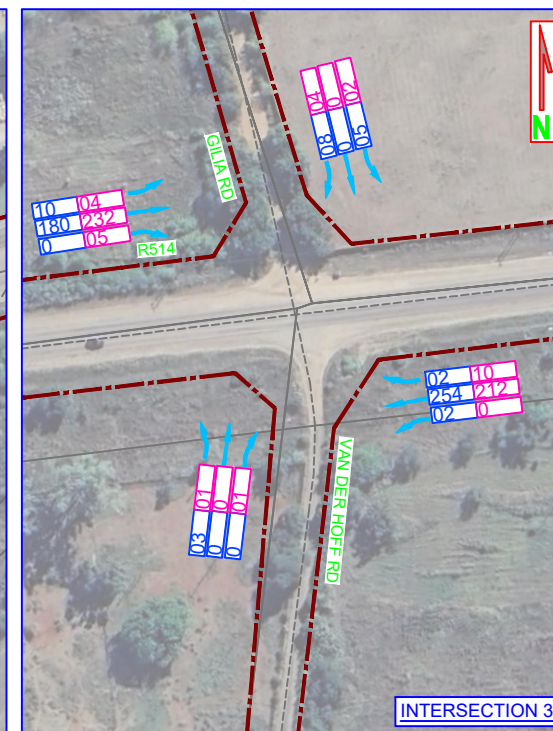
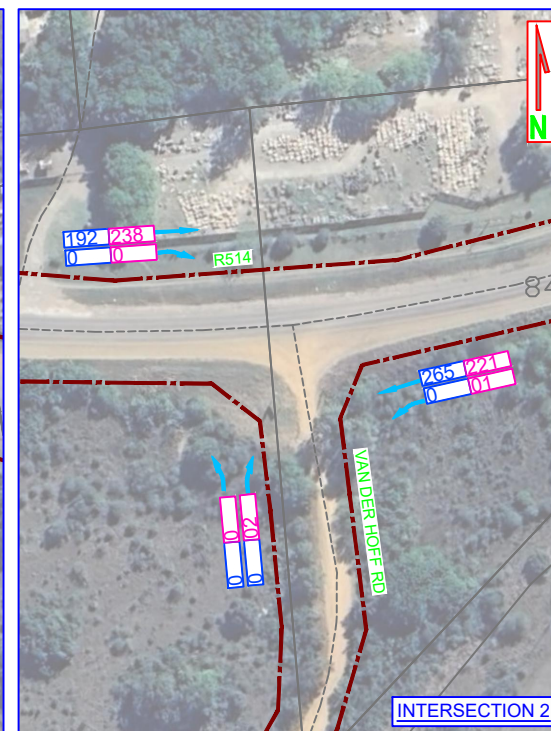
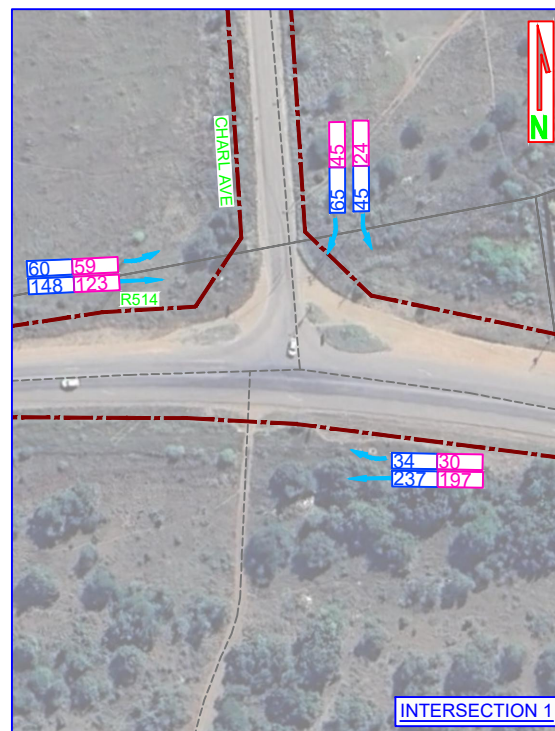
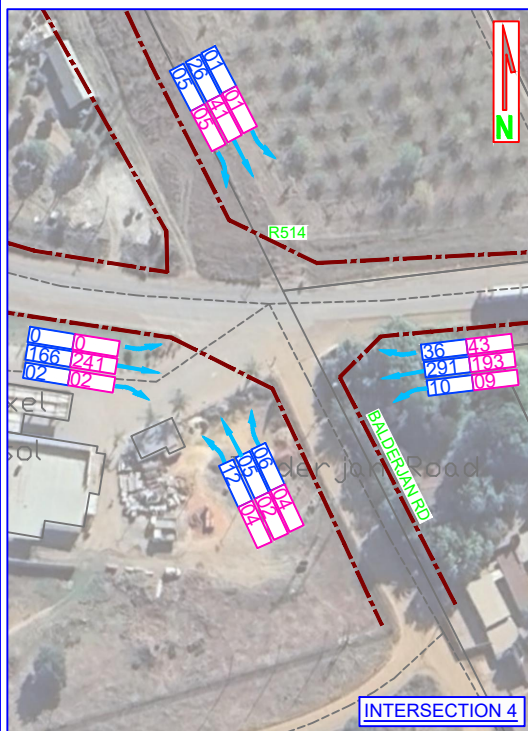
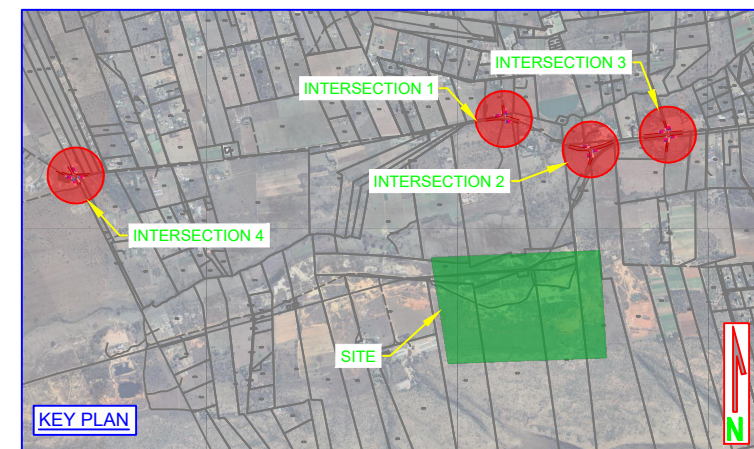
## APPENDIX B: TRAFFIC FLOWS



**LEGEND:**

|          |  |
|----------|--|
| ROAD     |  |
| SITES    |  |
| LEFT     |  |
| STRAIGHT |  |
| RIGHT    |  |
| AM       |  |
| PM       |  |

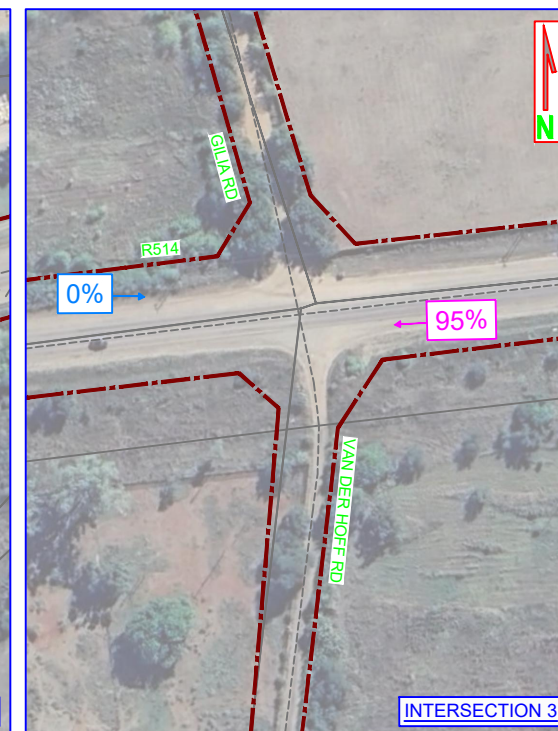
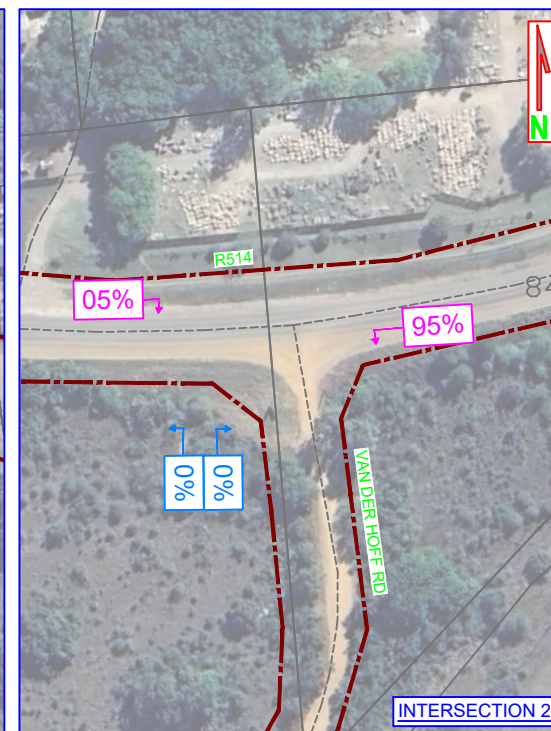
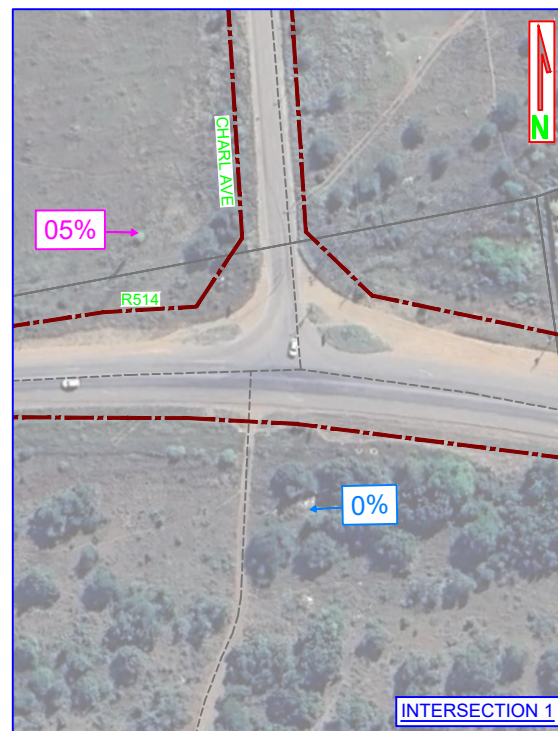
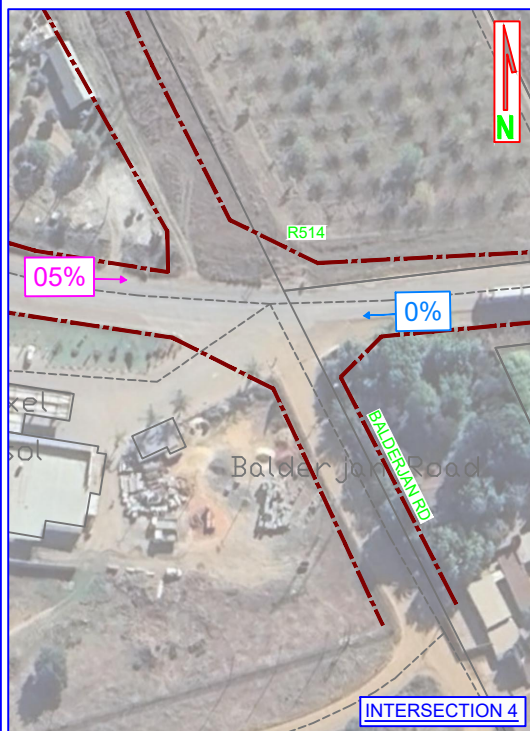
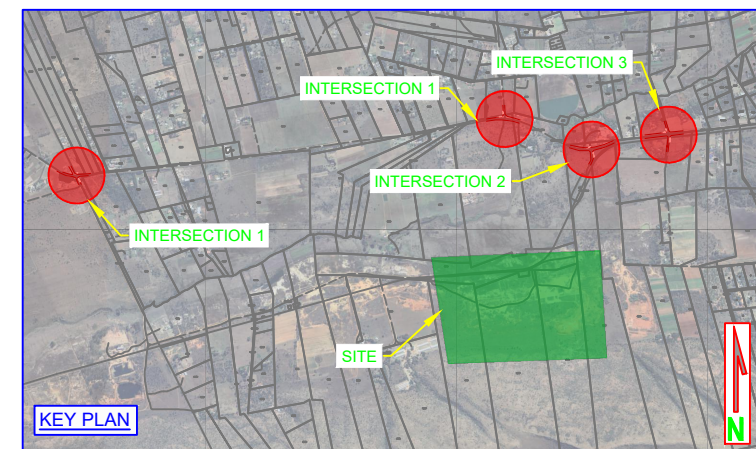




**LEGEND:**

|          |  |
|----------|--|
| ROAD     |  |
| SITES    |  |
| LEFT     |  |
| STRAIGHT |  |
| RIGHT    |  |
| AM       |  |
| PM       |  |

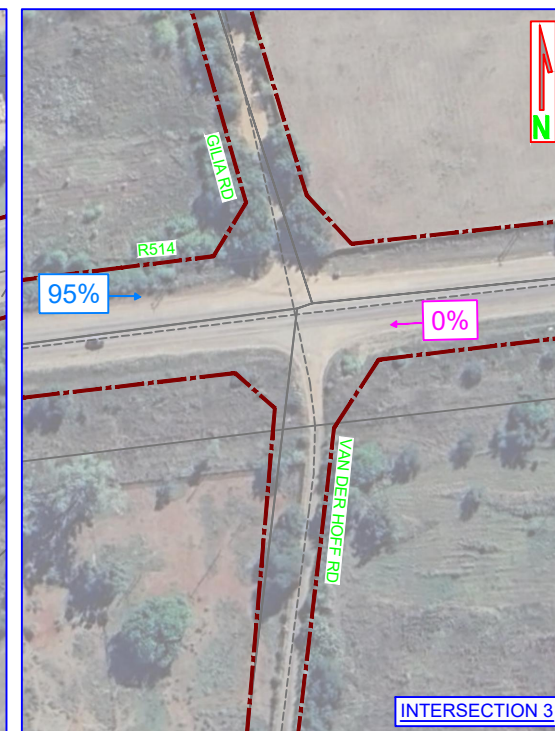
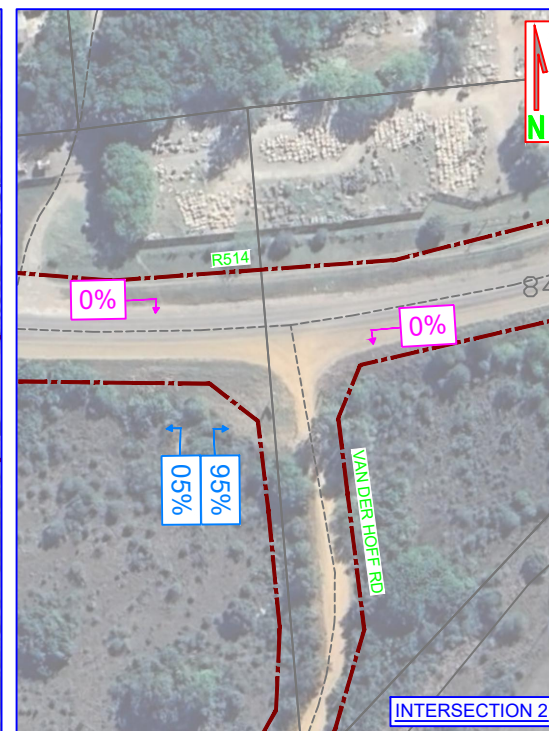
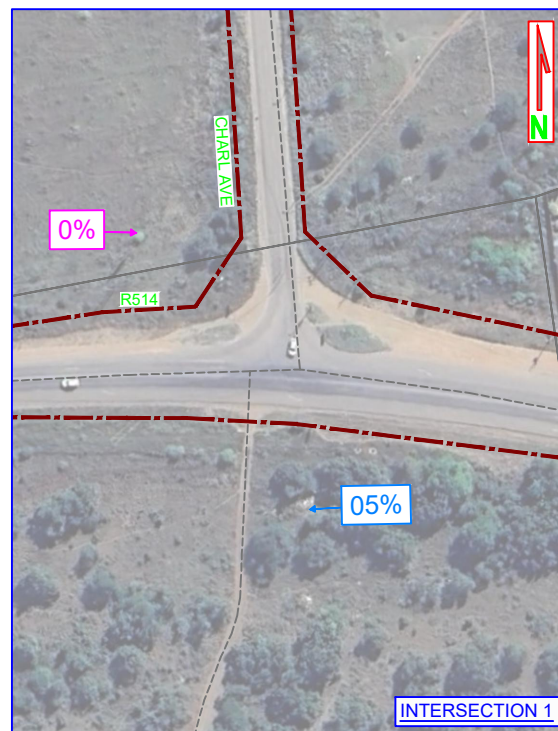
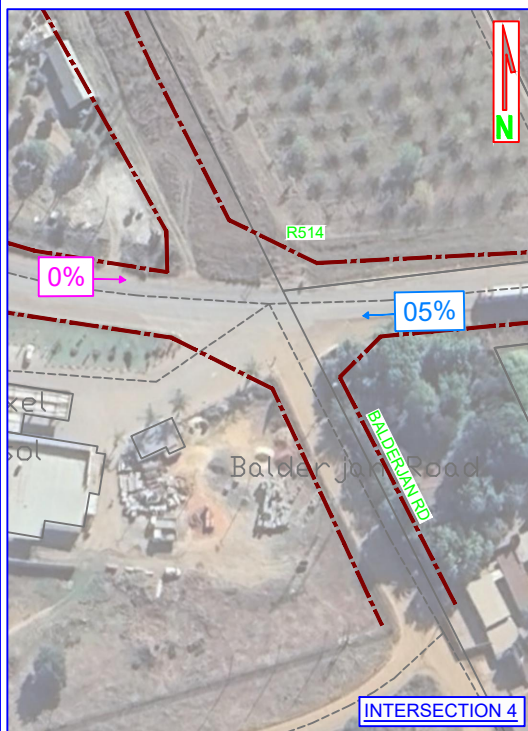
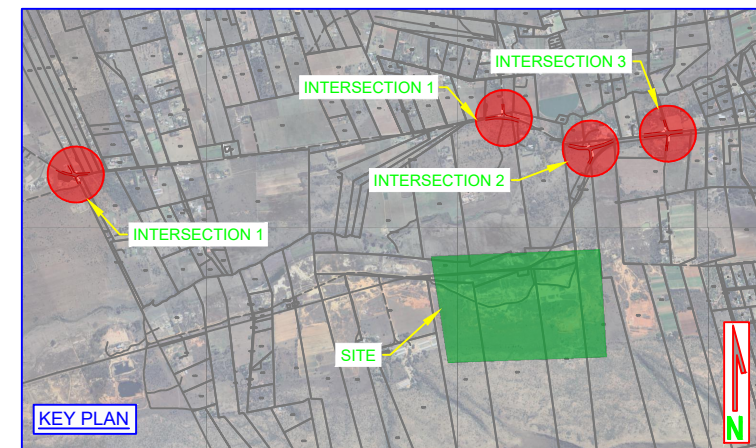




**LEGEND:**

|                |  |
|----------------|--|
| ROAD           |  |
| SITES          |  |
| LEFT           |  |
| STRAIGHT       |  |
| RIGHT          |  |
| INBOUND TRIPS  |  |
| OUTBOUND TRIPS |  |

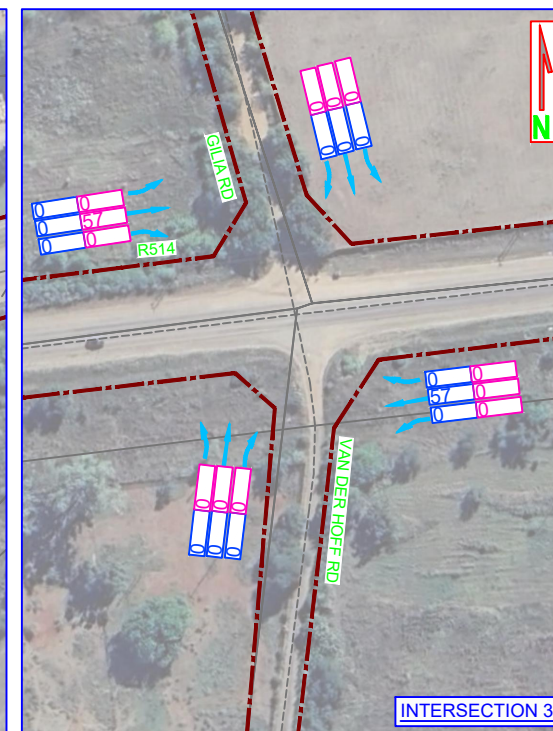
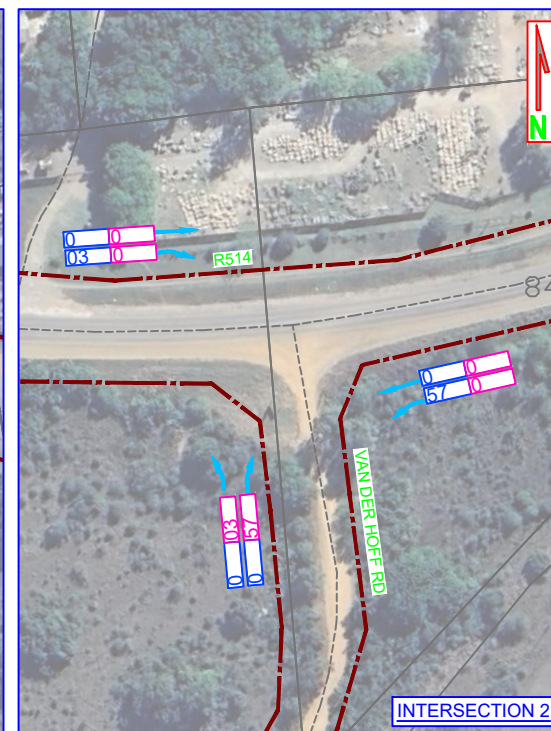
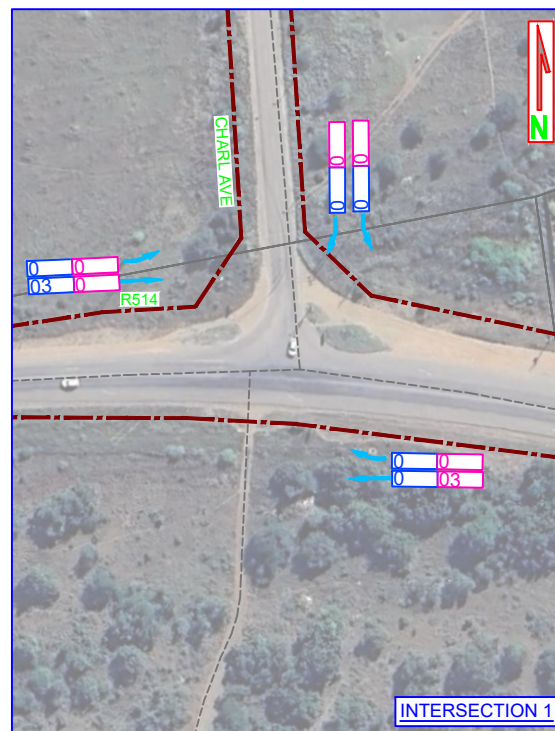
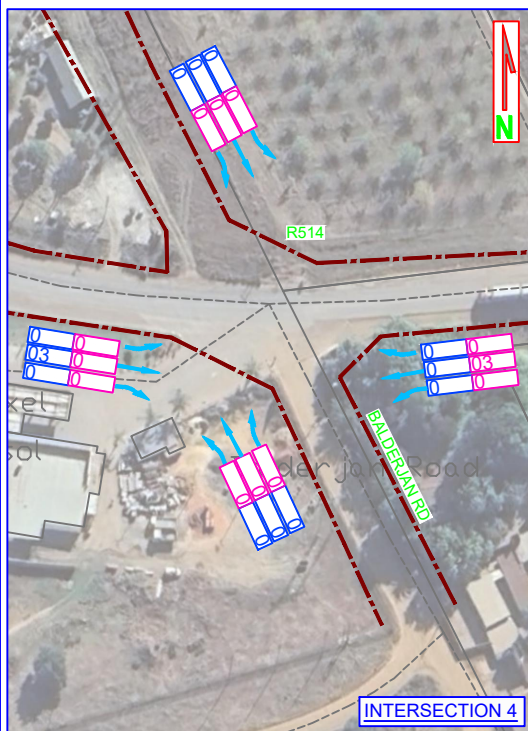
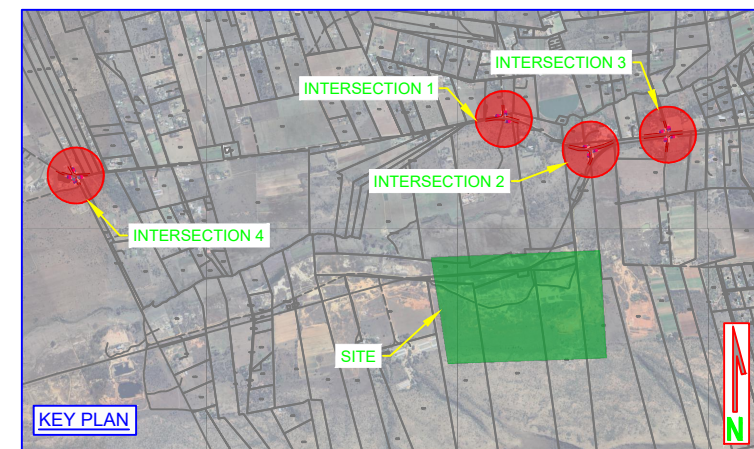




**LEGEND:**

|                |  |
|----------------|--|
| ROAD           |  |
| SITES          |  |
| LEFT           |  |
| STRAIGHT       |  |
| RIGHT          |  |
| INBOUND TRIPS  |  |
| OUTBOUND TRIPS |  |

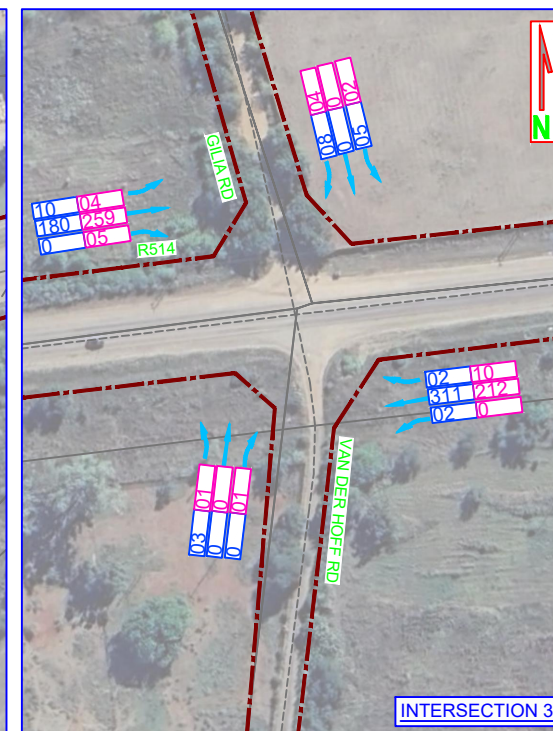
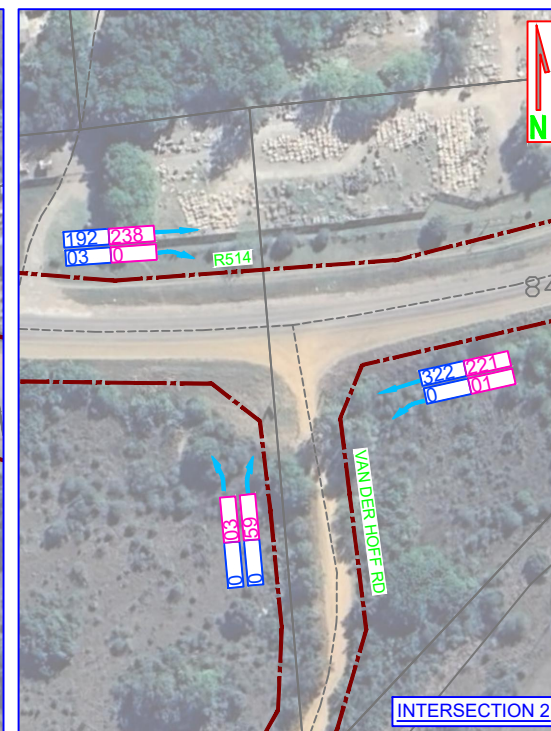
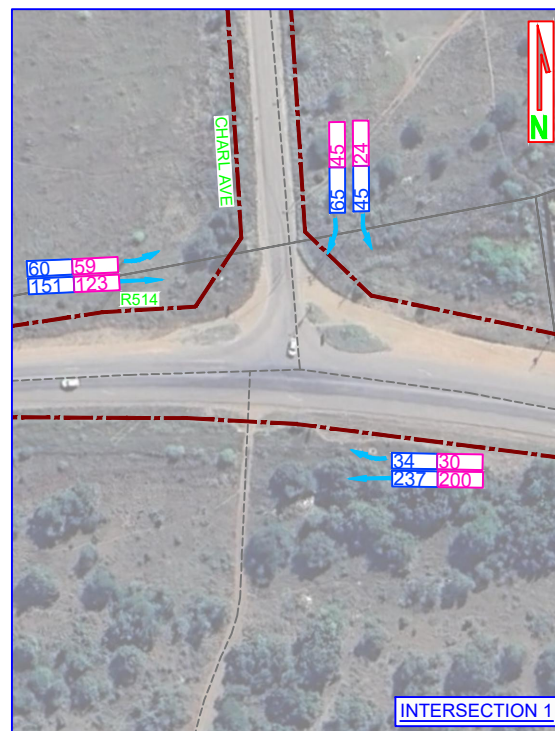
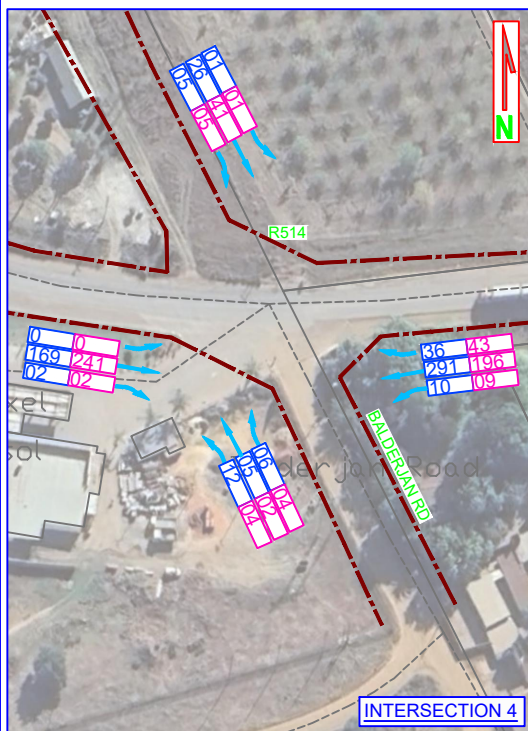
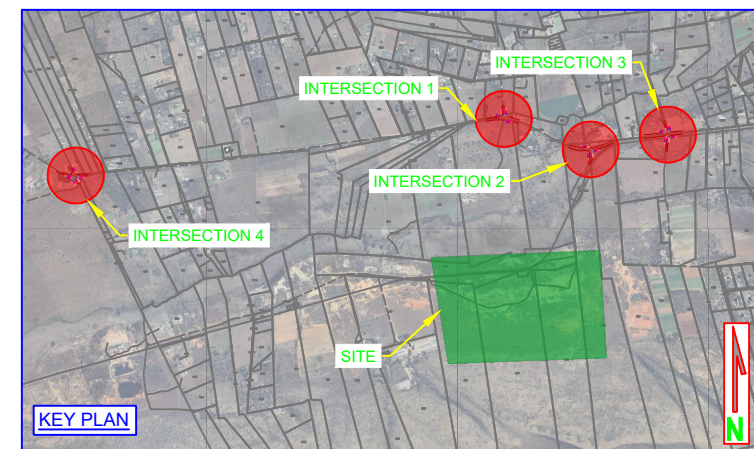




**LEGEND:**

|          |  |
|----------|--|
| ROAD     |  |
| SITES    |  |
| LEFT     |  |
| STRAIGHT |  |
| RIGHT    |  |
| AM       |  |
| PM       |  |





**LEGEND:**

|          |  |
|----------|--|
| ROAD     |  |
| SITES    |  |
| LEFT     |  |
| STRAIGHT |  |
| RIGHT    |  |
| AM       |  |
| PM       |  |

## **APPENDIX C: DETAILED LANE SUMMARY FOR THE 2024 BASE YEAR PEAK HOUR TRAFFIC ON THE EXISTING 2024 ROAD NETWORK**

| Approach Lane Flows (veh/h) |             |             |       |     |               |                     |                    |                      |                    |
|-----------------------------|-------------|-------------|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| East: R514                  |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From E<br>To Exit:  | T1<br><br>W | R2<br><br>N | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 88          | -           | 88    | 8.0 | 1854          | 0.048               | 48 <sup>6</sup>    | 0.0                  | 2                  |
| Lane 2                      | 132         | 32          | 164   | 8.2 | 1635          | 0.100               | 100                | NA                   | NA                 |
| Approach                    | 220         | 32          | 252   | 8.1 |               | 0.100               |                    |                      |                    |
| North: Charl Avenue         |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From N<br>To Exit:  | L2<br><br>E | R2<br><br>W | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 42          | 60          | 102   | 3.2 | 668           | 0.153               | 100                | NA                   | NA                 |
| Approach                    | 42          | 60          | 102   | 3.2 |               | 0.153               |                    |                      |                    |
| West: R514                  |             |             |       |     |               |                     |                    |                      |                    |

| Mov.<br>From W<br>To Exit: | L2<br>N | T1<br>E | Total | %HV   | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|----------------------------|---------|---------|-------|-------|---------------|---------------------|--------------------|----------------------|--------------------|
| Lane 1                     | 56      | -       | 56    | 9.0   | 1745          | 0.032               | 100                | 0.0                  | 2                  |
| Lane 2                     | -       | 137     | 137   | 3.0   | 1913          | 0.072               | 100                | NA                   | NA                 |
| Approach                   | 56      | 137     | 193   | 4.7   |               | 0.072               |                    |                      |                    |
| Total %HV Deg.Satn (v/c)   |         |         |       |       |               |                     |                    |                      |                    |
| All Vehicles               | 547     | 6.0     |       | 0.153 |               |                     |                    |                      |                    |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

6 Lane under-utilisation due to downstream effects

| Merge Analysis                                 |                  |                     |                              |                           |     |                  |                       |                      |                     |               |                |                 |
|------------------------------------------------|------------------|---------------------|------------------------------|---------------------------|-----|------------------|-----------------------|----------------------|---------------------|---------------|----------------|-----------------|
|                                                | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % veh/h | Opposing Flow Rate pcu/h  |     | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Lane Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
| East Exit: R514<br>Merge Type: <b>Priority</b> |                  |                     |                              |                           |     |                  |                       |                      |                     |               |                |                 |
| Exit Short Lane                                | 1                | 90                  | 0.0                          | 0                         | 0   | 3.05             | 2.03                  | 179                  | 1769                | 0.101         | 0.0            | 0.0             |
| Merge Lane                                     | 2                | -                   | 100.0                        | Merge Lane is not Opposed |     |                  |                       | 0                    | 1800                | 0.000         | 0.0            | 0.0             |
| West Exit: R514<br>Merge Type: <b>Priority</b> |                  |                     |                              |                           |     |                  |                       |                      |                     |               |                |                 |
| Exit Short Lane                                | 1                | 90                  | 0.0                          | 192                       | 198 | 3.12             | 2.08                  | 88                   | 1527                | 0.058         | 0.3            | 0.4             |
| Merge Lane                                     | 2                | -                   | 100.0                        | Merge Lane is not Opposed |     |                  |                       | 192                  | 1800                | 0.106         | 0.0            | 0.0             |

| Variable Demand Analysis |                                    |                                     |                                                   |                                   |
|--------------------------|------------------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------|
|                          | Initial<br>Queued<br>Demand<br>veh | Residual<br>Queued<br>Demand<br>veh | Time for<br>Residual<br>Demand<br>to Clear<br>sec | Duration<br>of<br>Oversatn<br>sec |
| East: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| Lane 2                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| North: Charl Avenue      |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| West: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| Lane 2                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |



## LANE SUMMARY

**Site: 4 [Intersection 1\_2024 Existing PM (Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Charl Avenue

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance |               |      |               |      |       |           |                 |             |                  |                   |          |             |             |             |     |
|--------------------------|---------------|------|---------------|------|-------|-----------|-----------------|-------------|------------------|-------------------|----------|-------------|-------------|-------------|-----|
|                          | Demand Flows  |      | Arrival Flows |      | Cap.  | Deg. Satn | Lane Util.      | Aver. Delay | Level of Service | 95% Back Of Queue |          | Lane Config | Lane Length | Cap. Prob.  |     |
|                          | [ Total veh/h | HV % | [ Total veh/h | HV % |       |           |                 |             |                  | [ Veh             | Dist ] m |             |             | Adj. Block. |     |
|                          |               |      |               |      | veh/h | v/c       | %               | sec         |                  |                   |          |             | m           | %           | %   |
| East: R514               |               |      |               |      |       |           |                 |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 74            | 4.0  | 74            | 4.0  | 1901  | 0.039     | 48 <sup>6</sup> | 0.3         | LOS A            | 0.0               | 0.0      | Short       | 90          | 0.0         | NA  |
| Lane 2                   | 137           | 3.2  | 137           | 3.2  | 1659  | 0.082     | 100             | 1.7         | LOS A            | 0.2               | 1.7      | Full        | 122         | 0.0         | 0.0 |
| Approach                 | 211           | 3.5  | 211           | 3.5  |       | 0.082     |                 | 1.2         | NA               | 0.2               | 1.7      |             |             |             |     |
| North: Charl Avenue      |               |      |               |      |       |           |                 |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 64            | 3.3  | 64            | 3.3  | 605   | 0.106     | 100             | 10.3        | LOS B            | 0.4               | 2.8      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 64            | 3.3  | 64            | 3.3  |       | 0.106     |                 | 10.3        | LOS B            | 0.4               | 2.8      |             |             |             |     |
| West: R514               |               |      |               |      |       |           |                 |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 55            | 2.0  | 55            | 2.0  | 1831  | 0.030     | 100             | 5.5         | LOS A            | 0.0               | 0.0      | Short       | 60          | 0.0         | NA  |
| Lane 2                   | 198           | 9.0  | 198           | 9.0  | 1842  | 0.107     | 100             | 0.0         | LOS A            | 0.0               | 0.0      | Full        | 100         | 0.0         | 0.0 |
| Approach                 | 253           | 7.5  | 253           | 7.5  |       | 0.107     |                 | 1.2         | NA               | 0.0               | 0.0      |             |             |             |     |
| All Vehicles             | 528           | 5.4  | 528           | 5.4  |       | 0.107     |                 | 2.3         | NA               | 0.4               | 2.8      |             |             |             |     |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

## 6 Lane under-utilisation due to downstream effects

| Approach Lane Flows (veh/h) |             |             |       |     |               |                     |                    |                      |                    |
|-----------------------------|-------------|-------------|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| East: R514                  |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From E<br>To Exit:  | T1<br><br>W | R2<br><br>N | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 74          | -           | 74    | 4.0 | 1901          | 0.039               | 48 <sup>6</sup>    | 0.0                  | 2                  |
| Lane 2                      | 109         | 28          | 137   | 3.2 | 1659          | 0.082               | 100                | NA                   | NA                 |
| Approach                    | 183         | 28          | 211   | 3.5 |               | 0.082               |                    |                      |                    |
| North: Charl Avenue         |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From N<br>To Exit:  | L2<br><br>E | R2<br><br>W | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 22          | 42          | 64    | 3.3 | 605           | 0.106               | 100                | NA                   | NA                 |
| Approach                    | 22          | 42          | 64    | 3.3 |               | 0.106               |                    |                      |                    |
| West: R514                  |             |             |       |     |               |                     |                    |                      |                    |

| Mov.<br>From W<br>To Exit: | L2<br>N | T1<br>E | Total | %HV   | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|----------------------------|---------|---------|-------|-------|---------------|---------------------|--------------------|----------------------|--------------------|
| Lane 1                     | 55      | -       | 55    | 2.0   | 1831          | 0.030               | 100                | 0.0                  | 2                  |
| Lane 2                     | -       | 198     | 198   | 9.0   | 1842          | 0.107               | 100                | NA                   | NA                 |
| Approach                   | 55      | 198     | 253   | 7.5   |               | 0.107               |                    |                      |                    |
| Total %HV Deg.Satn (v/c)   |         |         |       |       |               |                     |                    |                      |                    |
| All Vehicles               | 528     | 5.4     |       | 0.107 |               |                     |                    |                      |                    |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

6 Lane under-utilisation due to downstream effects

| Merge Analysis                                 |                  |                     |                              |                           |     |                  |                       |                      |                     |               |                |                 |
|------------------------------------------------|------------------|---------------------|------------------------------|---------------------------|-----|------------------|-----------------------|----------------------|---------------------|---------------|----------------|-----------------|
|                                                | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % veh/h | Opposing Flow Rate pcu/h  |     | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Lane Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
| East Exit: R514<br>Merge Type: <b>Priority</b> |                  |                     |                              |                           |     |                  |                       |                      |                     |               |                |                 |
| Exit Short Lane                                | 1                | 90                  | 0.0                          | 0                         | 0   | 3.12             | 2.08                  | 220                  | 1730                | 0.127         | 0.0            | 0.0             |
| Merge Lane                                     | 2                | -                   | 100.0                        | Merge Lane is not Opposed |     |                  |                       | 0                    | 1800                | 0.000         | 0.0            | 0.0             |
| West Exit: R514<br>Merge Type: <b>Priority</b> |                  |                     |                              |                           |     |                  |                       |                      |                     |               |                |                 |
| Exit Short Lane                                | 1                | 90                  | 0.0                          | 151                       | 154 | 3.06             | 2.04                  | 74                   | 1608                | 0.046         | 0.2            | 0.3             |
| Merge Lane                                     | 2                | -                   | 100.0                        | Merge Lane is not Opposed |     |                  |                       | 151                  | 1800                | 0.084         | 0.0            | 0.0             |

| Variable Demand Analysis |                                    |                                     |                                                   |                                   |
|--------------------------|------------------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------|
|                          | Initial<br>Queued<br>Demand<br>veh | Residual<br>Queued<br>Demand<br>veh | Time for<br>Residual<br>Demand<br>to Clear<br>sec | Duration<br>of<br>Oversatn<br>sec |
| East: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| Lane 2                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| North: Charl Avenue      |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| West: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| Lane 2                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |

# LANE SUMMARY

 **Site: 2 [Intersection 2\_2024 Existing AM (Site Folder: General)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.2.202**

Intersection of R514 and Unnamed Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance |              |      |               |      |      |           |            |             |                  |                   |        |             |             |             |       |
|--------------------------|--------------|------|---------------|------|------|-----------|------------|-------------|------------------|-------------------|--------|-------------|-------------|-------------|-------|
|                          | Demand Flows |      | Arrival Flows |      | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |        | Lane Config | Lane Length | Cap. Prob.  |       |
|                          | [ Total      | HV ] | [ Total       | HV ] |      |           |            |             |                  | [ Veh             | Dist ] |             |             | Adj. Block. |       |
|                          | veh/h        | %    | veh/h         | %    |      |           |            |             |                  |                   |        |             |             |             | veh/h |
| South: Unnamed Road      |              |      |               |      |      |           |            |             |                  |                   |        |             |             |             |       |
| Lane 1                   | 2            | 0.0  | 2             | 0.0  | 888  | 0.002     | 100        | 8.0         | LOS A            | 0.0               | 0.1    | Full        | 500         | 0.0         | 0.0   |
| Approach                 | 2            | 0.0  | 2             | 0.0  |      | 0.002     |            | 8.0         | LOS A            | 0.0               | 0.1    |             |             |             |       |
| East: R514               |              |      |               |      |      |           |            |             |                  |                   |        |             |             |             |       |
| Lane 1                   | 247          | 8.0  | 247           | 8.0  | 1854 | 0.133     | 100        | 0.1         | LOS A            | 0.0               | 0.0    | Full        | 500         | 0.0         | 0.0   |
| Approach                 | 247          | 8.0  | 247           | 8.0  |      | 0.133     |            | 0.1         | NA               | 0.0               | 0.0    |             |             |             |       |
| West: R514               |              |      |               |      |      |           |            |             |                  |                   |        |             |             |             |       |
| Lane 1                   | 179          | 4.0  | 179           | 4.0  | 1897 | 0.094     | 100        | 0.0         | LOS A            | 0.0               | 0.1    | Full        | 500         | 0.0         | 0.0   |
| Approach                 | 179          | 4.0  | 179           | 4.0  |      | 0.094     |            | 0.0         | NA               | 0.0               | 0.1    |             |             |             |       |
| All Vehicles             | 428          | 6.3  | 428           | 6.3  |      | 0.133     |            | 0.1         | NA               | 0.0               | 0.1    |             |             |             |       |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |     |     |       |     |      |           |            |          |         |              |
|-----------------------------|-----|-----|-------|-----|------|-----------|------------|----------|---------|--------------|
| South: Unnamed Road         |     |     |       |     |      |           |            |          |         |              |
| Mov.                        | L2  | R2  | Total | %HV | Cap. | Deg. Satn | Lane Util. | Prob. SL | Ov. Ov. | Ov. Lane No. |
| From S To Exit:             | W   | E   |       |     |      |           |            |          |         |              |
| Lane 1                      | 1   | 1   | 2     | 0.0 | 888  | 0.002     | 100        | NA       | NA      |              |
| Approach                    | 1   | 1   | 2     | 0.0 |      | 0.002     |            |          |         |              |
| East: R514                  |     |     |       |     |      |           |            |          |         |              |
| Mov.                        | L2  | T1  | Total | %HV | Cap. | Deg. Satn | Lane Util. | Prob. SL | Ov. Ov. | Ov. Lane No. |
| From E To Exit:             | S   | W   |       |     |      |           |            |          |         |              |
| Lane 1                      | 1   | 246 | 247   | 8.0 | 1854 | 0.133     | 100        | NA       | NA      |              |
| Approach                    | 1   | 246 | 247   | 8.0 |      | 0.133     |            |          |         |              |
| West: R514                  |     |     |       |     |      |           |            |          |         |              |
| Mov.                        | T1  | R2  | Total | %HV | Cap. | Deg. Satn | Lane Util. | Prob. SL | Ov. Ov. | Ov. Lane No. |
| From W To Exit:             | E   | S   |       |     |      |           |            |          |         |              |
| Lane 1                      | 178 | 1   | 179   | 4.0 | 1897 | 0.094     | 100        | NA       | NA      |              |

|                          |     |     |       |     |       |
|--------------------------|-----|-----|-------|-----|-------|
| Approach                 | 178 | 1   | 179   | 4.0 | 0.094 |
| Total %HV Deg.Satn (v/c) |     |     |       |     |       |
| All Vehicles             | 428 | 6.3 | 0.133 |     |       |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                  |                     |                              |                          |                  |                       |                      |                |               |                |                 |
|----------------------------------------------------------------|------------------|---------------------|------------------------------|--------------------------|------------------|-----------------------|----------------------|----------------|---------------|----------------|-----------------|
|                                                                | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                  |                     |                              |                          |                  |                       |                      |                |               |                |                 |

| Variable Demand Analysis |                           |                            |                                       |                          |
|--------------------------|---------------------------|----------------------------|---------------------------------------|--------------------------|
|                          | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
| South: Unnamed Road      |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |
| East: R514               |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |
| West: R514               |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |



# LANE SUMMARY

 **Site: 2 [Intersection 2\_2024 Existing PM (Site Folder: General)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.2.202**

Intersection of R514 and Unnamed Road  
Site Category: Existing Design  
Stop (Two-Way)

| Lane Use and Performance |              |      |               |      |      |           |            |             |                  |                   |        |             |             |           |              |
|--------------------------|--------------|------|---------------|------|------|-----------|------------|-------------|------------------|-------------------|--------|-------------|-------------|-----------|--------------|
|                          | Demand Flows |      | Arrival Flows |      | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |        | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|                          | [ Total      | HV ] | [ Total       | HV ] |      |           |            |             |                  | [ Veh             | Dist ] |             |             |           |              |
|                          | veh/h        | %    | veh/h         | %    |      |           |            |             |                  |                   |        |             |             |           |              |
| South: Unnamed Road      |              |      |               |      |      |           |            |             |                  |                   |        |             |             |           |              |
| Lane 1                   | 3            | 0.0  | 3             | 0.0  | 843  | 0.004     | 100        | 8.1         | LOS A            | 0.0               | 0.1    | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 3            | 0.0  | 3             | 0.0  |      | 0.004     |            | 8.1         | LOS A            | 0.0               | 0.1    |             |             |           |              |
| East: R514               |              |      |               |      |      |           |            |             |                  |                   |        |             |             |           |              |
| Lane 1                   | 206          | 4.0  | 206           | 4.0  | 1900 | 0.108     | 100        | 0.1         | LOS A            | 0.0               | 0.0    | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 206          | 4.0  | 206           | 4.0  |      | 0.108     |            | 0.1         | NA               | 0.0               | 0.0    |             |             |           |              |
| West: R514               |              |      |               |      |      |           |            |             |                  |                   |        |             |             |           |              |
| Lane 1                   | 222          | 8.0  | 222           | 8.0  | 1852 | 0.120     | 100        | 0.0         | LOS A            | 0.0               | 0.1    | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 222          | 8.0  | 222           | 8.0  |      | 0.120     |            | 0.0         | NA               | 0.0               | 0.1    |             |             |           |              |
| All Vehicles             | 431          | 6.0  | 431           | 6.0  |      | 0.120     |            | 0.1         | NA               | 0.0               | 0.1    |             |             |           |              |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).  
Lane LOS values are based on average delay per lane.  
Minor Road Approach LOS values are based on average delay for all lanes.  
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).  
Two-Way Sign Control Capacity Model: SIDRA Standard.  
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).  
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.  
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).  
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.  
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |     |     |       |     |      |           |            |          |     |              |
|-----------------------------|-----|-----|-------|-----|------|-----------|------------|----------|-----|--------------|
| South: Unnamed Road         |     |     |       |     |      |           |            |          |     |              |
| Mov.                        | L2  | R2  | Total | %HV | Cap. | Deg. Satn | Lane Util. | Prob. SL | Ov. | Ov. Lane No. |
| From S To Exit:             | W   | E   |       |     |      |           |            |          |     |              |
| Lane 1                      | 1   | 2   | 3     | 0.0 | 843  | 0.004     | 100        | NA       | NA  |              |
| Approach                    | 1   | 2   | 3     | 0.0 |      | 0.004     |            |          |     |              |
| East: R514                  |     |     |       |     |      |           |            |          |     |              |
| Mov.                        | L2  | T1  | Total | %HV | Cap. | Deg. Satn | Lane Util. | Prob. SL | Ov. | Ov. Lane No. |
| From E To Exit:             | S   | W   |       |     |      |           |            |          |     |              |
| Lane 1                      | 1   | 205 | 206   | 4.0 | 1900 | 0.108     | 100        | NA       | NA  |              |
| Approach                    | 1   | 205 | 206   | 4.0 |      | 0.108     |            |          |     |              |
| West: R514                  |     |     |       |     |      |           |            |          |     |              |
| Mov.                        | T1  | R2  | Total | %HV | Cap. | Deg. Satn | Lane Util. | Prob. SL | Ov. | Ov. Lane No. |
| From W To Exit:             | E   | S   |       |     |      |           |            |          |     |              |
| Lane 1                      | 221 | 1   | 222   | 8.0 | 1852 | 0.120     | 100        | NA       | NA  |              |

|                          |     |     |     |       |       |
|--------------------------|-----|-----|-----|-------|-------|
| Approach                 | 221 | 1   | 222 | 8.0   | 0.120 |
| Total %HV Deg.Satn (v/c) |     |     |     |       |       |
| All Vehicles             | 431 | 6.0 |     | 0.120 |       |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                  |                     |                              |                          |                  |                       |                      |                |               |                |                 |
|----------------------------------------------------------------|------------------|---------------------|------------------------------|--------------------------|------------------|-----------------------|----------------------|----------------|---------------|----------------|-----------------|
|                                                                | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                  |                     |                              |                          |                  |                       |                      |                |               |                |                 |

| Variable Demand Analysis |                           |                            |                                       |                          |
|--------------------------|---------------------------|----------------------------|---------------------------------------|--------------------------|
|                          | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
| South: Unnamed Road      |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |
| East: R514               |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |
| West: R514               |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |

## LANE SUMMARY

**Site: 3 [Intersection 3\_2024 Existing AM (Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Gilia Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
|--------------------------|---------------|--------|---------------|--------|------|-----------|------------|-------------|------------------|-------------------|----------|-------------|-------------|-------------|-----|
|                          | Demand Flows  |        | Arrival Flows |        | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |          | Lane Config | Lane Length | Cap. Prob.  |     |
|                          | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |      |           |            |             |                  | [ Veh             | Dist ] m |             |             | Adj. Block. |     |
| South: Gilia Road        |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 5             | 0.0    | 5             | 0.0    | 890  | 0.006     | 100        | 8.1         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 5             | 0.0    | 5             | 0.0    |      | 0.006     |            | 8.1         | LOS A            | 0.0               | 0.1      |             |             |             |     |
| East: R514               |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 240           | 8.9    | 240           | 8.9    | 1839 | 0.130     | 100        | 0.1         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 240           | 8.9    | 240           | 8.9    |      | 0.130     |            | 0.1         | NA               | 0.0               | 0.1      |             |             |             |     |
| North: Gilia Road        |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 13            | 0.0    | 13            | 0.0    | 777  | 0.017     | 100        | 8.4         | LOS A            | 0.1               | 0.4      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 13            | 0.0    | 13            | 0.0    |      | 0.017     |            | 8.4         | LOS A            | 0.1               | 0.4      |             |             |             |     |
| West: R514               |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 177           | 4.7    | 177           | 4.7    | 1883 | 0.094     | 100        | 0.2         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 177           | 4.7    | 177           | 4.7    |      | 0.094     |            | 0.2         | NA               | 0.0               | 0.1      |             |             |             |     |
| All Vehicles             | 435           | 6.8    | 435           | 6.8    |      | 0.130     |            | 0.5         | NA               | 0.1               | 0.4      |             |             |             |     |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for minor road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |             |             |             |       |     |               |                     |                    |                      |                    |
|-----------------------------|-------------|-------------|-------------|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| South: Gilia Road           |             |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From S<br>To Exit:  | L2<br><br>W | T1<br><br>N | R2<br><br>E | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 3           | 1           | 1           | 5     | 0.0 | 890           | 0.006               | 100                | NA                   | NA                 |
| Approach                    | 3           | 1           | 1           | 5     | 0.0 | 0.006         |                     |                    |                      |                    |
| East: R514                  |             |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From E<br>To Exit:  | L2<br><br>S | T1<br><br>W | R2<br><br>N | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 2           | 236         | 2           | 240   | 8.9 | 1839          | 0.130               | 100                | NA                   | NA                 |
| Approach                    | 2           | 236         | 2           | 240   | 8.9 | 0.130         |                     |                    |                      |                    |
| North: Gilia Road           |             |             |             |       |     |               |                     |                    |                      |                    |

| Mov.<br>From N<br>To Exit: | L2  | T1  | R2 | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|----------------------------|-----|-----|----|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| Lane 1                     | 5   | 1   | 7  | 13    | 0.0 | 777           | 0.017               | 100                | NA                   | NA                 |
| Approach                   | 5   | 1   | 7  | 13    | 0.0 |               | 0.017               |                    |                      |                    |
| West: R514                 |     |     |    |       |     |               |                     |                    |                      |                    |
| Mov.<br>From W<br>To Exit: | L2  | T1  | R2 | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                     | 9   | 167 | 1  | 177   | 4.7 | 1883          | 0.094               | 100                | NA                   | NA                 |
| Approach                   | 9   | 167 | 1  | 177   | 4.7 |               | 0.094               |                    |                      |                    |
| Total %HV Deg.Satn (v/c)   |     |     |    |       |     |               |                     |                    |                      |                    |
| All Vehicles               | 435 | 6.8 |    | 0.130 |     |               |                     |                    |                      |                    |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                        |                              |                                 |                                |       |                        |                             |                               |                   |                     |                      |                       |
|----------------------------------------------------------------|------------------------|------------------------------|---------------------------------|--------------------------------|-------|------------------------|-----------------------------|-------------------------------|-------------------|---------------------|----------------------|-----------------------|
|                                                                | Exit<br>Lane<br>Number | Short<br>Lane<br>Length<br>m | Percent<br>Opng in<br>Lane<br>% | Opposing<br>Flow Rate<br>veh/h | pcu/h | Critical<br>Gap<br>sec | Follow-up<br>Headway<br>sec | Lane<br>Flow<br>Rate<br>veh/h | Capacity<br>veh/h | Deg.<br>Satn<br>v/c | Min.<br>Delay<br>sec | Merge<br>Delay<br>sec |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                        |                              |                                 |                                |       |                        |                             |                               |                   |                     |                      |                       |

| Variable Demand Analysis |                                    |                                     |                                                   |                                   |
|--------------------------|------------------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------|
|                          | Initial<br>Queued<br>Demand<br>veh | Residual<br>Queued<br>Demand<br>veh | Time for<br>Residual<br>Demand<br>to Clear<br>sec | Duration<br>of<br>Oversatn<br>sec |
| South: Gilia Road        |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| East: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| North: Gilia Road        |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| West: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |



## LANE SUMMARY

 **Site: 3 [Intersection 3\_2024 Existing PM (Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Gilia Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
|--------------------------|---------------|--------|---------------|--------|------|-----------|------------|-------------|------------------|-------------------|----------|-------------|-------------|-------------|-----|
|                          | Demand Flows  |        | Arrival Flows |        | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |          | Lane Config | Lane Length | Cap. Prob.  |     |
|                          | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |      |           |            |             |                  | [ Veh             | Dist ] m |             |             | Adj. Block. | %   |
| South: Gilia Road        |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 3             | 0.0    | 3             | 0.0    | 781  | 0.004     | 100        | 8.4         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 3             | 0.0    | 3             | 0.0    |      | 0.004     |            | 8.4         | LOS A            | 0.0               | 0.1      |             |             |             |     |
| East: R514               |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 207           | 4.3    | 207           | 4.3    | 1861 | 0.111     | 100        | 0.3         | LOS A            | 0.1               | 0.6      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 207           | 4.3    | 207           | 4.3    |      | 0.111     |            | 0.3         | NA               | 0.1               | 0.6      |             |             |             |     |
| North: Gilia Road        |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 7             | 0.0    | 7             | 0.0    | 726  | 0.010     | 100        | 8.7         | LOS A            | 0.0               | 0.2      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 7             | 0.0    | 7             | 0.0    |      | 0.010     |            | 8.7         | LOS A            | 0.0               | 0.2      |             |             |             |     |
| West: R514               |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 224           | 7.7    | 224           | 7.7    | 1844 | 0.121     | 100        | 0.2         | LOS A            | 0.0               | 0.3      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 224           | 7.7    | 224           | 7.7    |      | 0.121     |            | 0.2         | NA               | 0.0               | 0.3      |             |             |             |     |
| All Vehicles             | 441           | 5.9    | 441           | 5.9    |      | 0.121     |            | 0.4         | NA               | 0.1               | 0.6      |             |             |             |     |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for minor road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |             |             |             |       |     |               |                     |                    |                      |                    |
|-----------------------------|-------------|-------------|-------------|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| South: Gilia Road           |             |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From S<br>To Exit:  | L2<br><br>W | T1<br><br>N | R2<br><br>E | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 1           | 1           | 1           | 3     | 0.0 | 781           | 0.004               | 100                | NA                   | NA                 |
| Approach                    | 1           | 1           | 1           | 3     | 0.0 |               | 0.004               |                    |                      |                    |
| East: R514                  |             |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From E<br>To Exit:  | L2<br><br>S | T1<br><br>W | R2<br><br>N | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 1           | 197         | 9           | 207   | 4.3 | 1861          | 0.111               | 100                | NA                   | NA                 |
| Approach                    | 1           | 197         | 9           | 207   | 4.3 |               | 0.111               |                    |                      |                    |
| North: Gilia Road           |             |             |             |       |     |               |                     |                    |                      |                    |

| Mov.<br>From N<br>To Exit: | L2  | T1  | R2 | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|----------------------------|-----|-----|----|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| Lane 1                     | 2   | 1   | 4  | 7     | 0.0 | 726           | 0.010               | 100                | NA                   | NA                 |
| Approach                   | 2   | 1   | 4  | 7     | 0.0 |               | 0.010               |                    |                      |                    |
| West: R514                 |     |     |    |       |     |               |                     |                    |                      |                    |
| Mov.<br>From W<br>To Exit: | L2  | T1  | R2 | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                     | 4   | 215 | 5  | 224   | 7.7 | 1844          | 0.121               | 100                | NA                   | NA                 |
| Approach                   | 4   | 215 | 5  | 224   | 7.7 |               | 0.121               |                    |                      |                    |
| Total %HV Deg.Satn (v/c)   |     |     |    |       |     |               |                     |                    |                      |                    |
| All Vehicles               | 441 | 5.9 |    | 0.121 |     |               |                     |                    |                      |                    |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                        |                              |                                       |                                |                        |                             |                               |                           |                     |                      |                       |  |
|----------------------------------------------------------------|------------------------|------------------------------|---------------------------------------|--------------------------------|------------------------|-----------------------------|-------------------------------|---------------------------|---------------------|----------------------|-----------------------|--|
|                                                                | Exit<br>Lane<br>Number | Short<br>Lane<br>Length<br>m | Percent<br>Opng in<br>Lane<br>% veh/h | Opposing<br>Flow Rate<br>pcu/h | Critical<br>Gap<br>sec | Follow-up<br>Headway<br>sec | Lane<br>Flow<br>Rate<br>veh/h | Lane<br>Capacity<br>veh/h | Deg.<br>Satn<br>v/c | Min.<br>Delay<br>sec | Merge<br>Delay<br>sec |  |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                        |                              |                                       |                                |                        |                             |                               |                           |                     |                      |                       |  |

| Variable Demand Analysis |                                    |                                     |                                                   |                                   |
|--------------------------|------------------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------|
|                          | Initial<br>Queued<br>Demand<br>veh | Residual<br>Queued<br>Demand<br>veh | Time for<br>Residual<br>Demand<br>to Clear<br>sec | Duration<br>of<br>Oversatn<br>sec |
| South: Gilia Road        |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| East: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| North: Gilia Road        |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| West: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |

## LANE SUMMARY

**Site: 4 [Intersection 4\_2024 Existing AM (Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Balderjan Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance  |                  |         |                  |         |      |           |            |             |                  |                   |                 |             |             |            |             |
|---------------------------|------------------|---------|------------------|---------|------|-----------|------------|-------------|------------------|-------------------|-----------------|-------------|-------------|------------|-------------|
|                           | Demand Flows     |         | Arrival Flows    |         | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |                 | Lane Config | Lane Length | Cap. Prob. | Adj. Block. |
|                           | [ Total<br>veh/h | HV<br>% | [ Total<br>veh/h | HV<br>% |      | v/c       | %          |             |                  | sec               | [ Veh<br>Dist ] |             |             | m          | m           |
| SouthEast: Balderjan Road |                  |         |                  |         |      |           |            |             |                  |                   |                 |             |             |            |             |
| Lane 1                    | 22               | 0.0     | 22               | 0.0     | 784  | 0.028     | 100        | 8.6         | LOS A            | 0.1               | 0.7             | Full        | 500         | 0.0        | 0.0         |
| Approach                  | 22               | 0.0     | 22               | 0.0     |      | 0.028     |            | 8.6         | LOS A            | 0.1               | 0.7             |             |             |            |             |
| East: R514                |                  |         |                  |         |      |           |            |             |                  |                   |                 |             |             |            |             |
| Lane 1                    | 312              | 6.9     | 312              | 6.9     | 1817 | 0.172     | 100        | 0.5         | LOS A            | 0.3               | 1.9             | Full        | 500         | 0.0        | 0.0         |
| Approach                  | 312              | 6.9     | 312              | 6.9     |      | 0.172     |            | 0.5         | NA               | 0.3               | 1.9             |             |             |            |             |
| NorthWest: Unnamed Access |                  |         |                  |         |      |           |            |             |                  |                   |                 |             |             |            |             |
| Lane 1                    | 30               | 0.0     | 30               | 0.0     | 678  | 0.044     | 100        | 9.4         | LOS A            | 0.2               | 1.1             | Full        | 500         | 0.0        | 0.0         |
| Approach                  | 30               | 0.0     | 30               | 0.0     |      | 0.044     |            | 9.4         | LOS A            | 0.2               | 1.1             |             |             |            |             |
| West: R514                |                  |         |                  |         |      |           |            |             |                  |                   |                 |             |             |            |             |
| Lane 1                    | 157              | 4.9     | 157              | 4.9     | 1878 | 0.084     | 100        | 0.1         | LOS A            | 0.0               | 0.1             | Full        | 500         | 0.0        | 0.0         |
| Approach                  | 157              | 4.9     | 157              | 4.9     |      | 0.084     |            | 0.1         | NA               | 0.0               | 0.1             |             |             |            |             |
| All Vehicles              | 521              | 5.6     | 521              | 5.6     |      | 0.172     |            | 1.2         | NA               | 0.3               | 1.9             |             |             |            |             |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for one road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |    |     |    |       |     |       |          |         |          |          |
|-----------------------------|----|-----|----|-------|-----|-------|----------|---------|----------|----------|
| SouthEast: Balderjan Road   |    |     |    |       |     |       |          |         |          |          |
| Mov.                        | L1 | T1  | R3 | Total | %HV |       |          |         |          |          |
| From SE                     |    |     |    |       |     | Cap.  | Deg.     | Lane    | Prob.    | Ov.      |
| To Exit:                    | W  | NW  | E  |       |     | veh/h | Satn v/c | Util. % | SL Ov. % | Lane No. |
| Lane 1                      | 11 | 5   | 6  | 22    | 0.0 | 784   | 0.028    | 100     | NA       | NA       |
| Approach                    | 11 | 5   | 6  | 22    | 0.0 |       | 0.028    |         |          |          |
| East: R514                  |    |     |    |       |     |       |          |         |          |          |
| Mov.                        | L3 | T1  | R1 | Total | %HV |       |          |         |          |          |
| From E                      |    |     |    |       |     | Cap.  | Deg.     | Lane    | Prob.    | Ov.      |
| To Exit:                    | SE | W   | NW |       |     | veh/h | Satn v/c | Util. % | SL Ov. % | Lane No. |
| Lane 1                      | 9  | 270 | 33 | 312   | 6.9 | 1817  | 0.172    | 100     | NA       | NA       |
| Approach                    | 9  | 270 | 33 | 312   | 6.9 |       | 0.172    |         |          |          |
| NorthWest: Unnamed Access   |    |     |    |       |     |       |          |         |          |          |

| Mov.                     | L1  | T1  | R3 | Total | %HV |       | Deg.  | Lane  | Prob.  | Ov.  |
|--------------------------|-----|-----|----|-------|-----|-------|-------|-------|--------|------|
| From NW                  | E   | SE  | W  |       |     | Cap.  | Satn  | Util. | SL Ov. | Lane |
| To Exit:                 |     |     |    |       |     | veh/h | v/c   | %     | %      | No.  |
| Lane 1                   | 1   | 24  | 5  | 30    | 0.0 | 678   | 0.044 | 100   | NA     | NA   |
| Approach                 | 1   | 24  | 5  | 30    | 0.0 |       | 0.044 |       |        |      |
| West: R514               |     |     |    |       |     |       |       |       |        |      |
| Mov.                     | L3  | T1  | R1 | Total | %HV |       | Deg.  | Lane  | Prob.  | Ov.  |
| From W                   | NW  | E   | SE |       |     | Cap.  | Satn  | Util. | SL Ov. | Lane |
| To Exit:                 |     |     |    |       |     | veh/h | v/c   | %     | %      | No.  |
| Lane 1                   | 1   | 154 | 2  | 157   | 4.9 | 1878  | 0.084 | 100   | NA     | NA   |
| Approach                 | 1   | 154 | 2  | 157   | 4.9 |       | 0.084 |       |        |      |
| Total %HV Deg.Satn (v/c) |     |     |    |       |     |       |       |       |        |      |
| All Vehicles             | 521 | 5.6 |    | 0.172 |     |       |       |       |        |      |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                        |                              |                                       |                                |                        |                             |                                        |  |                     |                      |                       |
|----------------------------------------------------------------|------------------------|------------------------------|---------------------------------------|--------------------------------|------------------------|-----------------------------|----------------------------------------|--|---------------------|----------------------|-----------------------|
|                                                                | Exit<br>Lane<br>Number | Short<br>Lane<br>Length<br>m | Percent<br>Opng in<br>Lane<br>% veh/h | Opposing<br>Flow Rate<br>pcu/h | Critical<br>Gap<br>sec | Follow-up<br>Headway<br>sec | Lane<br>Capacity<br>Flow Rate<br>veh/h |  | Deg.<br>Satn<br>v/c | Min.<br>Delay<br>sec | Merge<br>Delay<br>sec |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                        |                              |                                       |                                |                        |                             |                                        |  |                     |                      |                       |

| Variable Demand Analysis  |         |          |          |          |
|---------------------------|---------|----------|----------|----------|
|                           | Initial | Residual | Time for | Duration |
|                           | Queued  | Queued   | Residual | of       |
|                           | Demand  | Demand   | Demand   | Oversatn |
|                           | veh     | veh      | to Clear |          |
|                           |         |          | sec      | sec      |
| SouthEast: Balderjan Road |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |
| East: R514                |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |
| NorthWest: Unnamed Access |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |
| West: R514                |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |



## LANE SUMMARY

 **Site: 4 [Intersection 4\_2024 Existing PM (Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Balderjan Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance  |                  |           |                  |           |      |           |            |             |                  |                      |     |             |             |             |     |
|---------------------------|------------------|-----------|------------------|-----------|------|-----------|------------|-------------|------------------|----------------------|-----|-------------|-------------|-------------|-----|
|                           | Demand Flows     |           | Arrival Flows    |           | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue    |     | Lane Config | Lane Length | Cap. Prob.  |     |
|                           | [ Total<br>veh/h | HV ]<br>% | [ Total<br>veh/h | HV ]<br>% |      |           |            |             |                  | [ Veh<br>Dist ]<br>m |     |             |             | Adj. Block. |     |
| SouthEast: Balderjan Road |                  |           |                  |           |      |           |            |             |                  |                      |     |             |             |             |     |
| Lane 1                    | 10               | 10.0      | 10               | 10.0      | 666  | 0.015     | 100        | 9.4         | LOS A            | 0.0                  | 0.4 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 10               | 10.0      | 10               | 10.0      |      | 0.015     |            | 9.4         | LOS A            | 0.0                  | 0.4 |             |             |             |     |
| East: R514                |                  |           |                  |           |      |           |            |             |                  |                      |     |             |             |             |     |
| Lane 1                    | 227              | 4.7       | 227              | 4.7       | 1783 | 0.127     | 100        | 0.9         | LOS A            | 0.3                  | 2.2 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 227              | 4.7       | 227              | 4.7       |      | 0.127     |            | 0.9         | NA               | 0.3                  | 2.2 |             |             |             |     |
| NorthWest: Unnamed Access |                  |           |                  |           |      |           |            |             |                  |                      |     |             |             |             |     |
| Lane 1                    | 44               | 2.6       | 44               | 2.6       | 689  | 0.064     | 100        | 9.5         | LOS A            | 0.2                  | 1.6 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 44               | 2.6       | 44               | 2.6       |      | 0.064     |            | 9.5         | LOS A            | 0.2                  | 1.6 |             |             |             |     |
| West: R514                |                  |           |                  |           |      |           |            |             |                  |                      |     |             |             |             |     |
| Lane 1                    | 227              | 6.4       | 227              | 6.4       | 1860 | 0.122     | 100        | 0.1         | LOS A            | 0.0                  | 0.2 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 227              | 6.4       | 227              | 6.4       |      | 0.122     |            | 0.1         | NA               | 0.0                  | 0.2 |             |             |             |     |
| All Vehicles              | 508              | 5.4       | 508              | 5.4       |      | 0.127     |            | 1.4         | NA               | 0.3                  | 2.2 |             |             |             |     |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for minor road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |    |     |    |       |      |       |          |         |          |          |
|-----------------------------|----|-----|----|-------|------|-------|----------|---------|----------|----------|
| SouthEast: Balderjan Road   |    |     |    |       |      |       |          |         |          |          |
| Mov.                        | L1 | T1  | R3 | Total | %HV  |       |          |         |          |          |
| From SE                     |    |     |    |       |      | Cap.  | Deg.     | Lane    | Prob.    | Ov.      |
| To Exit:                    | W  | NW  | E  |       |      | veh/h | Satn v/c | Util. % | SL Ov. % | Lane No. |
| Lane 1                      | 4  | 2   | 4  | 10    | 10.0 | 666   | 0.015    | 100     | NA       | NA       |
| Approach                    | 4  | 2   | 4  | 10    | 10.0 |       | 0.015    |         |          |          |
| East: R514                  |    |     |    |       |      |       |          |         |          |          |
| Mov.                        | L3 | T1  | R1 | Total | %HV  |       |          |         |          |          |
| From E                      |    |     |    |       |      | Cap.  | Deg.     | Lane    | Prob.    | Ov.      |
| To Exit:                    | SE | W   | NW |       |      | veh/h | Satn v/c | Util. % | SL Ov. % | Lane No. |
| Lane 1                      | 8  | 179 | 40 | 227   | 4.7  | 1783  | 0.127    | 100     | NA       | NA       |
| Approach                    | 8  | 179 | 40 | 227   | 4.7  |       | 0.127    |         |          |          |
| NorthWest: Unnamed Access   |    |     |    |       |      |       |          |         |          |          |

| Mov.<br>From NW<br>To Exit: | L1<br>E  | T1<br>SE | R3<br>W  | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|-----------------------------|----------|----------|----------|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| Lane 1                      | 1        | 38       | 5        | 44    | 2.6 | 689           | 0.064               | 100                | NA                   | NA                 |
| Approach                    | 1        | 38       | 5        | 44    | 2.6 |               | 0.064               |                    |                      |                    |
| West: R514                  |          |          |          |       |     |               |                     |                    |                      |                    |
| Mov.<br>From W<br>To Exit:  | L3<br>NW | T1<br>E  | R1<br>SE | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 1        | 224      | 2        | 227   | 6.4 | 1860          | 0.122               | 100                | NA                   | NA                 |
| Approach                    | 1        | 224      | 2        | 227   | 6.4 |               | 0.122               |                    |                      |                    |
| Total %HV Deg.Satn (v/c)    |          |          |          |       |     |               |                     |                    |                      |                    |
| All Vehicles                | 508      | 5.4      |          | 0.127 |     |               |                     |                    |                      |                    |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                        |                              |                                       |                                |                        |                             |                               |                   |                     |                      |                       |  |
|----------------------------------------------------------------|------------------------|------------------------------|---------------------------------------|--------------------------------|------------------------|-----------------------------|-------------------------------|-------------------|---------------------|----------------------|-----------------------|--|
|                                                                | Exit<br>Lane<br>Number | Short<br>Lane<br>Length<br>m | Percent<br>Opng in<br>Lane<br>% veh/h | Opposing<br>Flow Rate<br>pcu/h | Critical<br>Gap<br>sec | Follow-up<br>Headway<br>sec | Lane<br>Flow<br>Rate<br>veh/h | Capacity<br>veh/h | Deg.<br>Satn<br>v/c | Min.<br>Delay<br>sec | Merge<br>Delay<br>sec |  |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                        |                              |                                       |                                |                        |                             |                               |                   |                     |                      |                       |  |

| Variable Demand Analysis  |                                    |                                     |                                                   |                                   |
|---------------------------|------------------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------|
|                           | Initial<br>Queued<br>Demand<br>veh | Residual<br>Queued<br>Demand<br>veh | Time for<br>Residual<br>Demand<br>to Clear<br>sec | Duration<br>of<br>Oversatn<br>sec |
| SouthEast: Balderjan Road |                                    |                                     |                                                   |                                   |
| Lane 1                    | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| East: R514                |                                    |                                     |                                                   |                                   |
| Lane 1                    | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| NorthWest: Unnamed Access |                                    |                                     |                                                   |                                   |
| Lane 1                    | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| West: R514                |                                    |                                     |                                                   |                                   |
| Lane 1                    | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |

## **APPENDIX D: DETAILED LANE SUMMARY FOR THE 2029 BACKGROUND TRAFFIC WITH GROWTH PEAK HOUR ON THE EXISTING 2024 ROAD NETWORK**

## LANE SUMMARY

**Site: 4 [Intersection 1\_2029 Background AM (Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Charl Avenue

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance |               |        |               |        |      |           |                 |             |                  |                   |          |             |             |           |              |
|--------------------------|---------------|--------|---------------|--------|------|-----------|-----------------|-------------|------------------|-------------------|----------|-------------|-------------|-----------|--------------|
|                          | Demand Flows  |        | Arrival Flows |        | Cap. | Deg. Satn | Lane Util.      | Aver. Delay | Level of Service | 95% Back Of Queue |          | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|                          | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |      |           |                 |             |                  | [ Veh             | Dist ] m |             |             |           |              |
| East: R514               |               |        |               |        |      |           |                 |             |                  |                   |          |             |             |           |              |
| Lane 1                   | 95            | 8.0    | 95            | 8.0    | 1854 | 0.051     | 48 <sup>6</sup> | 0.4         | LOS A            | 0.0               | 0.0      | Short       | 90          | 0.0       | NA           |
| Lane 2                   | 176           | 8.2    | 176           | 8.2    | 1630 | 0.108     | 100             | 1.5         | LOS A            | 0.3               | 2.2      | Full        | 122         | 0.0       | 0.0          |
| Approach                 | 271           | 8.1    | 271           | 8.1    |      | 0.108     |                 | 1.1         | NA               | 0.3               | 2.2      |             |             |           |              |
| North: Charl Avenue      |               |        |               |        |      |           |                 |             |                  |                   |          |             |             |           |              |
| Lane 1                   | 110           | 3.2    | 110           | 3.2    | 640  | 0.172     | 100             | 10.1        | LOS B            | 0.7               | 4.9      | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 110           | 3.2    | 110           | 3.2    |      | 0.172     |                 | 10.1        | LOS B            | 0.7               | 4.9      |             |             |           |              |
| West: R514               |               |        |               |        |      |           |                 |             |                  |                   |          |             |             |           |              |
| Lane 1                   | 60            | 9.0    | 60            | 9.0    | 1745 | 0.034     | 100             | 5.6         | LOS A            | 0.0               | 0.0      | Short       | 60          | 0.0       | NA           |
| Lane 2                   | 148           | 3.0    | 148           | 3.0    | 1913 | 0.077     | 100             | 0.0         | LOS A            | 0.0               | 0.0      | Full        | 100         | 0.0       | 0.0          |
| Approach                 | 208           | 4.7    | 208           | 4.7    |      | 0.077     |                 | 1.6         | NA               | 0.0               | 0.0      |             |             |           |              |
| All Vehicles             | 589           | 6.0    | 589           | 6.0    |      | 0.172     |                 | 3.0         | NA               | 0.7               | 4.9      |             |             |           |              |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

## 6 Lane under-utilisation due to downstream effects

| Approach Lane Flows (veh/h) |     |    |       |     |       |       |                 |       |      |
|-----------------------------|-----|----|-------|-----|-------|-------|-----------------|-------|------|
| East: R514                  |     |    |       |     |       |       |                 |       |      |
| Mov.                        | T1  | R2 | Total | %HV |       | Deg.  | Lane            | Prob. | Ov.  |
| From E                      |     |    |       |     | Cap.  | Satn  | Util.           | SL    | Lane |
| To Exit:                    | W   | N  |       |     | veh/h | v/c   | %               | %     | No.  |
| Lane 1                      | 95  | -  | 95    | 8.0 | 1854  | 0.051 | 48 <sup>6</sup> | 0.0   | 2    |
| Lane 2                      | 142 | 34 | 176   | 8.2 | 1630  | 0.108 | 100             | NA    | NA   |
| Approach                    | 237 | 34 | 271   | 8.1 |       | 0.108 |                 |       |      |
| North: Charl Avenue         |     |    |       |     |       |       |                 |       |      |
| Mov.                        | L2  | R2 | Total | %HV |       | Deg.  | Lane            | Prob. | Ov.  |
| From N                      |     |    |       |     | Cap.  | Satn  | Util.           | SL    | Lane |
| To Exit:                    | E   | W  |       |     | veh/h | v/c   | %               | %     | No.  |
| Lane 1                      | 45  | 65 | 110   | 3.2 | 640   | 0.172 | 100             | NA    | NA   |
| Approach                    | 45  | 65 | 110   | 3.2 |       | 0.172 |                 |       |      |
| West: R514                  |     |    |       |     |       |       |                 |       |      |



| Mov.<br>From W<br>To Exit: | L2<br>N | T1<br>E | Total | %HV   | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|----------------------------|---------|---------|-------|-------|---------------|---------------------|--------------------|----------------------|--------------------|
| Lane 1                     | 60      | -       | 60    | 9.0   | 1745          | 0.034               | 100                | 0.0                  | 2                  |
| Lane 2                     | -       | 148     | 148   | 3.0   | 1913          | 0.077               | 100                | NA                   | NA                 |
| Approach                   | 60      | 148     | 208   | 4.7   |               | 0.077               |                    |                      |                    |
| Total %HV Deg.Satn (v/c)   |         |         |       |       |               |                     |                    |                      |                    |
| All Vehicles               | 589     | 6.0     |       | 0.172 |               |                     |                    |                      |                    |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

6 Lane under-utilisation due to downstream effects

| Merge Analysis                                 |                  |                     |                              |                           |     |                  |                       |                      |                     |               |                |                 |
|------------------------------------------------|------------------|---------------------|------------------------------|---------------------------|-----|------------------|-----------------------|----------------------|---------------------|---------------|----------------|-----------------|
|                                                | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % veh/h | Opposing Flow Rate pcu/h  |     | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Lane Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
| East Exit: R514<br>Merge Type: <b>Priority</b> |                  |                     |                              |                           |     |                  |                       |                      |                     |               |                |                 |
| Exit Short Lane                                | 1                | 90                  | 0.0                          | 0                         | 0   | 3.05             | 2.03                  | 193                  | 1769                | 0.109         | 0.0            | 0.0             |
| Merge Lane                                     | 2                | -                   | 100.0                        | Merge Lane is not Opposed |     |                  |                       | 0                    | 1800                | 0.000         | 0.0            | 0.0             |
| West Exit: R514<br>Merge Type: <b>Priority</b> |                  |                     |                              |                           |     |                  |                       |                      |                     |               |                |                 |
| Exit Short Lane                                | 1                | 90                  | 0.0                          | 207                       | 213 | 3.12             | 2.08                  | 95                   | 1511                | 0.063         | 0.3            | 0.4             |
| Merge Lane                                     | 2                | -                   | 100.0                        | Merge Lane is not Opposed |     |                  |                       | 207                  | 1800                | 0.115         | 0.0            | 0.0             |

| Variable Demand Analysis |                                    |                                     |                                                   |                                   |
|--------------------------|------------------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------|
|                          | Initial<br>Queued<br>Demand<br>veh | Residual<br>Queued<br>Demand<br>veh | Time for<br>Residual<br>Demand<br>to Clear<br>sec | Duration<br>of<br>Oversatn<br>sec |
| East: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| Lane 2                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| North: Charl Avenue      |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| West: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| Lane 2                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |

| Approach Lane Flows (veh/h) |             |             |       |     |               |                     |                    |                      |                    |
|-----------------------------|-------------|-------------|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| East: R514                  |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From E<br>To Exit:  | T1<br><br>W | R2<br><br>N | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 80          | -           | 80    | 4.0 | 1901          | 0.042               | 48 <sup>6</sup>    | 0.0                  | 2                  |
| Lane 2                      | 117         | 30          | 147   | 3.2 | 1649          | 0.089               | 100                | NA                   | NA                 |
| Approach                    | 197         | 30          | 227   | 3.5 |               | 0.089               |                    |                      |                    |
| North: Charl Avenue         |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From N<br>To Exit:  | L2<br><br>E | R2<br><br>W | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 24          | 45          | 69    | 3.3 | 578           | 0.119               | 100                | NA                   | NA                 |
| Approach                    | 24          | 45          | 69    | 3.3 |               | 0.119               |                    |                      |                    |
| West: R514                  |             |             |       |     |               |                     |                    |                      |                    |

| Mov.<br>From W<br>To Exit: | L2<br>N | T1<br>E | Total | %HV   | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|----------------------------|---------|---------|-------|-------|---------------|---------------------|--------------------|----------------------|--------------------|
| Lane 1                     | 59      | -       | 59    | 2.0   | 1831          | 0.032               | 100                | 0.0                  | 2                  |
| Lane 2                     | -       | 213     | 213   | 9.0   | 1842          | 0.116               | 100                | NA                   | NA                 |
| Approach                   | 59      | 213     | 272   | 7.5   |               | 0.116               |                    |                      |                    |
| Total %HV Deg.Satn (v/c)   |         |         |       |       |               |                     |                    |                      |                    |
| All Vehicles               | 568     | 5.4     |       | 0.119 |               |                     |                    |                      |                    |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

6 Lane under-utilisation due to downstream effects

| Merge Analysis                                 |                  |                     |                              |                           |     |                  |                       |                      |                     |               |                |                 |
|------------------------------------------------|------------------|---------------------|------------------------------|---------------------------|-----|------------------|-----------------------|----------------------|---------------------|---------------|----------------|-----------------|
|                                                | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % veh/h | Opposing Flow Rate pcu/h  |     | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Lane Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
| East Exit: R514<br>Merge Type: <b>Priority</b> |                  |                     |                              |                           |     |                  |                       |                      |                     |               |                |                 |
| Exit Short Lane                                | 1                | 90                  | 0.0                          | 0                         | 0   | 3.12             | 2.08                  | 237                  | 1730                | 0.137         | 0.0            | 0.0             |
| Merge Lane                                     | 2                | -                   | 100.0                        | Merge Lane is not Opposed |     |                  |                       | 0                    | 1800                | 0.000         | 0.0            | 0.0             |
| West Exit: R514<br>Merge Type: <b>Priority</b> |                  |                     |                              |                           |     |                  |                       |                      |                     |               |                |                 |
| Exit Short Lane                                | 1                | 90                  | 0.0                          | 162                       | 165 | 3.06             | 2.04                  | 80                   | 1597                | 0.050         | 0.2            | 0.3             |
| Merge Lane                                     | 2                | -                   | 100.0                        | Merge Lane is not Opposed |     |                  |                       | 162                  | 1800                | 0.090         | 0.0            | 0.0             |

| Variable Demand Analysis |                                    |                                     |                                                   |                                   |
|--------------------------|------------------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------|
|                          | Initial<br>Queued<br>Demand<br>veh | Residual<br>Queued<br>Demand<br>veh | Time for<br>Residual<br>Demand<br>to Clear<br>sec | Duration<br>of<br>Oversatn<br>sec |
| East: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| Lane 2                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| North: Charl Avenue      |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| West: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| Lane 2                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |

## LANE SUMMARY

 **Site: 2 [Intersection 2\_2029 Background AM (Site Folder: General)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.2.202**

Intersection of R514 and Unnamed Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance |                 |      |                 |      |       |           |            |             |                  |                   |          |             |             |           |              |
|--------------------------|-----------------|------|-----------------|------|-------|-----------|------------|-------------|------------------|-------------------|----------|-------------|-------------|-----------|--------------|
|                          | Demand Flows    |      | Arrival Flows   |      | Cap.  | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |          | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|                          | [ Total veh/h ] | HV % | [ Total veh/h ] | HV % | veh/h | v/c       | %          | sec         |                  | [ Veh ]           | Dist ] m |             | m           | %         | %            |
| South: Unnamed Road      |                 |      |                 |      |       |           |            |             |                  |                   |          |             |             |           |              |
| Lane 1                   | 2               | 0.0  | 2               | 0.0  | 859   | 0.002     | 100        | 8.2         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 2               | 0.0  | 2               | 0.0  |       | 0.002     |            | 8.2         | LOS A            | 0.0               | 0.1      |             |             |           |              |
| East: R514               |                 |      |                 |      |       |           |            |             |                  |                   |          |             |             |           |              |
| Lane 1                   | 266             | 8.0  | 266             | 8.0  | 1854  | 0.144     | 100        | 0.1         | LOS A            | 0.0               | 0.0      | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 266             | 8.0  | 266             | 8.0  |       | 0.144     |            | 0.1         | NA               | 0.0               | 0.0      |             |             |           |              |
| West: R514               |                 |      |                 |      |       |           |            |             |                  |                   |          |             |             |           |              |
| Lane 1                   | 193             | 4.0  | 193             | 4.0  | 1897  | 0.102     | 100        | 0.0         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 193             | 4.0  | 193             | 4.0  |       | 0.102     |            | 0.0         | NA               | 0.0               | 0.1      |             |             |           |              |
| All Vehicles             | 461             | 6.3  | 461             | 6.3  |       | 0.144     |            | 0.1         | NA               | 0.0               | 0.1      |             |             |           |              |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |     |     |       |     |            |           |            |          |          |  |
|-----------------------------|-----|-----|-------|-----|------------|-----------|------------|----------|----------|--|
| South: Unnamed Road         |     |     |       |     |            |           |            |          |          |  |
| Mov.                        | L2  | R2  | Total | %HV |            | Deg. Satn | Lane Util. | Prob. SL | Ov. Lane |  |
| From S                      |     |     |       |     | Cap. veh/h | v/c       | %          | %        | No.      |  |
| To Exit:                    | W   | E   |       |     |            |           |            |          |          |  |
| Lane 1                      | 1   | 1   | 2     | 0.0 | 859        | 0.002     | 100        | NA       | NA       |  |
| Approach                    | 1   | 1   | 2     | 0.0 |            | 0.002     |            |          |          |  |
| East: R514                  |     |     |       |     |            |           |            |          |          |  |
| Mov.                        | L2  | T1  | Total | %HV |            | Deg. Satn | Lane Util. | Prob. SL | Ov. Lane |  |
| From E                      |     |     |       |     | Cap. veh/h | v/c       | %          | %        | No.      |  |
| To Exit:                    | S   | W   |       |     |            |           |            |          |          |  |
| Lane 1                      | 1   | 265 | 266   | 8.0 | 1854       | 0.144     | 100        | NA       | NA       |  |
| Approach                    | 1   | 265 | 266   | 8.0 |            | 0.144     |            |          |          |  |
| West: R514                  |     |     |       |     |            |           |            |          |          |  |
| Mov.                        | T1  | R2  | Total | %HV |            | Deg. Satn | Lane Util. | Prob. SL | Ov. Lane |  |
| From W                      |     |     |       |     | Cap. veh/h | v/c       | %          | %        | No.      |  |
| To Exit:                    | E   | S   |       |     |            |           |            |          |          |  |
| Lane 1                      | 192 | 1   | 193   | 4.0 | 1897       | 0.102     | 100        | NA       | NA       |  |



|                          |     |     |       |     |       |
|--------------------------|-----|-----|-------|-----|-------|
| Approach                 | 192 | 1   | 193   | 4.0 | 0.102 |
| Total %HV Deg.Satn (v/c) |     |     |       |     |       |
| All Vehicles             | 461 | 6.3 | 0.144 |     |       |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                  |                     |                              |                          |                  |                       |                      |                |               |                |                 |
|----------------------------------------------------------------|------------------|---------------------|------------------------------|--------------------------|------------------|-----------------------|----------------------|----------------|---------------|----------------|-----------------|
|                                                                | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                  |                     |                              |                          |                  |                       |                      |                |               |                |                 |

| Variable Demand Analysis |                           |                            |                                       |                          |
|--------------------------|---------------------------|----------------------------|---------------------------------------|--------------------------|
|                          | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
| South: Unnamed Road      |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |
| East: R514               |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |
| West: R514               |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |

## LANE SUMMARY

 **Site: 2 [Intersection 2\_2029 Background PM (Site Folder: General)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.2.202**

Intersection of R514 and Unnamed Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance |               |      |               |      |       |           |            |             |                  |                   |          |             |             |           |              |
|--------------------------|---------------|------|---------------|------|-------|-----------|------------|-------------|------------------|-------------------|----------|-------------|-------------|-----------|--------------|
|                          | Demand Flows  |      | Arrival Flows |      | Cap.  | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |          | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|                          | [ Total veh/h | HV % | [ Total veh/h | HV % | veh/h | v/c       | %          | sec         |                  | [ Veh             | Dist ] m |             | m           | %         | %            |
| South: Unnamed Road      |               |      |               |      |       |           |            |             |                  |                   |          |             |             |           |              |
| Lane 1                   | 3             | 0.0  | 3             | 0.0  | 814   | 0.004     | 100        | 8.2         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 3             | 0.0  | 3             | 0.0  |       | 0.004     |            | 8.2         | LOS A            | 0.0               | 0.1      |             |             |           |              |
| East: R514               |               |      |               |      |       |           |            |             |                  |                   |          |             |             |           |              |
| Lane 1                   | 222           | 4.0  | 222           | 4.0  | 1900  | 0.117     | 100        | 0.1         | LOS A            | 0.0               | 0.0      | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 222           | 4.0  | 222           | 4.0  |       | 0.117     |            | 0.1         | NA               | 0.0               | 0.0      |             |             |           |              |
| West: R514               |               |      |               |      |       |           |            |             |                  |                   |          |             |             |           |              |
| Lane 1                   | 239           | 8.0  | 239           | 8.0  | 1852  | 0.129     | 100        | 0.0         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 239           | 8.0  | 239           | 8.0  |       | 0.129     |            | 0.0         | NA               | 0.0               | 0.1      |             |             |           |              |
| All Vehicles             | 464           | 6.0  | 464           | 6.0  |       | 0.129     |            | 0.1         | NA               | 0.0               | 0.1      |             |             |           |              |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |     |     |       |     |            |           |            |          |          |  |
|-----------------------------|-----|-----|-------|-----|------------|-----------|------------|----------|----------|--|
| South: Unnamed Road         |     |     |       |     |            |           |            |          |          |  |
| Mov.                        | L2  | R2  | Total | %HV |            | Deg. Satn | Lane Util. | Prob. SL | Ov. Lane |  |
| From S                      |     |     |       |     | Cap. veh/h | v/c       | %          | %        | No.      |  |
| To Exit:                    | W   | E   |       |     |            |           |            |          |          |  |
| Lane 1                      | 1   | 2   | 3     | 0.0 | 814        | 0.004     | 100        | NA       | NA       |  |
| Approach                    | 1   | 2   | 3     | 0.0 |            | 0.004     |            |          |          |  |
| East: R514                  |     |     |       |     |            |           |            |          |          |  |
| Mov.                        | L2  | T1  | Total | %HV |            | Deg. Satn | Lane Util. | Prob. SL | Ov. Lane |  |
| From E                      |     |     |       |     | Cap. veh/h | v/c       | %          | %        | No.      |  |
| To Exit:                    | S   | W   |       |     |            |           |            |          |          |  |
| Lane 1                      | 1   | 221 | 222   | 4.0 | 1900       | 0.117     | 100        | NA       | NA       |  |
| Approach                    | 1   | 221 | 222   | 4.0 |            | 0.117     |            |          |          |  |
| West: R514                  |     |     |       |     |            |           |            |          |          |  |
| Mov.                        | T1  | R2  | Total | %HV |            | Deg. Satn | Lane Util. | Prob. SL | Ov. Lane |  |
| From W                      |     |     |       |     | Cap. veh/h | v/c       | %          | %        | No.      |  |
| To Exit:                    | E   | S   |       |     |            |           |            |          |          |  |
| Lane 1                      | 238 | 1   | 239   | 8.0 | 1852       | 0.129     | 100        | NA       | NA       |  |

|                          |     |     |     |       |       |
|--------------------------|-----|-----|-----|-------|-------|
| Approach                 | 238 | 1   | 239 | 8.0   | 0.129 |
| Total %HV Deg.Satn (v/c) |     |     |     |       |       |
| All Vehicles             | 464 | 6.0 |     | 0.129 |       |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                  |                     |                              |                          |                  |                       |                      |                |               |                |                 |
|----------------------------------------------------------------|------------------|---------------------|------------------------------|--------------------------|------------------|-----------------------|----------------------|----------------|---------------|----------------|-----------------|
|                                                                | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                  |                     |                              |                          |                  |                       |                      |                |               |                |                 |

| Variable Demand Analysis |                           |                            |                                       |                          |
|--------------------------|---------------------------|----------------------------|---------------------------------------|--------------------------|
|                          | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
| South: Unnamed Road      |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |
| East: R514               |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |
| West: R514               |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |

## LANE SUMMARY

**Site: 3 [Intersection 3\_2029 Background AM (Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Gilia Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance |               |      |               |      |      |           |            |             |                  |                   |          |             |             |             |     |
|--------------------------|---------------|------|---------------|------|------|-----------|------------|-------------|------------------|-------------------|----------|-------------|-------------|-------------|-----|
|                          | Demand Flows  |      | Arrival Flows |      | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |          | Lane Config | Lane Length | Cap. Prob.  |     |
|                          | [ Total veh/h | HV % | [ Total veh/h | HV % |      |           |            |             |                  | [ Veh             | Dist ] m |             |             | Adj. Block. |     |
| South: Gilia Road        |               |      |               |      |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 5             | 0.0  | 5             | 0.0  | 862  | 0.006     | 100        | 8.3         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 5             | 0.0  | 5             | 0.0  |      | 0.006     |            | 8.3         | LOS A            | 0.0               | 0.1      |             |             |             |     |
| East: R514               |               |      |               |      |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 258           | 8.9  | 258           | 8.9  | 1839 | 0.140     | 100        | 0.1         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 258           | 8.9  | 258           | 8.9  |      | 0.140     |            | 0.1         | NA               | 0.0               | 0.1      |             |             |             |     |
| North: Gilia Road        |               |      |               |      |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 14            | 0.0  | 14            | 0.0  | 735  | 0.019     | 100        | 8.7         | LOS A            | 0.1               | 0.5      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 14            | 0.0  | 14            | 0.0  |      | 0.019     |            | 8.7         | LOS A            | 0.1               | 0.5      |             |             |             |     |
| West: R514               |               |      |               |      |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 191           | 4.7  | 191           | 4.7  | 1883 | 0.101     | 100        | 0.2         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 191           | 4.7  | 191           | 4.7  |      | 0.101     |            | 0.2         | NA               | 0.0               | 0.1      |             |             |             |     |
| All Vehicles             | 468           | 6.8  | 468           | 6.8  |      | 0.140     |            | 0.5         | NA               | 0.1               | 0.5      |             |             |             |     |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for one road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |             |             |             |       |     |               |                     |                    |                      |                    |
|-----------------------------|-------------|-------------|-------------|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| South: Gilia Road           |             |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From S<br>To Exit:  | L2<br><br>W | T1<br><br>N | R2<br><br>E | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 3           | 1           | 1           | 5     | 0.0 | 862           | 0.006               | 100                | NA                   | NA                 |
| Approach                    | 3           | 1           | 1           | 5     | 0.0 | 0.006         |                     |                    |                      |                    |
| East: R514                  |             |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From E<br>To Exit:  | L2<br><br>S | T1<br><br>W | R2<br><br>N | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 2           | 254         | 2           | 258   | 8.9 | 1839          | 0.140               | 100                | NA                   | NA                 |
| Approach                    | 2           | 254         | 2           | 258   | 8.9 | 0.140         |                     |                    |                      |                    |
| North: Gilia Road           |             |             |             |       |     |               |                     |                    |                      |                    |

| Mov.<br>From N<br>To Exit: | L2  | T1  | R2 | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|----------------------------|-----|-----|----|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| Lane 1                     | 5   | 1   | 8  | 14    | 0.0 | 735           | 0.019               | 100                | NA                   | NA                 |
| Approach                   | 5   | 1   | 8  | 14    | 0.0 |               | 0.019               |                    |                      |                    |
| West: R514                 |     |     |    |       |     |               |                     |                    |                      |                    |
| Mov.<br>From W<br>To Exit: | L2  | T1  | R2 | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                     | 10  | 180 | 1  | 191   | 4.7 | 1883          | 0.101               | 100                | NA                   | NA                 |
| Approach                   | 10  | 180 | 1  | 191   | 4.7 |               | 0.101               |                    |                      |                    |
| Total %HV Deg. Satn (v/c)  |     |     |    |       |     |               |                     |                    |                      |                    |
| All Vehicles               | 468 | 6.8 |    | 0.140 |     |               |                     |                    |                      |                    |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                        |                              |                                       |                                |                        |                             |                               |                   |                     |                      |                       |  |
|----------------------------------------------------------------|------------------------|------------------------------|---------------------------------------|--------------------------------|------------------------|-----------------------------|-------------------------------|-------------------|---------------------|----------------------|-----------------------|--|
|                                                                | Exit<br>Lane<br>Number | Short<br>Lane<br>Length<br>m | Percent<br>Opng in<br>Lane<br>% veh/h | Opposing<br>Flow Rate<br>pcu/h | Critical<br>Gap<br>sec | Follow-up<br>Headway<br>sec | Lane<br>Flow<br>Rate<br>veh/h | Capacity<br>veh/h | Deg.<br>Satn<br>v/c | Min.<br>Delay<br>sec | Merge<br>Delay<br>sec |  |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                        |                              |                                       |                                |                        |                             |                               |                   |                     |                      |                       |  |

| Variable Demand Analysis |                                    |                                     |                                                   |                                   |
|--------------------------|------------------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------|
|                          | Initial<br>Queued<br>Demand<br>veh | Residual<br>Queued<br>Demand<br>veh | Time for<br>Residual<br>Demand<br>to Clear<br>sec | Duration<br>of<br>Oversatn<br>sec |
| South: Gilia Road        |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| East: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| North: Gilia Road        |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| West: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |



## LANE SUMMARY

**Site: 3 [Intersection 3\_2029 Background PM (Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Gilia Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
|--------------------------|---------------|--------|---------------|--------|------|-----------|------------|-------------|------------------|-------------------|----------|-------------|-------------|-------------|-----|
|                          | Demand Flows  |        | Arrival Flows |        | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |          | Lane Config | Lane Length | Cap. Prob.  |     |
|                          | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |      |           |            |             |                  | [ Veh             | Dist ] m |             |             | Adj. Block. | %   |
| South: Gilia Road        |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 3             | 0.0    | 3             | 0.0    | 752  | 0.004     | 100        | 8.7         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 3             | 0.0    | 3             | 0.0    |      | 0.004     |            | 8.7         | LOS A            | 0.0               | 0.1      |             |             |             |     |
| East: R514               |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 223           | 4.3    | 223           | 4.3    | 1857 | 0.120     | 100        | 0.3         | LOS A            | 0.1               | 0.6      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 223           | 4.3    | 223           | 4.3    |      | 0.120     |            | 0.3         | NA               | 0.1               | 0.6      |             |             |             |     |
| North: Gilia Road        |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 7             | 0.0    | 7             | 0.0    | 697  | 0.010     | 100        | 8.9         | LOS A            | 0.0               | 0.2      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 7             | 0.0    | 7             | 0.0    |      | 0.010     |            | 8.9         | LOS A            | 0.0               | 0.2      |             |             |             |     |
| West: R514               |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 241           | 7.7    | 241           | 7.7    | 1844 | 0.131     | 100        | 0.2         | LOS A            | 0.0               | 0.3      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 241           | 7.7    | 241           | 7.7    |      | 0.131     |            | 0.2         | NA               | 0.0               | 0.3      |             |             |             |     |
| All Vehicles             | 474           | 5.9    | 474           | 5.9    |      | 0.131     |            | 0.4         | NA               | 0.1               | 0.6      |             |             |             |     |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for minor road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |             |             |             |       |     |               |                     |                    |                      |                    |
|-----------------------------|-------------|-------------|-------------|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| South: Gilia Road           |             |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From S<br>To Exit:  | L2<br><br>W | T1<br><br>N | R2<br><br>E | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 1           | 1           | 1           | 3     | 0.0 | 752           | 0.004               | 100                | NA                   | NA                 |
| Approach                    | 1           | 1           | 1           | 3     | 0.0 | 0.004         |                     |                    |                      |                    |
| East: R514                  |             |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From E<br>To Exit:  | L2<br><br>S | T1<br><br>W | R2<br><br>N | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 1           | 212         | 10          | 223   | 4.3 | 1857          | 0.120               | 100                | NA                   | NA                 |
| Approach                    | 1           | 212         | 10          | 223   | 4.3 | 0.120         |                     |                    |                      |                    |
| North: Gilia Road           |             |             |             |       |     |               |                     |                    |                      |                    |

| Mov.<br>From N<br>To Exit: | L2  | T1  | R2 | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|----------------------------|-----|-----|----|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| Lane 1                     | 2   | 1   | 4  | 7     | 0.0 | 697           | 0.010               | 100                | NA                   | NA                 |
| Approach                   | 2   | 1   | 4  | 7     | 0.0 |               | 0.010               |                    |                      |                    |
| West: R514                 |     |     |    |       |     |               |                     |                    |                      |                    |
| Mov.<br>From W<br>To Exit: | L2  | T1  | R2 | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                     | 4   | 232 | 5  | 241   | 7.7 | 1844          | 0.131               | 100                | NA                   | NA                 |
| Approach                   | 4   | 232 | 5  | 241   | 7.7 |               | 0.131               |                    |                      |                    |
| Total %HV Deg.Satn (v/c)   |     |     |    |       |     |               |                     |                    |                      |                    |
| All Vehicles               | 474 | 5.9 |    | 0.131 |     |               |                     |                    |                      |                    |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                        |                              |                                 |                                |       |                        |                             |                               |                   |                     |                      |                       |
|----------------------------------------------------------------|------------------------|------------------------------|---------------------------------|--------------------------------|-------|------------------------|-----------------------------|-------------------------------|-------------------|---------------------|----------------------|-----------------------|
|                                                                | Exit<br>Lane<br>Number | Short<br>Lane<br>Length<br>m | Percent<br>Opng in<br>Lane<br>% | Opposing<br>Flow Rate<br>veh/h | pcu/h | Critical<br>Gap<br>sec | Follow-up<br>Headway<br>sec | Lane<br>Flow<br>Rate<br>veh/h | Capacity<br>veh/h | Deg.<br>Satn<br>v/c | Min.<br>Delay<br>sec | Merge<br>Delay<br>sec |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                        |                              |                                 |                                |       |                        |                             |                               |                   |                     |                      |                       |

| Variable Demand Analysis |                                    |                                     |                                                   |                                   |
|--------------------------|------------------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------|
|                          | Initial<br>Queued<br>Demand<br>veh | Residual<br>Queued<br>Demand<br>veh | Time for<br>Residual<br>Demand<br>to Clear<br>sec | Duration<br>of<br>Oversatn<br>sec |
| South: Gilia Road        |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| East: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| North: Gilia Road        |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| West: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |

## LANE SUMMARY

**Site: 4 [Intersection 4\_2029 Background AM (Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Balderjan Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance  |                  |         |                  |         |      |           |            |             |                  |                   |     |             |             |             |     |
|---------------------------|------------------|---------|------------------|---------|------|-----------|------------|-------------|------------------|-------------------|-----|-------------|-------------|-------------|-----|
|                           | Demand Flows     |         | Arrival Flows    |         | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |     | Lane Config | Lane Length | Cap. Prob.  |     |
|                           | [ Total<br>veh/h | HV<br>% | [ Total<br>veh/h | HV<br>% |      |           |            |             |                  | [ Veh<br>Dist ]   | m   |             |             | Adj. Block. | %   |
| SouthEast: Balderjan Road |                  |         |                  |         |      |           |            |             |                  |                   |     |             |             |             |     |
| Lane 1                    | 23               | 0.0     | 23               | 0.0     | 760  | 0.030     | 100        | 8.8         | LOS A            | 0.1               | 0.7 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 23               | 0.0     | 23               | 0.0     |      | 0.030     |            | 8.8         | LOS A            | 0.1               | 0.7 |             |             |             |     |
| East: R514                |                  |         |                  |         |      |           |            |             |                  |                   |     |             |             |             |     |
| Lane 1                    | 337              | 6.9     | 337              | 6.9     | 1814 | 0.186     | 100        | 0.6         | LOS A            | 0.3               | 2.1 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 337              | 6.9     | 337              | 6.9     |      | 0.186     |            | 0.6         | NA               | 0.3               | 2.1 |             |             |             |     |
| NorthWest: Unnamed Access |                  |         |                  |         |      |           |            |             |                  |                   |     |             |             |             |     |
| Lane 1                    | 32               | 0.0     | 32               | 0.0     | 646  | 0.050     | 100        | 9.8         | LOS A            | 0.2               | 1.2 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 32               | 0.0     | 32               | 0.0     |      | 0.050     |            | 9.8         | LOS A            | 0.2               | 1.2 |             |             |             |     |
| West: R514                |                  |         |                  |         |      |           |            |             |                  |                   |     |             |             |             |     |
| Lane 1                    | 169              | 4.9     | 169              | 4.9     | 1878 | 0.090     | 100        | 0.1         | LOS A            | 0.0               | 0.1 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 169              | 4.9     | 169              | 4.9     |      | 0.090     |            | 0.1         | NA               | 0.0               | 0.1 |             |             |             |     |
| All Vehicles              | 561              | 5.6     | 561              | 5.6     |      | 0.186     |            | 1.3         | NA               | 0.3               | 2.1 |             |             |             |     |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for minor road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |    |     |    |       |     |       |       |       |        |      |
|-----------------------------|----|-----|----|-------|-----|-------|-------|-------|--------|------|
| SouthEast: Balderjan Road   |    |     |    |       |     |       |       |       |        |      |
| Mov.                        | L1 | T1  | R3 | Total | %HV |       | Deg.  | Lane  | Prob.  | Ov.  |
| From SE                     |    |     |    |       |     | Cap.  | Satn  | Util. | SL Ov. | Lane |
| To Exit:                    | W  | NW  | E  |       |     | veh/h | v/c   | %     | %      | No.  |
| Lane 1                      | 12 | 5   | 6  | 23    | 0.0 | 760   | 0.030 | 100   | NA     | NA   |
| Approach                    | 12 | 5   | 6  | 23    | 0.0 |       | 0.030 |       |        |      |
| East: R514                  |    |     |    |       |     |       |       |       |        |      |
| Mov.                        | L3 | T1  | R1 | Total | %HV |       | Deg.  | Lane  | Prob.  | Ov.  |
| From E                      |    |     |    |       |     | Cap.  | Satn  | Util. | SL Ov. | Lane |
| To Exit:                    | SE | W   | NW |       |     | veh/h | v/c   | %     | %      | No.  |
| Lane 1                      | 10 | 291 | 36 | 337   | 6.9 | 1814  | 0.186 | 100   | NA     | NA   |
| Approach                    | 10 | 291 | 36 | 337   | 6.9 |       | 0.186 |       |        |      |
| NorthWest: Unnamed Access   |    |     |    |       |     |       |       |       |        |      |

| Mov.                     | L1  | T1  | R3 | Total | %HV |       | Deg.  | Lane  | Prob. | Ov.  |
|--------------------------|-----|-----|----|-------|-----|-------|-------|-------|-------|------|
| From NW                  | E   | SE  | W  |       |     | Cap.  | Satn  | Util. | SL    | Lane |
| To Exit:                 |     |     |    |       |     | veh/h | v/c   | %     | %     | No.  |
| Lane 1                   | 1   | 26  | 5  | 32    | 0.0 | 646   | 0.050 | 100   | NA    | NA   |
| Approach                 | 1   | 26  | 5  | 32    | 0.0 |       | 0.050 |       |       |      |
| West: R514               |     |     |    |       |     |       |       |       |       |      |
| Mov.                     | L3  | T1  | R1 | Total | %HV |       | Deg.  | Lane  | Prob. | Ov.  |
| From W                   | NW  | E   | SE |       |     | Cap.  | Satn  | Util. | SL    | Lane |
| To Exit:                 |     |     |    |       |     | veh/h | v/c   | %     | %     | No.  |
| Lane 1                   | 1   | 166 | 2  | 169   | 4.9 | 1878  | 0.090 | 100   | NA    | NA   |
| Approach                 | 1   | 166 | 2  | 169   | 4.9 |       | 0.090 |       |       |      |
| Total %HV Deg.Satn (v/c) |     |     |    |       |     |       |       |       |       |      |
| All Vehicles             | 561 | 5.6 |    | 0.186 |     |       |       |       |       |      |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                        |                              |                                       |                                |                        |                             |                                           |  |                     |                      |                       |
|----------------------------------------------------------------|------------------------|------------------------------|---------------------------------------|--------------------------------|------------------------|-----------------------------|-------------------------------------------|--|---------------------|----------------------|-----------------------|
|                                                                | Exit<br>Lane<br>Number | Short<br>Lane<br>Length<br>m | Percent<br>Opng in<br>Lane<br>% veh/h | Opposing<br>Flow Rate<br>pcu/h | Critical<br>Gap<br>sec | Follow-up<br>Headway<br>sec | Lane<br>Capacity<br>Flow<br>Rate<br>veh/h |  | Deg.<br>Satn<br>v/c | Min.<br>Delay<br>sec | Merge<br>Delay<br>sec |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                        |                              |                                       |                                |                        |                             |                                           |  |                     |                      |                       |

| Variable Demand Analysis  |         |          |          |          |
|---------------------------|---------|----------|----------|----------|
|                           | Initial | Residual | Time for | Duration |
|                           | Queued  | Queued   | Residual | of       |
|                           | Demand  | Demand   | Demand   | Oversatn |
|                           | veh     | veh      | to Clear |          |
|                           |         |          | sec      | sec      |
| SouthEast: Balderjan Road |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |
| East: R514                |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |
| NorthWest: Unnamed Access |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |
| West: R514                |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |

## LANE SUMMARY

**Site: 4 [Intersection 4\_2029 Background PM (Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Balderjan Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance  |                  |           |                  |           |      |           |            |             |                  |                   |     |             |             |             |     |
|---------------------------|------------------|-----------|------------------|-----------|------|-----------|------------|-------------|------------------|-------------------|-----|-------------|-------------|-------------|-----|
|                           | Demand Flows     |           | Arrival Flows    |           | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |     | Lane Config | Lane Length | Cap. Prob.  |     |
|                           | [ Total<br>veh/h | HV ]<br>% | [ Total<br>veh/h | HV ]<br>% |      |           |            |             |                  | [ Veh<br>Dist ]   |     |             |             | Adj. Block. |     |
| SouthEast: Balderjan Road |                  |           |                  |           |      |           |            |             |                  |                   |     |             |             |             |     |
| Lane 1                    | 10               | 10.0      | 10               | 10.0      | 634  | 0.016     | 100        | 9.7         | LOS A            | 0.1               | 0.4 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 10               | 10.0      | 10               | 10.0      |      | 0.016     |            | 9.7         | LOS A            | 0.1               | 0.4 |             |             |             |     |
| East: R514                |                  |           |                  |           |      |           |            |             |                  |                   |     |             |             |             |     |
| Lane 1                    | 245              | 4.7       | 245              | 4.7       | 1777 | 0.138     | 100        | 1.0         | LOS A            | 0.3               | 2.5 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 245              | 4.7       | 245              | 4.7       |      | 0.138     |            | 1.0         | NA               | 0.3               | 2.5 |             |             |             |     |
| NorthWest: Unnamed Access |                  |           |                  |           |      |           |            |             |                  |                   |     |             |             |             |     |
| Lane 1                    | 47               | 2.6       | 47               | 2.6       | 658  | 0.071     | 100        | 9.8         | LOS A            | 0.2               | 1.8 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 47               | 2.6       | 47               | 2.6       |      | 0.071     |            | 9.8         | LOS A            | 0.2               | 1.8 |             |             |             |     |
| West: R514                |                  |           |                  |           |      |           |            |             |                  |                   |     |             |             |             |     |
| Lane 1                    | 244              | 6.3       | 244              | 6.3       | 1861 | 0.131     | 100        | 0.0         | LOS A            | 0.0               | 0.2 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 244              | 6.3       | 244              | 6.3       |      | 0.131     |            | 0.0         | NA               | 0.0               | 0.2 |             |             |             |     |
| All Vehicles              | 546              | 5.4       | 546              | 5.4       |      | 0.138     |            | 1.5         | NA               | 0.3               | 2.5 |             |             |             |     |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for one road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |              |              |              |       |      |               |                     |                    |                      |                    |
|-----------------------------|--------------|--------------|--------------|-------|------|---------------|---------------------|--------------------|----------------------|--------------------|
| SouthEast: Balderjan Road   |              |              |              |       |      |               |                     |                    |                      |                    |
| Mov.<br>From SE<br>To Exit: | L1<br><br>W  | T1<br><br>NW | R3<br><br>E  | Total | %HV  | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 4            | 2            | 4            | 10    | 10.0 | 634           | 0.016               | 100                | NA                   | NA                 |
| Approach                    | 4            | 2            | 4            | 10    | 10.0 |               | 0.016               |                    |                      |                    |
| East: R514                  |              |              |              |       |      |               |                     |                    |                      |                    |
| Mov.<br>From E<br>To Exit:  | L3<br><br>SE | T1<br><br>W  | R1<br><br>NW | Total | %HV  | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 9            | 193          | 43           | 245   | 4.7  | 1777          | 0.138               | 100                | NA                   | NA                 |
| Approach                    | 9            | 193          | 43           | 245   | 4.7  |               | 0.138               |                    |                      |                    |
| NorthWest: Unnamed Access   |              |              |              |       |      |               |                     |                    |                      |                    |



| Mov.<br>From NW<br>To Exit: | L1<br>E  | T1<br>SE | R3<br>W  | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|-----------------------------|----------|----------|----------|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| Lane 1                      | 1        | 41       | 5        | 47    | 2.6 | 658           | 0.071               | 100                | NA                   | NA                 |
| Approach                    | 1        | 41       | 5        | 47    | 2.6 |               | 0.071               |                    |                      |                    |
| West: R514                  |          |          |          |       |     |               |                     |                    |                      |                    |
| Mov.<br>From W<br>To Exit:  | L3<br>NW | T1<br>E  | R1<br>SE | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 1        | 241      | 2        | 244   | 6.3 | 1861          | 0.131               | 100                | NA                   | NA                 |
| Approach                    | 1        | 241      | 2        | 244   | 6.3 |               | 0.131               |                    |                      |                    |
| Total %HV Deg.Satn (v/c)    |          |          |          |       |     |               |                     |                    |                      |                    |
| All Vehicles                | 546      | 5.4      |          | 0.138 |     |               |                     |                    |                      |                    |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                        |                              |                                       |                                |                        |                             |                               |                   |                     |                      |                       |  |
|----------------------------------------------------------------|------------------------|------------------------------|---------------------------------------|--------------------------------|------------------------|-----------------------------|-------------------------------|-------------------|---------------------|----------------------|-----------------------|--|
|                                                                | Exit<br>Lane<br>Number | Short<br>Lane<br>Length<br>m | Percent<br>Opng in<br>Lane<br>% veh/h | Opposing<br>Flow Rate<br>pcu/h | Critical<br>Gap<br>sec | Follow-up<br>Headway<br>sec | Lane<br>Flow<br>Rate<br>veh/h | Capacity<br>veh/h | Deg.<br>Satn<br>v/c | Min.<br>Delay<br>sec | Merge<br>Delay<br>sec |  |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                        |                              |                                       |                                |                        |                             |                               |                   |                     |                      |                       |  |

| Variable Demand Analysis  |                                    |                                     |                                                   |                                   |
|---------------------------|------------------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------|
|                           | Initial<br>Queued<br>Demand<br>veh | Residual<br>Queued<br>Demand<br>veh | Time for<br>Residual<br>Demand<br>to Clear<br>sec | Duration<br>of<br>Oversatn<br>sec |
| SouthEast: Balderjan Road |                                    |                                     |                                                   |                                   |
| Lane 1                    | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| East: R514                |                                    |                                     |                                                   |                                   |
| Lane 1                    | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| NorthWest: Unnamed Access |                                    |                                     |                                                   |                                   |
| Lane 1                    | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| West: R514                |                                    |                                     |                                                   |                                   |
| Lane 1                    | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |

## **APPENDIX E: DETAILED LANE SUMMARY FOR THE 2029 BACKGROUND GROWTH TRAFFIC AND THE DEVELOPMENT DEMAND PEAK HOUR ON THE 2024 ROAD NETWORK**

## LANE SUMMARY

**Site: 4 [Intersection 1\_2029 Background + Development AM  
(Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Charl Avenue

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance |               |      |               |      |      |           |                 |             |                  |                   |          |             |             |             |     |
|--------------------------|---------------|------|---------------|------|------|-----------|-----------------|-------------|------------------|-------------------|----------|-------------|-------------|-------------|-----|
|                          | Demand Flows  |      | Arrival Flows |      | Cap. | Deg. Satn | Lane Util.      | Aver. Delay | Level of Service | 95% Back Of Queue |          | Lane Config | Lane Length | Cap. Prob.  |     |
|                          | [ Total veh/h | HV % | [ Total veh/h | HV % |      |           |                 |             |                  | [ Veh             | Dist ] m |             |             | Adj. Block. |     |
| East: R514               |               |      |               |      |      |           |                 |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 95            | 8.0  | 95            | 8.0  | 1854 | 0.051     | 48 <sup>6</sup> | 0.4         | LOS A            | 0.0               | 0.0      | Short       | 90          | 0.0         | NA  |
| Lane 2                   | 176           | 8.2  | 176           | 8.2  | 1628 | 0.108     | 100             | 1.5         | LOS A            | 0.3               | 2.2      | Full        | 122         | 0.0         | 0.0 |
| Approach                 | 271           | 8.1  | 271           | 8.1  |      | 0.108     |                 | 1.1         | NA               | 0.3               | 2.2      |             |             |             |     |
| North: Charl Avenue      |               |      |               |      |      |           |                 |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 110           | 3.2  | 110           | 3.2  | 637  | 0.173     | 100             | 10.1        | LOS B            | 0.7               | 4.9      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 110           | 3.2  | 110           | 3.2  |      | 0.173     |                 | 10.1        | LOS B            | 0.7               | 4.9      |             |             |             |     |
| West: R514               |               |      |               |      |      |           |                 |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 60            | 9.0  | 60            | 9.0  | 1745 | 0.034     | 100             | 5.6         | LOS A            | 0.0               | 0.0      | Short       | 60          | 0.0         | NA  |
| Lane 2                   | 151           | 3.0  | 151           | 3.0  | 1913 | 0.079     | 100             | 0.0         | LOS A            | 0.0               | 0.0      | Full        | 100         | 0.0         | 0.0 |
| Approach                 | 211           | 4.7  | 211           | 4.7  |      | 0.079     |                 | 1.6         | NA               | 0.0               | 0.0      |             |             |             |     |
| All Vehicles             | 592           | 6.0  | 592           | 6.0  |      | 0.173     |                 | 3.0         | NA               | 0.7               | 4.9      |             |             |             |     |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

## 6 Lane under-utilisation due to downstream effects

| Approach Lane Flows (veh/h) |             |             |       |     |               |                     |                    |                      |                    |
|-----------------------------|-------------|-------------|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| East: R514                  |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From E<br>To Exit:  | T1<br><br>W | R2<br><br>N | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 95          | -           | 95    | 8.0 | 1854          | 0.051               | 48 <sup>6</sup>    | 0.0                  | 2                  |
| Lane 2                      | 142         | 34          | 176   | 8.2 | 1628          | 0.108               | 100                | NA                   | NA                 |
| Approach                    | 237         | 34          | 271   | 8.1 | 0.108         |                     |                    |                      |                    |
| North: Charl Avenue         |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From N<br>To Exit:  | L2<br><br>E | R2<br><br>W | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 45          | 65          | 110   | 3.2 | 637           | 0.173               | 100                | NA                   | NA                 |
| Approach                    | 45          | 65          | 110   | 3.2 | 0.173         |                     |                    |                      |                    |
| West: R514                  |             |             |       |     |               |                     |                    |                      |                    |

| Mov.<br>From W<br>To Exit: | L2<br>N | T1<br>E | Total | %HV   | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|----------------------------|---------|---------|-------|-------|---------------|---------------------|--------------------|----------------------|--------------------|
| Lane 1                     | 60      | -       | 60    | 9.0   | 1745          | 0.034               | 100                | 0.0                  | 2                  |
| Lane 2                     | -       | 151     | 151   | 3.0   | 1913          | 0.079               | 100                | NA                   | NA                 |
| Approach                   | 60      | 151     | 211   | 4.7   |               | 0.079               |                    |                      |                    |
| Total %HV Deg.Satn (v/c)   |         |         |       |       |               |                     |                    |                      |                    |
| All Vehicles               | 592     | 6.0     |       | 0.173 |               |                     |                    |                      |                    |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

6 Lane under-utilisation due to downstream effects

| Merge Analysis                                 |                  |                     |                              |                           |     |                  |                       |                      |                |               |                |                 |
|------------------------------------------------|------------------|---------------------|------------------------------|---------------------------|-----|------------------|-----------------------|----------------------|----------------|---------------|----------------|-----------------|
|                                                | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % veh/h | Opposing Flow Rate pcu/h  |     | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
| East Exit: R514<br>Merge Type: <b>Priority</b> |                  |                     |                              |                           |     |                  |                       |                      |                |               |                |                 |
| Exit Short Lane                                | 1                | 90                  | 0.0                          | 0                         | 0   | 3.05             | 2.03                  | 196                  | 1769           | 0.111         | 0.0            | 0.0             |
| Merge Lane                                     | 2                | -                   | 100.0                        | Merge Lane is not Opposed |     |                  |                       | 0                    | 1800           | 0.000         | 0.0            | 0.0             |
| West Exit: R514<br>Merge Type: <b>Priority</b> |                  |                     |                              |                           |     |                  |                       |                      |                |               |                |                 |
| Exit Short Lane                                | 1                | 90                  | 0.0                          | 207                       | 213 | 3.12             | 2.08                  | 95                   | 1511           | 0.063         | 0.3            | 0.4             |
| Merge Lane                                     | 2                | -                   | 100.0                        | Merge Lane is not Opposed |     |                  |                       | 207                  | 1800           | 0.115         | 0.0            | 0.0             |

| Variable Demand Analysis |                                    |                                     |                                                   |                                   |
|--------------------------|------------------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------|
|                          | Initial<br>Queued<br>Demand<br>veh | Residual<br>Queued<br>Demand<br>veh | Time for<br>Residual<br>Demand<br>to Clear<br>sec | Duration<br>of<br>Oversatn<br>sec |
| East: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| Lane 2                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| North: Charl Avenue      |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| West: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| Lane 2                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |

## LANE SUMMARY

**Site: 4 [Intersection 1\_2029 Background + Development PM  
(Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Charl Avenue

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance |               |      |               |      |       |           |                 |             |                  |                   |          |             |             |             |     |
|--------------------------|---------------|------|---------------|------|-------|-----------|-----------------|-------------|------------------|-------------------|----------|-------------|-------------|-------------|-----|
|                          | Demand Flows  |      | Arrival Flows |      | Cap.  | Deg. Satn | Lane Util.      | Aver. Delay | Level of Service | 95% Back Of Queue |          | Lane Config | Lane Length | Cap. Prob.  |     |
|                          | [ Total veh/h | HV % | [ Total veh/h | HV % |       |           |                 |             |                  | [ Veh             | Dist ] m |             |             | Adj. Block. |     |
|                          |               |      |               |      | veh/h | v/c       | %               | sec         |                  |                   |          |             | m           | %           | %   |
| East: R514               |               |      |               |      |       |           |                 |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 81            | 4.0  | 81            | 4.0  | 1901  | 0.043     | 48 <sup>6</sup> | 0.3         | LOS A            | 0.0               | 0.0      | Short       | 90          | 0.0         | NA  |
| Lane 2                   | 149           | 3.2  | 149           | 3.2  | 1652  | 0.090     | 100             | 1.7         | LOS A            | 0.3               | 1.8      | Full        | 122         | 0.0         | 0.0 |
| Approach                 | 230           | 3.5  | 230           | 3.5  |       | 0.090     |                 | 1.2         | NA               | 0.3               | 1.8      |             |             |             |     |
| North: Charl Avenue      |               |      |               |      |       |           |                 |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 69            | 3.3  | 69            | 3.3  | 576   | 0.120     | 100             | 10.7        | LOS B            | 0.4               | 3.2      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 69            | 3.3  | 69            | 3.3  |       | 0.120     |                 | 10.7        | LOS B            | 0.4               | 3.2      |             |             |             |     |
| West: R514               |               |      |               |      |       |           |                 |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 59            | 2.0  | 59            | 2.0  | 1831  | 0.032     | 100             | 5.5         | LOS A            | 0.0               | 0.0      | Short       | 60          | 0.0         | NA  |
| Lane 2                   | 213           | 9.0  | 213           | 9.0  | 1842  | 0.116     | 100             | 0.0         | LOS A            | 0.0               | 0.0      | Full        | 100         | 0.0         | 0.0 |
| Approach                 | 272           | 7.5  | 272           | 7.5  |       | 0.116     |                 | 1.2         | NA               | 0.0               | 0.0      |             |             |             |     |
| All Vehicles             | 571           | 5.4  | 571           | 5.4  |       | 0.120     |                 | 2.3         | NA               | 0.4               | 3.2      |             |             |             |     |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

## 6 Lane under-utilisation due to downstream effects

| Approach Lane Flows (veh/h) |             |             |       |     |               |                     |                    |                      |                    |
|-----------------------------|-------------|-------------|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| East: R514                  |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From E<br>To Exit:  | T1<br><br>W | R2<br><br>N | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 81          | -           | 81    | 4.0 | 1901          | 0.043               | 48 <sup>6</sup>    | 0.0                  | 2                  |
| Lane 2                      | 119         | 30          | 149   | 3.2 | 1652          | 0.090               | 100                | NA                   | NA                 |
| Approach                    | 200         | 30          | 230   | 3.5 |               | 0.090               |                    |                      |                    |
| North: Charl Avenue         |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From N<br>To Exit:  | L2<br><br>E | R2<br><br>W | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 24          | 45          | 69    | 3.3 | 576           | 0.120               | 100                | NA                   | NA                 |
| Approach                    | 24          | 45          | 69    | 3.3 |               | 0.120               |                    |                      |                    |
| West: R514                  |             |             |       |     |               |                     |                    |                      |                    |



| Mov.<br>From W<br>To Exit: | L2<br>N | T1<br>E | Total | %HV   | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|----------------------------|---------|---------|-------|-------|---------------|---------------------|--------------------|----------------------|--------------------|
| Lane 1                     | 59      | -       | 59    | 2.0   | 1831          | 0.032               | 100                | 0.0                  | 2                  |
| Lane 2                     | -       | 213     | 213   | 9.0   | 1842          | 0.116               | 100                | NA                   | NA                 |
| Approach                   | 59      | 213     | 272   | 7.5   |               | 0.116               |                    |                      |                    |
| Total %HV Deg.Satn (v/c)   |         |         |       |       |               |                     |                    |                      |                    |
| All Vehicles               | 571     | 5.4     |       | 0.120 |               |                     |                    |                      |                    |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

6 Lane under-utilisation due to downstream effects

| Merge Analysis                                 |                        |                              |                                       |                                |                        |                             |                               |                   |                     |                      |                       |     |
|------------------------------------------------|------------------------|------------------------------|---------------------------------------|--------------------------------|------------------------|-----------------------------|-------------------------------|-------------------|---------------------|----------------------|-----------------------|-----|
|                                                | Exit<br>Lane<br>Number | Short<br>Lane<br>Length<br>m | Percent<br>Opng in<br>Lane<br>% veh/h | Opposing<br>Flow Rate<br>pcu/h | Critical<br>Gap<br>sec | Follow-up<br>Headway<br>sec | Lane<br>Flow<br>Rate<br>veh/h | Capacity<br>veh/h | Deg.<br>Satn<br>v/c | Min.<br>Delay<br>sec | Merge<br>Delay<br>sec |     |
| East Exit: R514<br>Merge Type: <b>Priority</b> |                        |                              |                                       |                                |                        |                             |                               |                   |                     |                      |                       |     |
| Exit Short Lane                                | 1                      | 90                           | 0.0                                   | 0                              | 0                      | 3.12                        | 2.08                          | 237               | 1730                | 0.137                | 0.0                   | 0.0 |
| Merge Lane                                     | 2                      | -                            | 100.0                                 | Merge Lane is not Opposed      |                        |                             |                               | 0                 | 1800                | 0.000                | 0.0                   | 0.0 |
| West Exit: R514<br>Merge Type: <b>Priority</b> |                        |                              |                                       |                                |                        |                             |                               |                   |                     |                      |                       |     |
| Exit Short Lane                                | 1                      | 90                           | 0.0                                   | 164                            | 167                    | 3.06                        | 2.04                          | 81                | 1594                | 0.051                | 0.2                   | 0.3 |
| Merge Lane                                     | 2                      | -                            | 100.0                                 | Merge Lane is not Opposed      |                        |                             |                               | 164               | 1800                | 0.091                | 0.0                   | 0.0 |

| Variable Demand Analysis |                                    |                                     |                                                   |                                   |
|--------------------------|------------------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------|
|                          | Initial<br>Queued<br>Demand<br>veh | Residual<br>Queued<br>Demand<br>veh | Time for<br>Residual<br>Demand<br>to Clear<br>sec | Duration<br>of<br>Oversatn<br>sec |
| East: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| Lane 2                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| North: Charl Avenue      |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| West: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| Lane 2                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |

## LANE SUMMARY

 **Site: 2 [Intersection 2\_2029 Background + Development AM (Site Folder: General)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.2.202**

Intersection of R514 and Unnamed Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance |                 |      |                 |      |       |           |            |             |                  |                   |          |             |             |           |              |
|--------------------------|-----------------|------|-----------------|------|-------|-----------|------------|-------------|------------------|-------------------|----------|-------------|-------------|-----------|--------------|
|                          | Demand Flows    |      | Arrival Flows   |      | Cap.  | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |          | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|                          | [ Total veh/h ] | HV % | [ Total veh/h ] | HV % | veh/h | v/c       | %          | sec         |                  | [ Veh ]           | Dist ] m |             | m           | %         | %            |
| South: Unnamed Road      |                 |      |                 |      |       |           |            |             |                  |                   |          |             |             |           |              |
| Lane 1                   | 2               | 0.0  | 2               | 0.0  | 839   | 0.002     | 100        | 8.3         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 2               | 0.0  | 2               | 0.0  |       | 0.002     |            | 8.3         | LOS A            | 0.0               | 0.1      |             |             |           |              |
| East: R514               |                 |      |                 |      |       |           |            |             |                  |                   |          |             |             |           |              |
| Lane 1                   | 322             | 6.6  | 322             | 6.6  | 1854  | 0.174     | 100        | 0.7         | LOS A            | 0.0               | 0.0      | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 322             | 6.6  | 322             | 6.6  |       | 0.174     |            | 0.7         | NA               | 0.0               | 0.0      |             |             |           |              |
| West: R514               |                 |      |                 |      |       |           |            |             |                  |                   |          |             |             |           |              |
| Lane 1                   | 195             | 3.9  | 195             | 3.9  | 1887  | 0.103     | 100        | 0.1         | LOS A            | 0.0               | 0.2      | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 195             | 3.9  | 195             | 3.9  |       | 0.103     |            | 0.1         | NA               | 0.0               | 0.2      |             |             |           |              |
| All Vehicles             | 519             | 5.6  | 519             | 5.6  |       | 0.174     |            | 0.5         | NA               | 0.0               | 0.2      |             |             |           |              |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |     |     |       |     |            |           |            |          |          |  |
|-----------------------------|-----|-----|-------|-----|------------|-----------|------------|----------|----------|--|
| South: Unnamed Road         |     |     |       |     |            |           |            |          |          |  |
| Mov.                        | L2  | R2  | Total | %HV |            | Deg. Satn | Lane Util. | Prob. SL | Ov. Lane |  |
| From S                      |     |     |       |     | Cap. veh/h | v/c       | %          | %        | No.      |  |
| To Exit:                    | W   | E   |       |     |            |           |            |          |          |  |
| Lane 1                      | 1   | 1   | 2     | 0.0 | 839        | 0.002     | 100        | NA       | NA       |  |
| Approach                    | 1   | 1   | 2     | 0.0 |            | 0.002     |            |          |          |  |
| East: R514                  |     |     |       |     |            |           |            |          |          |  |
| Mov.                        | L2  | T1  | Total | %HV |            | Deg. Satn | Lane Util. | Prob. SL | Ov. Lane |  |
| From E                      |     |     |       |     | Cap. veh/h | v/c       | %          | %        | No.      |  |
| To Exit:                    | S   | W   |       |     |            |           |            |          |          |  |
| Lane 1                      | 57  | 265 | 322   | 6.6 | 1854       | 0.174     | 100        | NA       | NA       |  |
| Approach                    | 57  | 265 | 322   | 6.6 |            | 0.174     |            |          |          |  |
| West: R514                  |     |     |       |     |            |           |            |          |          |  |
| Mov.                        | T1  | R2  | Total | %HV |            | Deg. Satn | Lane Util. | Prob. SL | Ov. Lane |  |
| From W                      |     |     |       |     | Cap. veh/h | v/c       | %          | %        | No.      |  |
| To Exit:                    | E   | S   |       |     |            |           |            |          |          |  |
| Lane 1                      | 192 | 3   | 195   | 3.9 | 1887       | 0.103     | 100        | NA       | NA       |  |

|                          |     |     |       |     |       |
|--------------------------|-----|-----|-------|-----|-------|
| Approach                 | 192 | 3   | 195   | 3.9 | 0.103 |
| Total %HV Deg.Satn (v/c) |     |     |       |     |       |
| All Vehicles             | 519 | 5.6 | 0.174 |     |       |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                  |                     |                              |                          |                  |                       |                      |                |               |                |                 |
|----------------------------------------------------------------|------------------|---------------------|------------------------------|--------------------------|------------------|-----------------------|----------------------|----------------|---------------|----------------|-----------------|
|                                                                | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                  |                     |                              |                          |                  |                       |                      |                |               |                |                 |

| Variable Demand Analysis |                           |                            |                                       |                          |
|--------------------------|---------------------------|----------------------------|---------------------------------------|--------------------------|
|                          | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
| South: Unnamed Road      |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |
| East: R514               |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |
| West: R514               |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |

## LANE SUMMARY

 **Site: 2 [Intersection 2\_2029 Background + Development PM (Site Folder: General)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.2.202**

Intersection of R514 and Unnamed Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance |                 |      |                 |      |       |           |            |             |                  |                   |          |             |             |           |              |
|--------------------------|-----------------|------|-----------------|------|-------|-----------|------------|-------------|------------------|-------------------|----------|-------------|-------------|-----------|--------------|
|                          | Demand Flows    |      | Arrival Flows   |      | Cap.  | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |          | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|                          | [ Total veh/h ] | HV % | [ Total veh/h ] | HV % | veh/h | v/c       | %          | sec         |                  | [ Veh ]           | Dist ] m |             | m           | %         | %            |
| South: Unnamed Road      |                 |      |                 |      |       |           |            |             |                  |                   |          |             |             |           |              |
| Lane 1                   | 62              | 0.0  | 62              | 0.0  | 723   | 0.086     | 100        | 8.8         | LOS A            | 0.3               | 2.0      | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 62              | 0.0  | 62              | 0.0  |       | 0.086     |            | 8.8         | LOS A            | 0.3               | 2.0      |             |             |           |              |
| East: R514               |                 |      |                 |      |       |           |            |             |                  |                   |          |             |             |           |              |
| Lane 1                   | 222             | 4.0  | 222             | 4.0  | 1900  | 0.117     | 100        | 0.1         | LOS A            | 0.0               | 0.0      | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 222             | 4.0  | 222             | 4.0  |       | 0.117     |            | 0.1         | NA               | 0.0               | 0.0      |             |             |           |              |
| West: R514               |                 |      |                 |      |       |           |            |             |                  |                   |          |             |             |           |              |
| Lane 1                   | 239             | 8.0  | 239             | 8.0  | 1852  | 0.129     | 100        | 0.0         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0       | 0.0          |
| Approach                 | 239             | 8.0  | 239             | 8.0  |       | 0.129     |            | 0.0         | NA               | 0.0               | 0.1      |             |             |           |              |
| All Vehicles             | 523             | 5.3  | 523             | 5.3  |       | 0.129     |            | 1.1         | NA               | 0.3               | 2.0      |             |             |           |              |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |     |     |       |     |            |           |            |          |     |              |
|-----------------------------|-----|-----|-------|-----|------------|-----------|------------|----------|-----|--------------|
| South: Unnamed Road         |     |     |       |     |            |           |            |          |     |              |
| Mov.                        | L2  | R2  | Total | %HV |            | Deg. Satn | Lane Util. | Prob. SL | Ov. | Ov. Lane No. |
| From S                      |     |     |       |     | Cap. veh/h | v/c       | %          | %        |     |              |
| To Exit:                    | W   | E   |       |     |            |           |            |          |     |              |
| Lane 1                      | 3   | 59  | 62    | 0.0 | 723        | 0.086     | 100        | NA       | NA  |              |
| Approach                    | 3   | 59  | 62    | 0.0 |            | 0.086     |            |          |     |              |
| East: R514                  |     |     |       |     |            |           |            |          |     |              |
| Mov.                        | L2  | T1  | Total | %HV |            | Deg. Satn | Lane Util. | Prob. SL | Ov. | Ov. Lane No. |
| From E                      |     |     |       |     | Cap. veh/h | v/c       | %          | %        |     |              |
| To Exit:                    | S   | W   |       |     |            |           |            |          |     |              |
| Lane 1                      | 1   | 221 | 222   | 4.0 | 1900       | 0.117     | 100        | NA       | NA  |              |
| Approach                    | 1   | 221 | 222   | 4.0 |            | 0.117     |            |          |     |              |
| West: R514                  |     |     |       |     |            |           |            |          |     |              |
| Mov.                        | T1  | R2  | Total | %HV |            | Deg. Satn | Lane Util. | Prob. SL | Ov. | Ov. Lane No. |
| From W                      |     |     |       |     | Cap. veh/h | v/c       | %          | %        |     |              |
| To Exit:                    | E   | S   |       |     |            |           |            |          |     |              |
| Lane 1                      | 238 | 1   | 239   | 8.0 | 1852       | 0.129     | 100        | NA       | NA  |              |

|                          |     |     |     |       |       |
|--------------------------|-----|-----|-----|-------|-------|
| Approach                 | 238 | 1   | 239 | 8.0   | 0.129 |
| Total %HV Deg.Satn (v/c) |     |     |     |       |       |
| All Vehicles             | 523 | 5.3 |     | 0.129 |       |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                  |                     |                              |                          |                  |                       |                      |                |               |                |                 |
|----------------------------------------------------------------|------------------|---------------------|------------------------------|--------------------------|------------------|-----------------------|----------------------|----------------|---------------|----------------|-----------------|
|                                                                | Exit Lane Number | Short Lane Length m | Percent Opng in Lane % veh/h | Opposing Flow Rate pcu/h | Critical Gap sec | Follow-up Headway sec | Lane Flow Rate veh/h | Capacity veh/h | Deg. Satn v/c | Min. Delay sec | Merge Delay sec |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                  |                     |                              |                          |                  |                       |                      |                |               |                |                 |

| Variable Demand Analysis |                           |                            |                                       |                          |
|--------------------------|---------------------------|----------------------------|---------------------------------------|--------------------------|
|                          | Initial Queued Demand veh | Residual Queued Demand veh | Time for Residual Demand to Clear sec | Duration of Oversatn sec |
| South: Unnamed Road      |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |
| East: R514               |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |
| West: R514               |                           |                            |                                       |                          |
| Lane 1                   | 0.0                       | 0.0                        | 0.0                                   | 0.0                      |



## LANE SUMMARY

**Site: 3 [Intersection 3\_2029 Background + Development AM  
(Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Gilia Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance |               |      |               |      |      |           |            |             |                  |                   |          |             |             |             |     |
|--------------------------|---------------|------|---------------|------|------|-----------|------------|-------------|------------------|-------------------|----------|-------------|-------------|-------------|-----|
|                          | Demand Flows  |      | Arrival Flows |      | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |          | Lane Config | Lane Length | Cap. Prob.  |     |
|                          | [ Total veh/h | HV % | [ Total veh/h | HV % |      |           |            |             |                  | [ Veh             | Dist ] m |             |             | Adj. Block. |     |
| South: Gilia Road        |               |      |               |      |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 5             | 0.0  | 5             | 0.0  | 798  | 0.006     | 100        | 8.7         | LOS A            | 0.0               | 0.2      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 5             | 0.0  | 5             | 0.0  |      | 0.006     |            | 8.7         | LOS A            | 0.0               | 0.2      |             |             |             |     |
| East: R514               |               |      |               |      |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 315           | 8.9  | 315           | 8.9  | 1840 | 0.171     | 100        | 0.0         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 315           | 8.9  | 315           | 8.9  |      | 0.171     |            | 0.0         | NA               | 0.0               | 0.1      |             |             |             |     |
| North: Gilia Road        |               |      |               |      |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 14            | 0.0  | 14            | 0.0  | 687  | 0.020     | 100        | 9.1         | LOS A            | 0.1               | 0.5      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 14            | 0.0  | 14            | 0.0  |      | 0.020     |            | 9.1         | LOS A            | 0.1               | 0.5      |             |             |             |     |
| West: R514               |               |      |               |      |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 191           | 4.7  | 191           | 4.7  | 1883 | 0.101     | 100        | 0.2         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 191           | 4.7  | 191           | 4.7  |      | 0.101     |            | 0.2         | NA               | 0.0               | 0.1      |             |             |             |     |
| All Vehicles             | 525           | 7.0  | 525           | 7.0  |      | 0.171     |            | 0.4         | NA               | 0.1               | 0.5      |             |             |             |     |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for one road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |             |             |             |       |     |               |                     |                    |                      |                    |
|-----------------------------|-------------|-------------|-------------|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| South: Gilia Road           |             |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From S<br>To Exit:  | L2<br><br>W | T1<br><br>N | R2<br><br>E | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 3           | 1           | 1           | 5     | 0.0 | 798           | 0.006               | 100                | NA                   | NA                 |
| Approach                    | 3           | 1           | 1           | 5     | 0.0 | 0.006         |                     |                    |                      |                    |
| East: R514                  |             |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From E<br>To Exit:  | L2<br><br>S | T1<br><br>W | R2<br><br>N | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 2           | 311         | 2           | 315   | 8.9 | 1840          | 0.171               | 100                | NA                   | NA                 |
| Approach                    | 2           | 311         | 2           | 315   | 8.9 | 0.171         |                     |                    |                      |                    |
| North: Gilia Road           |             |             |             |       |     |               |                     |                    |                      |                    |

| Mov.<br>From N<br>To Exit: | L2  | T1  | R2 | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|----------------------------|-----|-----|----|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| Lane 1                     | 5   | 1   | 8  | 14    | 0.0 | 687           | 0.020               | 100                | NA                   | NA                 |
| Approach                   | 5   | 1   | 8  | 14    | 0.0 |               | 0.020               |                    |                      |                    |
| West: R514                 |     |     |    |       |     |               |                     |                    |                      |                    |
| Mov.<br>From W<br>To Exit: | L2  | T1  | R2 | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                     | 10  | 180 | 1  | 191   | 4.7 | 1883          | 0.101               | 100                | NA                   | NA                 |
| Approach                   | 10  | 180 | 1  | 191   | 4.7 |               | 0.101               |                    |                      |                    |
| Total %HV Deg. Satn (v/c)  |     |     |    |       |     |               |                     |                    |                      |                    |
| All Vehicles               | 525 | 7.0 |    | 0.171 |     |               |                     |                    |                      |                    |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                        |                              |                                       |                                |                        |                             |                               |                           |                     |                      |                       |  |
|----------------------------------------------------------------|------------------------|------------------------------|---------------------------------------|--------------------------------|------------------------|-----------------------------|-------------------------------|---------------------------|---------------------|----------------------|-----------------------|--|
|                                                                | Exit<br>Lane<br>Number | Short<br>Lane<br>Length<br>m | Percent<br>Opng in<br>Lane<br>% veh/h | Opposing<br>Flow Rate<br>pcu/h | Critical<br>Gap<br>sec | Follow-up<br>Headway<br>sec | Lane<br>Flow<br>Rate<br>veh/h | Lane<br>Capacity<br>veh/h | Deg.<br>Satn<br>v/c | Min.<br>Delay<br>sec | Merge<br>Delay<br>sec |  |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                        |                              |                                       |                                |                        |                             |                               |                           |                     |                      |                       |  |

| Variable Demand Analysis |                                    |                                     |                                                   |                                   |
|--------------------------|------------------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------|
|                          | Initial<br>Queued<br>Demand<br>veh | Residual<br>Queued<br>Demand<br>veh | Time for<br>Residual<br>Demand<br>to Clear<br>sec | Duration<br>of<br>Oversatn<br>sec |
| South: Gilia Road        |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| East: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| North: Gilia Road        |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| West: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |

## LANE SUMMARY

**Site: 3 [Intersection 3\_2029 Background + Development PM  
(Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Gilia Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
|--------------------------|---------------|--------|---------------|--------|------|-----------|------------|-------------|------------------|-------------------|----------|-------------|-------------|-------------|-----|
|                          | Demand Flows  |        | Arrival Flows |        | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |          | Lane Config | Lane Length | Cap. Prob.  |     |
|                          | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |      |           |            |             |                  | [ Veh             | Dist ] m |             |             | Adj. Block. | %   |
| South: Gilia Road        |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 3             | 0.0    | 3             | 0.0    | 704  | 0.004     | 100        | 9.0         | LOS A            | 0.0               | 0.1      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 3             | 0.0    | 3             | 0.0    |      | 0.004     |            | 9.0         | LOS A            | 0.0               | 0.1      |             |             |             |     |
| East: R514               |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 223           | 4.3    | 223           | 4.3    | 1849 | 0.121     | 100        | 0.3         | LOS A            | 0.1               | 0.7      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 223           | 4.3    | 223           | 4.3    |      | 0.121     |            | 0.3         | NA               | 0.1               | 0.7      |             |             |             |     |
| North: Gilia Road        |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 7             | 0.0    | 7             | 0.0    | 642  | 0.011     | 100        | 9.4         | LOS A            | 0.0               | 0.3      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 7             | 0.0    | 7             | 0.0    |      | 0.011     |            | 9.4         | LOS A            | 0.0               | 0.3      |             |             |             |     |
| West: R514               |               |        |               |        |      |           |            |             |                  |                   |          |             |             |             |     |
| Lane 1                   | 298           | 7.8    | 298           | 7.8    | 1846 | 0.161     | 100        | 0.1         | LOS A            | 0.0               | 0.3      | Full        | 500         | 0.0         | 0.0 |
| Approach                 | 298           | 7.8    | 298           | 7.8    |      | 0.161     |            | 0.1         | NA               | 0.0               | 0.3      |             |             |             |     |
| All Vehicles             | 531           | 6.2    | 531           | 6.2    |      | 0.161     |            | 0.4         | NA               | 0.1               | 0.7      |             |             |             |     |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for minor road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |             |             |             |       |     |               |                     |                    |                      |                    |
|-----------------------------|-------------|-------------|-------------|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| South: Gilia Road           |             |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From S<br>To Exit:  | L2<br><br>W | T1<br><br>N | R2<br><br>E | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 1           | 1           | 1           | 3     | 0.0 | 704           | 0.004               | 100                | NA                   | NA                 |
| Approach                    | 1           | 1           | 1           | 3     | 0.0 | 0.004         |                     |                    |                      |                    |
| East: R514                  |             |             |             |       |     |               |                     |                    |                      |                    |
| Mov.<br>From E<br>To Exit:  | L2<br><br>S | T1<br><br>W | R2<br><br>N | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 1           | 212         | 10          | 223   | 4.3 | 1849          | 0.121               | 100                | NA                   | NA                 |
| Approach                    | 1           | 212         | 10          | 223   | 4.3 | 0.121         |                     |                    |                      |                    |
| North: Gilia Road           |             |             |             |       |     |               |                     |                    |                      |                    |

| Mov.<br>From N<br>To Exit: | L2  | T1  | R2 | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
|----------------------------|-----|-----|----|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| Lane 1                     | 2   | 1   | 4  | 7     | 0.0 | 642           | 0.011               | 100                | NA                   | NA                 |
| Approach                   | 2   | 1   | 4  | 7     | 0.0 |               | 0.011               |                    |                      |                    |
| West: R514                 |     |     |    |       |     |               |                     |                    |                      |                    |
| Mov.<br>From W<br>To Exit: | L2  | T1  | R2 | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                     | 4   | 289 | 5  | 298   | 7.8 | 1846          | 0.161               | 100                | NA                   | NA                 |
| Approach                   | 4   | 289 | 5  | 298   | 7.8 |               | 0.161               |                    |                      |                    |
| Total %HV Deg.Satn (v/c)   |     |     |    |       |     |               |                     |                    |                      |                    |
| All Vehicles               | 531 | 6.2 |    | 0.161 |     |               |                     |                    |                      |                    |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                        |                              |                                       |                                |                        |                             |                               |                           |                     |                      |                       |  |
|----------------------------------------------------------------|------------------------|------------------------------|---------------------------------------|--------------------------------|------------------------|-----------------------------|-------------------------------|---------------------------|---------------------|----------------------|-----------------------|--|
|                                                                | Exit<br>Lane<br>Number | Short<br>Lane<br>Length<br>m | Percent<br>Opng in<br>Lane<br>% veh/h | Opposing<br>Flow Rate<br>pcu/h | Critical<br>Gap<br>sec | Follow-up<br>Headway<br>sec | Lane<br>Flow<br>Rate<br>veh/h | Lane<br>Capacity<br>veh/h | Deg.<br>Satn<br>v/c | Min.<br>Delay<br>sec | Merge<br>Delay<br>sec |  |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                        |                              |                                       |                                |                        |                             |                               |                           |                     |                      |                       |  |

| Variable Demand Analysis |                                    |                                     |                                                   |                                   |
|--------------------------|------------------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------|
|                          | Initial<br>Queued<br>Demand<br>veh | Residual<br>Queued<br>Demand<br>veh | Time for<br>Residual<br>Demand<br>to Clear<br>sec | Duration<br>of<br>Oversatn<br>sec |
| South: Gilia Road        |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| East: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| North: Gilia Road        |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |
| West: R514               |                                    |                                     |                                                   |                                   |
| Lane 1                   | 0.0                                | 0.0                                 | 0.0                                               | 0.0                               |

## LANE SUMMARY

**Site: 4 [Intersection 4\_2029 Background + Development AM  
(Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Balderjan Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance  |                  |         |                  |         |      |           |            |             |                  |                   |     |             |             |             |     |
|---------------------------|------------------|---------|------------------|---------|------|-----------|------------|-------------|------------------|-------------------|-----|-------------|-------------|-------------|-----|
|                           | Demand Flows     |         | Arrival Flows    |         | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |     | Lane Config | Lane Length | Cap. Prob.  |     |
|                           | [ Total<br>veh/h | HV<br>% | [ Total<br>veh/h | HV<br>% |      |           |            |             |                  | [ Veh<br>Dist ]   |     |             |             | Adj. Block. |     |
| SouthEast: Balderjan Road |                  |         |                  |         |      |           |            |             |                  |                   |     |             |             |             |     |
| Lane 1                    | 23               | 0.0     | 23               | 0.0     | 759  | 0.030     | 100        | 8.8         | LOS A            | 0.1               | 0.7 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 23               | 0.0     | 23               | 0.0     |      | 0.030     |            | 8.8         | LOS A            | 0.1               | 0.7 |             |             |             |     |
| East: R514                |                  |         |                  |         |      |           |            |             |                  |                   |     |             |             |             |     |
| Lane 1                    | 337              | 6.9     | 337              | 6.9     | 1813 | 0.186     | 100        | 0.6         | LOS A            | 0.3               | 2.1 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 337              | 6.9     | 337              | 6.9     |      | 0.186     |            | 0.6         | NA               | 0.3               | 2.1 |             |             |             |     |
| NorthWest: Unnamed Access |                  |         |                  |         |      |           |            |             |                  |                   |     |             |             |             |     |
| Lane 1                    | 32               | 0.0     | 32               | 0.0     | 643  | 0.050     | 100        | 9.8         | LOS A            | 0.2               | 1.2 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 32               | 0.0     | 32               | 0.0     |      | 0.050     |            | 9.8         | LOS A            | 0.2               | 1.2 |             |             |             |     |
| West: R514                |                  |         |                  |         |      |           |            |             |                  |                   |     |             |             |             |     |
| Lane 1                    | 172              | 4.9     | 172              | 4.9     | 1878 | 0.092     | 100        | 0.1         | LOS A            | 0.0               | 0.1 | Full        | 500         | 0.0         | 0.0 |
| Approach                  | 172              | 4.9     | 172              | 4.9     |      | 0.092     |            | 0.1         | NA               | 0.0               | 0.1 |             |             |             |     |
| All Vehicles              | 564              | 5.6     | 564              | 5.6     |      | 0.186     |            | 1.3         | NA               | 0.3               | 2.1 |             |             |             |     |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for minor road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |              |              |              |       |     |               |                     |                    |                      |                    |
|-----------------------------|--------------|--------------|--------------|-------|-----|---------------|---------------------|--------------------|----------------------|--------------------|
| SouthEast: Balderjan Road   |              |              |              |       |     |               |                     |                    |                      |                    |
| Mov.<br>From SE<br>To Exit: | L1<br><br>W  | T1<br><br>NW | R3<br><br>E  | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 12           | 5            | 6            | 23    | 0.0 | 759           | 0.030               | 100                | NA                   | NA                 |
| Approach                    | 12           | 5            | 6            | 23    | 0.0 |               | 0.030               |                    |                      |                    |
| East: R514                  |              |              |              |       |     |               |                     |                    |                      |                    |
| Mov.<br>From E<br>To Exit:  | L3<br><br>SE | T1<br><br>W  | R1<br><br>NW | Total | %HV | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 10           | 291          | 36           | 337   | 6.9 | 1813          | 0.186               | 100                | NA                   | NA                 |
| Approach                    | 10           | 291          | 36           | 337   | 6.9 |               | 0.186               |                    |                      |                    |
| NorthWest: Unnamed Access   |              |              |              |       |     |               |                     |                    |                      |                    |



| Mov.                     | L1  | T1  | R3 | Total | %HV |       | Deg.  | Lane  | Prob.  | Ov.  |
|--------------------------|-----|-----|----|-------|-----|-------|-------|-------|--------|------|
| From NW                  | E   | SE  | W  |       |     | Cap.  | Satn  | Util. | SL Ov. | Lane |
| To Exit:                 |     |     |    |       |     | veh/h | v/c   | %     | %      | No.  |
| Lane 1                   | 1   | 26  | 5  | 32    | 0.0 | 643   | 0.050 | 100   | NA     | NA   |
| Approach                 | 1   | 26  | 5  | 32    | 0.0 |       | 0.050 |       |        |      |
| West: R514               |     |     |    |       |     |       |       |       |        |      |
| Mov.                     | L3  | T1  | R1 | Total | %HV |       | Deg.  | Lane  | Prob.  | Ov.  |
| From W                   | NW  | E   | SE |       |     | Cap.  | Satn  | Util. | SL Ov. | Lane |
| To Exit:                 |     |     |    |       |     | veh/h | v/c   | %     | %      | No.  |
| Lane 1                   | 1   | 169 | 2  | 172   | 4.9 | 1878  | 0.092 | 100   | NA     | NA   |
| Approach                 | 1   | 169 | 2  | 172   | 4.9 |       | 0.092 |       |        |      |
| Total %HV Deg.Satn (v/c) |     |     |    |       |     |       |       |       |        |      |
| All Vehicles             | 564 | 5.6 |    | 0.186 |     |       |       |       |        |      |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                        |                              |                                       |                                |                        |                             |                                        |  |                     |                      |                       |
|----------------------------------------------------------------|------------------------|------------------------------|---------------------------------------|--------------------------------|------------------------|-----------------------------|----------------------------------------|--|---------------------|----------------------|-----------------------|
|                                                                | Exit<br>Lane<br>Number | Short<br>Lane<br>Length<br>m | Percent<br>Opng in<br>Lane<br>% veh/h | Opposing<br>Flow Rate<br>pcu/h | Critical<br>Gap<br>sec | Follow-up<br>Headway<br>sec | Lane<br>Capacity<br>Flow Rate<br>veh/h |  | Deg.<br>Satn<br>v/c | Min.<br>Delay<br>sec | Merge<br>Delay<br>sec |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                        |                              |                                       |                                |                        |                             |                                        |  |                     |                      |                       |

| Variable Demand Analysis  |         |          |          |          |
|---------------------------|---------|----------|----------|----------|
|                           | Initial | Residual | Time for | Duration |
|                           | Queued  | Queued   | Residual | of       |
|                           | Demand  | Demand   | Demand   | Oversatn |
|                           | veh     | veh      | to Clear |          |
|                           |         |          | sec      | sec      |
| SouthEast: Balderjan Road |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |
| East: R514                |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |
| NorthWest: Unnamed Access |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |
| West: R514                |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |

## LANE SUMMARY

**STOP Site: 4 [Intersection 4\_2029 Background + Development PM  
(Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

Intersection of R514 and Balderjan Road

Site Category: Existing Design

Stop (Two-Way)

| Lane Use and Performance  |                  |         |                  |         |      |           |            |             |                  |                   |             |             |             |           |              |
|---------------------------|------------------|---------|------------------|---------|------|-----------|------------|-------------|------------------|-------------------|-------------|-------------|-------------|-----------|--------------|
|                           | Demand Flows     |         | Arrival Flows    |         | Cap. | Deg. Satn | Lane Util. | Aver. Delay | Level of Service | 95% Back Of Queue |             | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
|                           | [ Total<br>veh/h | HV<br>% | [ Total<br>veh/h | HV<br>% |      |           |            |             |                  | [ Veh             | Dist ]<br>m |             |             |           |              |
| SouthEast: Balderjan Road |                  |         |                  |         |      |           |            |             |                  |                   |             |             |             |           |              |
| Lane 1                    | 10               | 10.0    | 10               | 10.0    | 631  | 0.016     | 100        | 9.7         | LOS A            | 0.1               | 0.4         | Full        | 500         | 0.0       | 0.0          |
| Approach                  | 10               | 10.0    | 10               | 10.0    |      | 0.016     |            | 9.7         | LOS A            | 0.1               | 0.4         |             |             |           |              |
| East: R514                |                  |         |                  |         |      |           |            |             |                  |                   |             |             |             |           |              |
| Lane 1                    | 248              | 4.7     | 248              | 4.7     | 1778 | 0.140     | 100        | 1.0         | LOS A            | 0.3               | 2.5         | Full        | 500         | 0.0       | 0.0          |
| Approach                  | 248              | 4.7     | 248              | 4.7     |      | 0.140     |            | 1.0         | NA               | 0.3               | 2.5         |             |             |           |              |
| NorthWest: Unnamed Access |                  |         |                  |         |      |           |            |             |                  |                   |             |             |             |           |              |
| Lane 1                    | 47               | 2.6     | 47               | 2.6     | 656  | 0.072     | 100        | 9.8         | LOS A            | 0.2               | 1.8         | Full        | 500         | 0.0       | 0.0          |
| Approach                  | 47               | 2.6     | 47               | 2.6     |      | 0.072     |            | 9.8         | LOS A            | 0.2               | 1.8         |             |             |           |              |
| West: R514                |                  |         |                  |         |      |           |            |             |                  |                   |             |             |             |           |              |
| Lane 1                    | 244              | 6.3     | 244              | 6.3     | 1860 | 0.131     | 100        | 0.0         | LOS A            | 0.0               | 0.2         | Full        | 500         | 0.0       | 0.0          |
| Approach                  | 244              | 6.3     | 244              | 6.3     |      | 0.131     |            | 0.0         | NA               | 0.0               | 0.2         |             |             |           |              |
| All Vehicles              | 549              | 5.4     | 549              | 5.4     |      | 0.140     |            | 1.5         | NA               | 0.3               | 2.5         |             |             |           |              |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Lane LOS values are based on average delay per lane.

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

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Approach Lane Flows (veh/h) |              |              |              |       |      |               |                     |                    |                      |                    |
|-----------------------------|--------------|--------------|--------------|-------|------|---------------|---------------------|--------------------|----------------------|--------------------|
| SouthEast: Balderjan Road   |              |              |              |       |      |               |                     |                    |                      |                    |
| Mov.<br>From SE<br>To Exit: | L1<br><br>W  | T1<br><br>NW | R3<br><br>E  | Total | %HV  | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 4            | 2            | 4            | 10    | 10.0 | 631           | 0.016               | 100                | NA                   | NA                 |
| Approach                    | 4            | 2            | 4            | 10    | 10.0 | 0.016         |                     |                    |                      |                    |
| East: R514                  |              |              |              |       |      |               |                     |                    |                      |                    |
| Mov.<br>From E<br>To Exit:  | L3<br><br>SE | T1<br><br>W  | R1<br><br>NW | Total | %HV  | Cap.<br>veh/h | Deg.<br>Satn<br>v/c | Lane<br>Util.<br>% | Prob.<br>SL Ov.<br>% | Ov.<br>Lane<br>No. |
| Lane 1                      | 9            | 196          | 43           | 248   | 4.7  | 1778          | 0.140               | 100                | NA                   | NA                 |
| Approach                    | 9            | 196          | 43           | 248   | 4.7  | 0.140         |                     |                    |                      |                    |
| NorthWest: Unnamed Access   |              |              |              |       |      |               |                     |                    |                      |                    |

| Mov.                     | L1  | T1  | R3 | Total | %HV |       | Deg.  | Lane  | Prob.  | Ov.  |
|--------------------------|-----|-----|----|-------|-----|-------|-------|-------|--------|------|
| From NW                  | E   | SE  | W  |       |     | Cap.  | Satn  | Util. | SL Ov. | Lane |
| To Exit:                 |     |     |    |       |     | veh/h | v/c   | %     | %      | No.  |
| Lane 1                   | 1   | 41  | 5  | 47    | 2.6 | 656   | 0.072 | 100   | NA     | NA   |
| Approach                 | 1   | 41  | 5  | 47    | 2.6 |       | 0.072 |       |        |      |
| West: R514               |     |     |    |       |     |       |       |       |        |      |
| Mov.                     | L3  | T1  | R1 | Total | %HV |       | Deg.  | Lane  | Prob.  | Ov.  |
| From W                   | NW  | E   | SE |       |     | Cap.  | Satn  | Util. | SL Ov. | Lane |
| To Exit:                 |     |     |    |       |     | veh/h | v/c   | %     | %      | No.  |
| Lane 1                   | 1   | 241 | 2  | 244   | 6.3 | 1860  | 0.131 | 100   | NA     | NA   |
| Approach                 | 1   | 241 | 2  | 244   | 6.3 |       | 0.131 |       |        |      |
| Total %HV Deg.Satn (v/c) |     |     |    |       |     |       |       |       |        |      |
| All Vehicles             | 549 | 5.4 |    | 0.140 |     |       |       |       |        |      |

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

| Merge Analysis                                                 |                        |                              |                                       |                                |                        |                             |                                        |  |                     |                      |                       |
|----------------------------------------------------------------|------------------------|------------------------------|---------------------------------------|--------------------------------|------------------------|-----------------------------|----------------------------------------|--|---------------------|----------------------|-----------------------|
|                                                                | Exit<br>Lane<br>Number | Short<br>Lane<br>Length<br>m | Percent<br>Opng in<br>Lane<br>% veh/h | Opposing<br>Flow Rate<br>pcu/h | Critical<br>Gap<br>sec | Follow-up<br>Headway<br>sec | Lane<br>Capacity<br>Flow Rate<br>veh/h |  | Deg.<br>Satn<br>v/c | Min.<br>Delay<br>sec | Merge<br>Delay<br>sec |
| There are no Exit Short Lanes for Merge Analysis at this Site. |                        |                              |                                       |                                |                        |                             |                                        |  |                     |                      |                       |

| Variable Demand Analysis  |         |          |          |          |
|---------------------------|---------|----------|----------|----------|
|                           | Initial | Residual | Time for | Duration |
|                           | Queued  | Queued   | Residual | of       |
|                           | Demand  | Demand   | Demand   | Oversatn |
|                           | veh     | veh      | to Clear |          |
|                           |         |          | sec      | sec      |
| SouthEast: Balderjan Road |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |
| East: R514                |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |
| NorthWest: Unnamed Access |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |
| West: R514                |         |          |          |          |
| Lane 1                    | 0.0     | 0.0      | 0.0      | 0.0      |