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TRAFFIC IMPACT STUDY

PROPOSED SIVUTSE HDF RENEWSTABLE POWER PLANT, MPUMALANGA PROVINCE

SEPTEMBER 2024

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REPORT INFORMATION SHEET

REPORT TYPE	Traffic Impact Study
TITLE	Proposed Sivutse HDF Renewstable Power Plant, Mpumalanga Province
DATE	September 2024
VERSION	1

STUDY PROPERTIES	Portion 4 of the farm Berbvleit 65-HS and the remainder of Portion 4, Portion 5 and Portion 10 of the farm Rietfontein 66-H
MUNICIPAL AREA	Dr Prixely Ka Isaka Seme Local Municipality, part of the greater Gert Sibande District Municipality
PROVINCE	Mpumalanga

PROJECT NUMBER	435
AUTHOR	Pieter Jooste | *Traffic Engineer*

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1 INTRODUCTION AND STUDY SCOPE

SA Traffic Surveys (Pty) Ltd (Traffic Surveys) was appointed to undertake a traffic impact study for a proposed renewable power plant to be located near the Majuba power station in the Dr Prixely Ka Isaka Seme Local Municipality, Mpumalanga Province.

The plant is referred to as the Sivutse Hydrogene de France (HDF) Renewstable Plant.

The scope of this TIA includes:

- Conducting traffic surveys to determine current traffic conditions on the surrounding road network (within a defined study area);
- Quantify the impact the proposed development is expected to have on the surrounding road network;
- Determine whether it is necessary to mitigate the expected impact, and
- If required, recommend measures to mitigate the traffic impact of the development.

This report will form part of the environmental authorisation associated with the application for the proposed plant.

2 PROPOSED DEVELOPMENT

2.1 Location

The location of the study site is shown in **Figure 1** (all figures, appendices and drawings are attached at the end of this report).

2.2 Property details

As shown in **Figure 1**, the HDF Renewstable Plant will be situated on the following property:

- Portion 4 of the farm Berbvleit 65-HS, with a portion of the site located on the remainder of Portion 5, Portion 4 and Portion 10 of the farm Rietfontein 66-H.

The farm portion is located within the Dr Prixely Ka Isaka Seme Local Municipality which forms part of the greater Gert Sibande District Municipality.

2.3 Development details

The Sivutse power plant will convert electricity from photovoltaic parks into hydrogen through an electrolyser system. Hydrogen will then be stored in a compressed gas form, which is then used to generate electricity through a fuel cell system when the photovoltaic park no longer produces sufficient energy.

The site will also include battery power storage, supplementing the fuel cell system to maximize plant performance and improve customer service.

The proposed draft layout of the site is shown in **Figure 2**.

3 OVERVIEW OF THE METHOD USED FOR ASSESSMENT

3.1 General overview

The assessment method used can generally be defined by the following steps:

- Determining the traffic characteristics of the proposed development
- Defining the affected area (study area)
- Collecting data to define the baseline operating conditions within the study area
- Determining the impact the proposed development will have on the baseline operating conditions
- Based on the expected impact, propose possible mitigation measures if necessary

These steps are further discussed in the remainder of this chapter.

3.2 Traffic characteristics

The type, volume and the expected travel paths are determined for the traffic to be generated by the proposed development. This is done by analysing current traffic volumes and movement patterns in the study area, considering the type of activity and its location in relation to other developments/points of interests and by consulting various guidelines. The traffic characteristics of the proposed activity are further discussed in **Section 5.4**.

3.3 Study area

The study area is defined based on the extent and type of activity and the characteristics of the traffic expected to be generated as a result of the proposed development. Although the traffic impact will most probably extend beyond a chosen study area, the area to be investigated should be large enough to ensure that the degree of impact outside its boundaries is insignificant and can be ignored. The study area is defined and described in the following subsections.

3.3.1 Site visit

As per the *TMH 16, Volume 2, South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual*[1], it is a specific requirement to undertake a site visit when conducting a traffic study. During such a site visit all relevant aspects of the area can be recorded and a better understanding of the study area can be acquired.

A site visit was conducted on Monday 31 July 2023. All relevant developments, points of interests, transport facilities, roads and road intersections were visited and recorded.

3.3.2 Surrounding road network

Considering the proposed access point to the development, the expected number of vehicle trips to be generated (discussed in **Section 5.4**) as well as the expected distribution of these trips on the surrounding road network, the following existing road was deemed relevant for the purpose of this study:

- Provincial Road D284: This road can be classified as a class 3 road (minor arterial) and falls under the jurisdiction of Mpumalanga Province's Department of Public Works, Roads and Transport. A proposed new access road will link up with this road to provide access to the second portion of the site as shown in **Figure 2**. This road is a gravel road between the N11 freeway and the Majuba Rail Project access.

The classification of this road is based on the *TRH 26, South African Road Classification and Access Management Manual*[2]. The location of the above road in relation to the subject site is also shown in **Figure 1**.

3.3.3 Intersections investigated

As per the *TMH 16, Volume 2, South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual*[1] the study area should include all routes and intersections within a maximum distance of 1.5 km from the access to the site measured along the shortest routes to the access. At least one intersection with an arterial route (in this case Road D284) should also form part of the study area.

By considering these guidelines as well as the expected number of vehicle trips to be generated as a result of the proposed activity (discussed in **Section 5.4**) the following intersections were deemed relevant for investigation:

- Road D284/Majuba Rail Procet access, and
- Road D284/Future access to portion two of the site

The boundaries of the study area are therefore limited to the location of these intersections.

3.3.4 Vulnerabilities/Sensitivities

From a traffic engineering and transportation planning perspective, no vulnerabilities or sensitivities have been identified in the study area. Due to the existing mines located in and around the study area the relevant road network has been designed to cater for heavy vehicles.

3.4 Data collection

To determine the existing traffic demand on the nearby road network, traffic surveys were conducted on Tuesday 1 August 2023 at the study intersections previously discussed. A more detailed discussion follows in **Section 4.2**.

3.5 Impact and mitigation

By using the data collected, traffic operating conditions were determined by means of traffic engineering software, namely SIDRA INTERSECTION 8. Operating conditions at the study intersections identified in **Section 3.3.3** were determined and compared for the following three scenarios:

- Existing conditions (baseline)
- During the implementation of the proposed development (construction phase)
- After implementation of the proposed development (operational phase)

Based on the results obtained, the need for mitigation measures is discussed.

4 EXISTING TRAFFIC STATE (ENVIRONMENTAL BASELINE)

4.1 Site access

Access to the Sivutse HDF site is proposed as follows:

- The existing access to the Majuba Rail Project from Road D284 will be used. For the second portion of the site a new access road to Road D284 will be constructed. The planned access to the site is shown in **Figure 2**.

The layouts and traffic flow control for these access intersections are shown in **Drawings D001** and **D002**.

It can be confirmed that these access locations are in line with the *TRH 26, South African Road Classification and Access Management Manual*[2] and is, therefore, supported from a traffic engineering and transport planning viewpoint.

4.2 Existing traffic flows

To determine the existing traffic demand on the surrounding road network, weekday traffic surveys were conducted on Tuesday 1 August 2023 at the key intersections previously discussed in **Section 3.3.3**.

From this survey it was determined that the common peak traffic hours occurred between 06h45-07h45 for the AM peak hour and between 14h15-15h15 for the PM peak hour. These existing 2023 peak hour traffic volumes are shown in **Figure 3**.

4.3 Baseline operating conditions

The baseline operating conditions for the key intersections are summarized in **Table 4.3** overleaf with the detailed SIDRA outputs attached as **Appendix A**. These operating conditions are based on the existing 2023 peak hour traffic volumes (as per **Figure 3**) and considers the existing intersection layouts and traffic control.

The Level of Service (LOS) parameter is determined by the V/C ratio (ratio between the traffic volume and traffic capacity per movement, both measured in vehicles per hour) and delay (time delay experienced, measured in seconds) values. LOS values can vary between "A" and "F", with "F" being the worst operating condition. A LOS of "D" or better is deemed acceptable, with a LOS of "E" acceptable for right-turn traffic movements if adequate lengths of storage lanes are provided.

Table 4.3 – Baseline operating conditions

Intersection & approach definitions	Peak hour	Analysis parameter	Intersection capacity analysis results								
			Approach 1			Approach 2			Approach 3		
			L	T	R	L	T	R	L	T	R
Site Access (Majuba Rail Project)/ Road D284 Approach 1: D284 S Approach 2: Site 1 E Approach 3: D284 N	**Week AM**	**V/C**	-	0.01	0.01	0.01	-	0.01	0.01	0.01	-
		Delay (s)	-	0	6	6	-	6	6	0	-
		LOS	-	A	A	A	-	A	A	A	-
	Week PM	**V/C**	-	0.01	0.01	0.01	-	0.01	0.01	0.01	-
		Delay (s)	-	0	6	6	-	6	6	0	-
		LOS	-	A	A	A	-	A	A	A	-
Site 2 Access/ Road D284 Approach 1: D284 S Approach 2: D284 N Approach 3: Sites W	**Week AM**	**V/C**	-	0.01	-	-	0.01	-	-	-	-
		Delay (s)	-	0	-	-	0	-	-	-	-
		LOS	-	A	-	-	A	-	-	-	-
	Week PM	**V/C**	-	0.01	-	-	0.01	-	-	-	-
		Delay (s)	-	0	-	-	0	-	-	-	-
		LOS	-	A	-	-	A	-	-	-	-

Notes: L=left, T=through, R=right, V/C=volume/capacity, LOS=Level of Service, red text indicates unacceptable performance

The baseline operating conditions tabulated in **Table 4.3** above indicate that good traffic operating conditions are currently experienced at the key study intersections. These conditions would be influenced by the following variables:

- Traffic volumes
- Intersection geometry
- Intersection traffic control

4.4 Non-motorised and public transport

A public transportation and non-motorised transport assessment were carried out as part of this study.

No public transport is available in the study area due to the remote location of the project site.

The proposed development is expected to generate some demand for non-motorised and public transport, but due to the remote location of the site no new facilities are recommended. It is however recommended that transport for some staff be considered to and from the site during both the construction and operational phases of the project.

5 DEVELOPMENT TRAFFIC IMPACT

5.1 Status of impact

The impact of the project activities (discussed in **Section 2.3**) is investigated for the following project phases:

- Construction phase
- Operational phase

Each development phase will have the following traffic characteristics:

- Construction phase:
  - Construction workers will commute to and from the site on a daily basis by either making use of public transport, transport provided by the contractor or private vehicles, and
  - Construction and delivery vehicles will travel to and from the site on a daily basis as required.
- Operational phase:
  - Employees will commute to and from the site on a daily basis by either making use of public transport, transport provided by the mine or private vehicles, and
  - General delivery vehicles will travel to and from the site on a weekly basis.

Based on the traffic characteristics above, and considering **Table 5.1** below, the **status of the impact during both the project phases can be described as "negative"**.

Table 5.1 – Listing of the descriptors for the status of the impact

Impact nature descriptors	Definitions
Positive	A benefit to the receiving environment
Neutral	No determined cost or benefit to the receiving environment
Negative	At a cost to the receiving environment

5.2 Spatial extent of impact

Although some of the traffic generated during the construction or operational phases will be destined regionally or even nationally, the impact (as determined by the defined study area) will be concentrated locally. The traffic influence outside the boundaries of the study area is expected to be insignificant. As per **Table 5.2** below the extent of the impact can be described as "local" for both the project phases and a rating of 2 can be adopted.

Table 5.2 – Listing of the descriptors for the extent of the impact

Extent descriptors	Definitions	Rating
Site	Impact is confined within the project site boundary	1
Local	Impact is limited to the site boundary and immediate surroundings	2
Regional	Impact extends beyond the immediate surroundings, but is confined within the regional or provincial boundaries	3
National	National impact, but is confined within the boundaries of South Africa	4
International	Impact extends beyond the national boundaries and has a global effect	5

5.3 Duration of impact

The traffic impact due to the construction phase will only last for the duration of the activity which is estimated to be 1-2 years. The traffic impact of the operational phase will however last for the entire operational life span of the project, which is expected to be at least 25 years.

According to **Table 5.3** below a duration rating of 2 can thus be adopted for the construction phase and 4 for the operational phase.

Table 5.3 – Listing of the descriptors for the duration of the impact

Duration descriptors	Definitions	Rating
Immediate	Impact expected only for the duration of the project or not greater than 1 year	1
Short term	Impact expected on a duration timescale of 1 to 5 years	2
Medium term	Impact expected on a duration timescale of 5-15 years	3
Long term	Impact cease after the operational life span of the project	4
Permanent	Impact expected beyond the operational life span of the project	5

5.4 Magnitude of impact

5.4.1 Impact during construction phase

To determine the traffic impact during construction the following construction activity assumptions are made:

- A maximum of 150 construction workers will be on each project site;
- 80% of the construction workers will make use of public transport or transport provided by the contractor;
- The remaining 20% will make use of private transport which is assumed to have a vehicle occupancy of 1.5 occupants per vehicle during the peak traffic hours, and
- An in:out traffic split of 80%:20% and 20%:80% is assumed for the AM and PM peak traffic hours, respectively.

Based on the assumptions above the construction phase is expected to generate peak hour traffic volumes as per **Table 5.5.1.1** below.

Table 5.5.1.1 – Expected traffic to be generated per project site during the construction phase

Peak hour	Vehicle trips generated (veh/h)		
	In	Out	Total
AM	22	6	28
PM	6	22	28

Figure 4 presents the expected peak hour traffic volumes at the key study intersections during the construction phase. These volumes also include an expected 2% annual growth in background traffic (i.e., existing traffic) over a period of 3 years.

The operating conditions for the key intersections during the construction phase are summarized in **Table 5.5.1.2** overleaf, with the detailed SIDRA outputs attached as **Appendix A**. These operating conditions are based on the expected peak hour traffic volumes during construction (as per **Figure 4**) and considers the proposed intersection layouts and traffic control as per **Drawings D001** and **D002**.

The SIDRA analysis results indicate that good traffic operating conditions are expected during the construction phase at the key study intersections.

Table 5.5.1.2 – Construction phase operating conditions

Intersection & approach definitions	Peak hour	Analysis parameter	Intersection capacity analysis results								
			Approach 1			Approach 2			Approach 3		
			L	T	R	L	T	R	L	T	R
Site Access(Majuba Rail Project)/ Road D284 Approach 1: D284 S Approach 2: Site 1 E Approach 3: D284 N	**Week AM**	**V/C**	-	0.03	0.03	0.01	-	0.01	0.01	0.01	-
		Delay (s)	-	0	6	6	-	7	6	0	-
		LOS	-	A	A	A	-	A	A	A	-
	Week PM	**V/C**	-	0.01	0.01	0.04	-	0.04	0.01	0.02	-
		Delay (s)	-	0	6	6	-	6	6	0	-
		LOS	-	A	A	A	-	A	A	A	-
Site 2 Access/ Road D284 Approach 1: D284 S Approach 2: D284 N Approach 3: Sites W	**Week AM**	**V/C**	0.02	0.02	-	-	0.01	0.01	0.01	-	0.01
		Delay (s)	6	0	-	-	0	6	9	-	9
		LOS	A	A	-	-	A	A	A	-	A
	Week PM	**V/C**	0.02	0.02	-	-	0.01	0.01	0.01	-	0.01
		Delay (s)	6	0	-	-	0	6	9	-	9
		LOS	A	A	-	-	A	A	A	-	A

Notes: L=left, T=through, R=right, V/C=volume/capacity, LOS=Level of Service, red text indicates unacceptable performance

5.4.2 Impact during operational phase

The *South African Trip Data Manual*[3] do not provide any vehicle trip data for renewable power plants. To determine project-specific trip generation data, information regarding operational characteristics of renewable power plants was obtained and the following assumptions are made:

- A maximum of 50 employees will be employed on each project site during the operational phase
- 70% of the employees will make use of private transport which is assumed to have a vehicle occupancy of 1.5 occupants per vehicle during the peak traffic hours
- The remaining 30% will make use of transport provided by the employer (busses or shuttles)
- 80% of the workers will commute to and from the site during the AM and PM peak traffic hours
- A peak hour factor of 0.7 is applicable to the critical 15-minute traffic peak
- An in:out traffic split of 80%:20% and 20%:80% is assumed for the AM and PM peak traffic hours, respectively

Based on the preceding assumptions the future operational phase is expected to generate peak hour traffic volumes as per **Table 5.5.2.1** below.

Table 5.5.2.1 – Expected traffic to be generated per project site during the operational phase

Peak hour	Vehicle trips generated (veh/h)		
	In	Out	Total
AM	17	4	21
PM	4	17	21

Figure 5 presents the expected peak hour traffic volumes at the key study intersections during the future operational phase. These volumes also include an expected 2% annual growth in background traffic (i.e., existing traffic) over a period of 5 years. Although the project's life cycle is expected to be at least 25 years, national guidelines require a 5-year future traffic horizon to be investigated based on the extent of the subject project.

The operating conditions for the key intersections during the future operational phase are summarized in **Table 5.5.2.2** below, with the detailed SIDRA outputs attached as **Appendix A**. These operating conditions are based on the expected peak hour traffic volumes during future operations (as per **Figure 5**) and considers the proposed intersection layouts and traffic control as per **Drawings D001** and **D002**.

The SIDRA analysis results indicate that good traffic operating conditions are expected during the operational phase at the key study intersections.

Table 5.5.2.2 – Operational phase operating conditions

Intersection & approach definitions	Peak hour	Analysis parameter	Intersection capacity analysis results								
			Approach 1			Approach 2			Approach 3		
			L	T	R	L	T	R	L	T	R
Site Access(Majuba Rail Project)/ Road D284 Approach 1: D284 S Approach 2: Site 1 E Approach 3: D284 N	**Week AM**	**V/C**	-	0.03	0.03	0.01	-	0.01	0.01	0.01	-
		Delay (s)	-	0	6	6	-	7	6	0	-
		LOS	-	A	A	A	-	A	A	A	-
	Week PM	**V/C**	-	0.01	0.01	0.03	-	0.03	0.01	0.02	-
		Delay (s)	-	0	6	6	-	6	6	0	-
		LOS	-	A	A	A	-	A	A	A	-
Site 2 Access/ Road D284 Approach 1: D284 S Approach 2: D284 N Approach 3: Sites W	**Week AM**	**V/C**	0.02	0.02	-	-	0.01	0.01	0.01	-	0.01
		Delay (s)	6	0	-	-	0	6	9	-	9
		LOS	A	A	-	-	A	A	A	-	A
	Week PM	**V/C**	0.01	0.01	-	-	0.01	0.01	0.02	-	0.02
		Delay (s)	6	0	-	-	0	6	9	-	9
		LOS	A	A	-	-	A	A	A	-	A

Notes: L=left, T=through, R=right, V/C=volume/capacity, LOS=Level of Service, red text indicates unacceptable performance

5.4.3 Comparing operating conditions with the baseline

By comparing the expected operating conditions during the project's construction and operational phases with the baseline, it can be stated that an insignificant traffic impact on the external road network is expected for both these project phases.

Based on the above and considering **Table 5.5.3** below the magnitude (or intensity) of the traffic impact can be described as "minor" for both the project phases, and a rating of 2 can thus be adopted.

Table 5.5.3 – Listing of the descriptors for the intensity of the impact

Intensity descriptors	Definitions	Rating
None	Negligible – zero or very low impact	0
Minor	Site specific and short-term impact	2
Low	Local scale and / or short-term impact	4
Moderate	Regional and / or medium-term impact	6
High	National scale and / or long-term environmental change	8
Very High	Global scale and / or permanent environmental change	10

5.5 Probability of impact occurring

Considering **Table 5.6** below a rating of 4 can be allocated to the probability of the traffic impact during both the construction and operational phases.

Table 5.6 – Listing of the descriptors for the probability of the impact

Probability descriptors	Definitions	Rating
None	Absolute certainty that impact will not occur	0
Improbable	Probability very low due to design or experience	1
Low Probability	Unlikely to occur	2
Medium Probability	Distinct probability that the impact will occur	3
High Probability	Impact most likely to occur	4
Definite	Absolute certainty that impact will occur	5

6 MITIGATION MEASURES

A significance rating can be allocated to the expected traffic impact, based on the following equation and the descriptors provided in **Table 6.1** below:

Significance = (Extent + Duration + Magnitude) x Probability

Table 6.1 – Listing of the descriptors for the significance score of the impact

Significance descriptors	Definitions	Rating
Low	The project can be authorised with a low risk to of environmental degradation	< 30
Medium	The project can be authorised, but with required mitigation measures	30 – 60
High	The project can be authorised, but with strict conditions and high levels of compliance and enforcement in respect of the impact in question	> 60

The significant ratings for the development phases are presented in **Table 6.2** below.

Table 6.2 – Impact assessment for the project phases considered

Project phase	Mitigation	Status/ Nature	Impact rating criteria				Significance
			Extent	Duration	Magnitude	Probability	
Construction	No	Negative	2	2	2	4	24
Operational	No	Negative	2	4	2	4	32

Based on the significance scores in **Table 6.2**, the construction phase of the project can be authorised in terms of the criteria as per **Table 6.1** without the need to implement any mitigation measures.

The operational phase of the project has a "medium" significance rating, which requires minor mitigation measures. From a traffic operational viewpoint, no road capacity upgrades are required with the implementation of the projects. Current and future traffic volumes, with or without the implementation of the subject projects, also do not justify the surfacing of the gravel portion of road D284. The following minor mitigation measures are, however, recommended:

- Dust control along all gravel roads on site and the gravel section of road D284 affected by project traffic, and
- Ensuring that access points to the project sites are maintained to the required standards and that sufficient sight distances are always available and not obstructed by any obstacles or vegetation.

7 LEGAL REQUIREMENTS AND OTHER CONSIDERATIONS

The following comments can be made with regard to legal requirements and other considerations during the project phases:

- All legal authorisations and permits must be obtained for the transportation of abnormal loads and hazardous materials on public roads;
- Measures should be taken to ensure that all health and safety requirements regarding transportation activities are complied with. This may include dust covers for hauling vehicles and dust control on all gravel roads;
- It is proposed that flagmen and temporary warning signs be placed at all access points where heavy vehicles will access public roads during construction, and
- Controls should be in place to ensure that vehicles exiting the site are not overloaded.

8 SUMMARY AND CONCLUSIONS

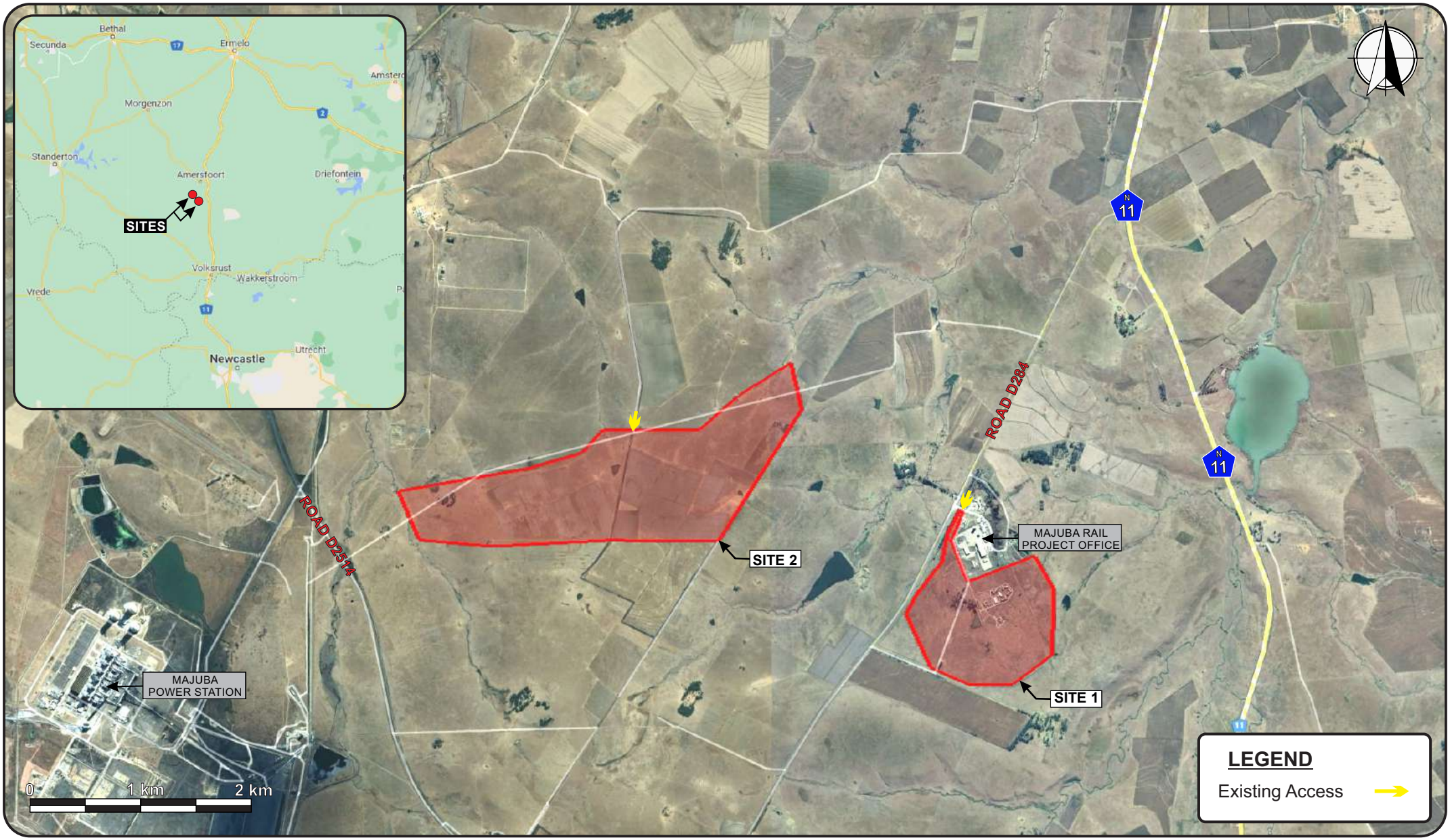
In summary and based on the contents of this document the following key conclusions are made regarding the proposed Sivutse renewable power plant to be located near the Majuba power station in the Dr Prixely Ka Isaka Seme Local Municipality, Mpumalanga Province:

- This report will form part of the environmental authorisation associated with the application for the proposed plant;
- The purpose of this report is to investigate the traffic impact that the proposed project will have on the surrounding road network and, if necessary, propose possible measures to mitigate such impact;
- The following access to the project site is proposed:
  - The existing access to the Majuba Rail Project from Road D284 will be used. For the second portion of the site a new access road to Road D284 will be constructed.
- The study area (receiving environment) was defined based on the extent and type of the project activities and the characteristics of the traffic expected to be generated as a result. Based on this the boundaries of the study area are limited to the location of the following key intersections:
  - Road D284/Majuba Rail Procet access, and
  - Road D284/Future access to portion 2 of the site.
- No vulnerabilities or sensitivities currently exists in the defined study area;
- To determine the existing traffic demand on the nearby road network weekday traffic surveys were conducted on Tuesday 1 August 2023 at the key study intersections;
- By using the data collected and observations made during the site visit traffic operating conditions were determined by means of traffic engineer software, namely SIDRA INERSECTION 8. Operating conditions were determined and compared for the following three scenarios:
  - Baseline
  - Project construction phase
  - Project operational phase
- By comparing the operating conditions for the different scenarios, it is concluded that the proposed project will have an insignificant traffic impact on the surrounding road network;
- Seeing as no traffic problems or congestion are expected as a result of the project activities (providing that the possible issues discussed in **Section 6** and **Section 7** of this report be addressed) no mitigation measures are required.
- Traffic impact significance scores of 24 and 32 are calculated for the construction and operational phases of the proposed project, respectively, which implies that the project can be authorized from a traffic engineering viewpoint.

9 REFERENCES

1. Committee of Transport Officials. TMH 16 Volume 2, South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual. Version 1.0, August 2012.
2. Committee of Transport Officials. TRH 26, South African Road Classification and Access Management Manual. Version 1.0, August 2012.
3. Committee of Transport Officials. TMH 17 Volume 1, South African Trip Data Manual. Version 1.0, September 2012.

FIGURES



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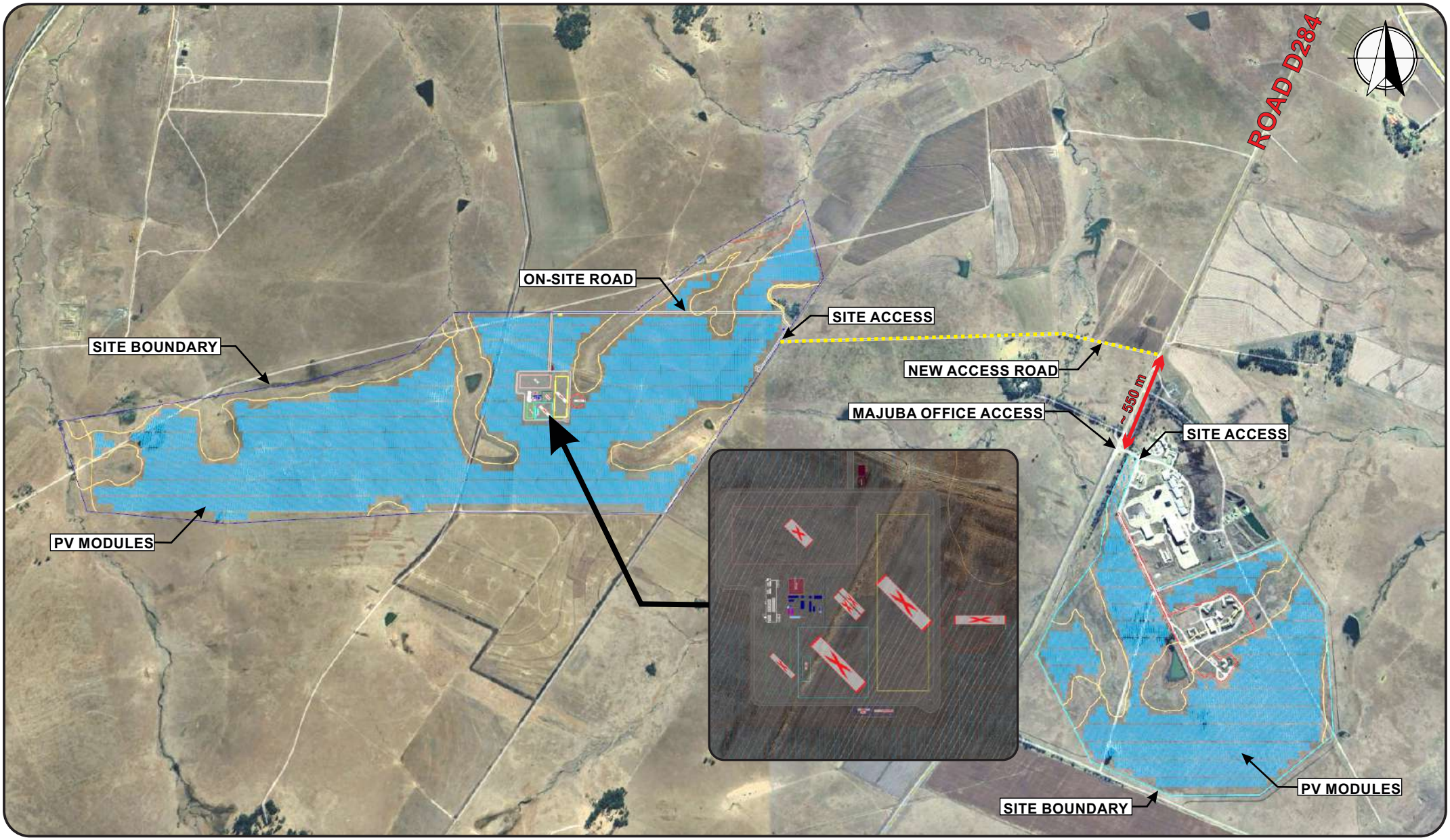
PROJECT:
Traffic Impact Study:
Sivutse HDF Renewstable Plant,
Mpumalanga

FIGURE NAME:
Locality Map

PROJECT NO.
435

FIGURE NO.
1



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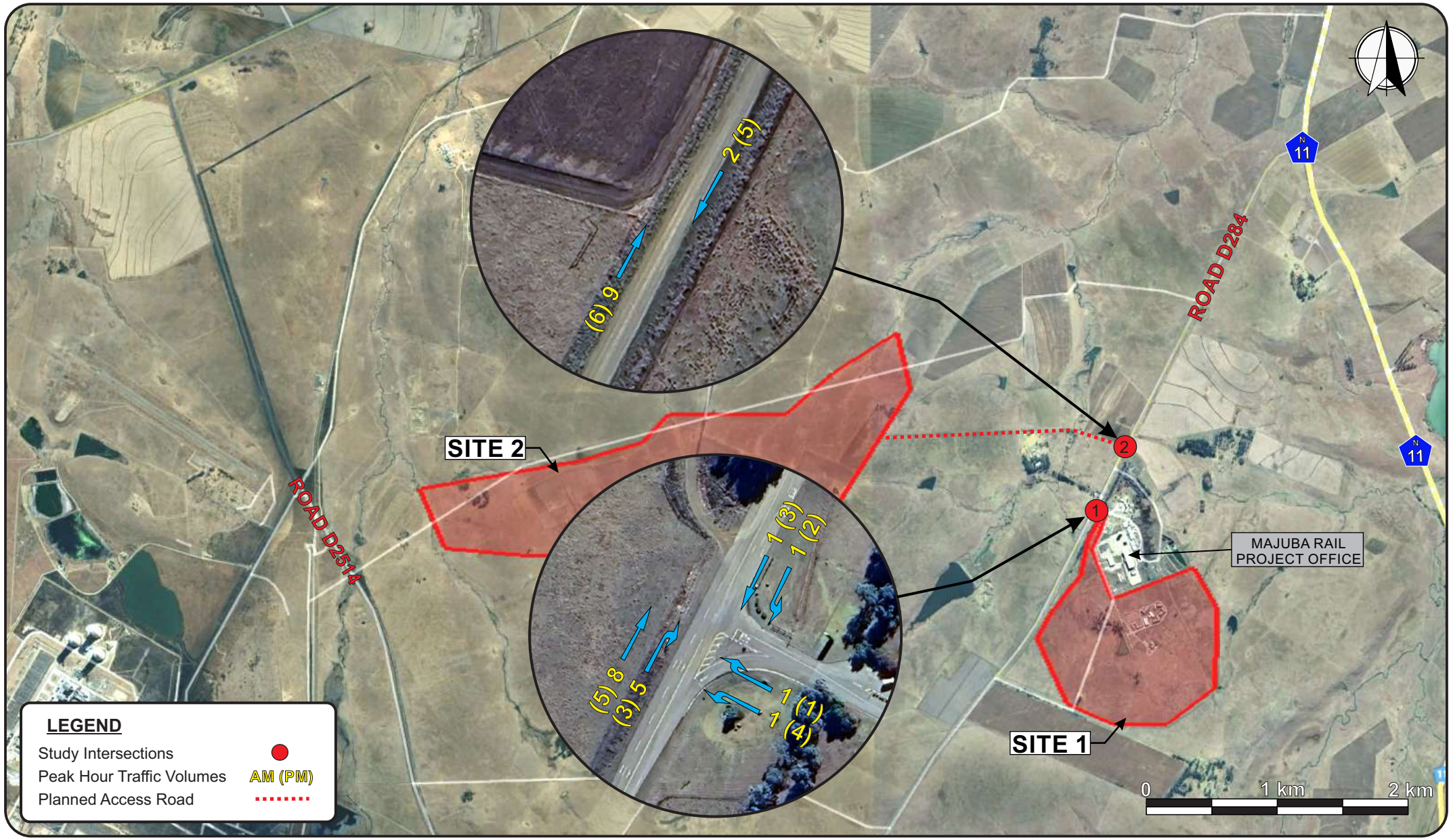
PROJECT:
Traffic Impact Study:
Sivutse HDF Renewstable Plant,
Mpumalanga

FIGURE NAME:
Proposed Plant Layout

PROJECT NO.
435

FIGURE NO.
2



TRAFFIC SURVEYS
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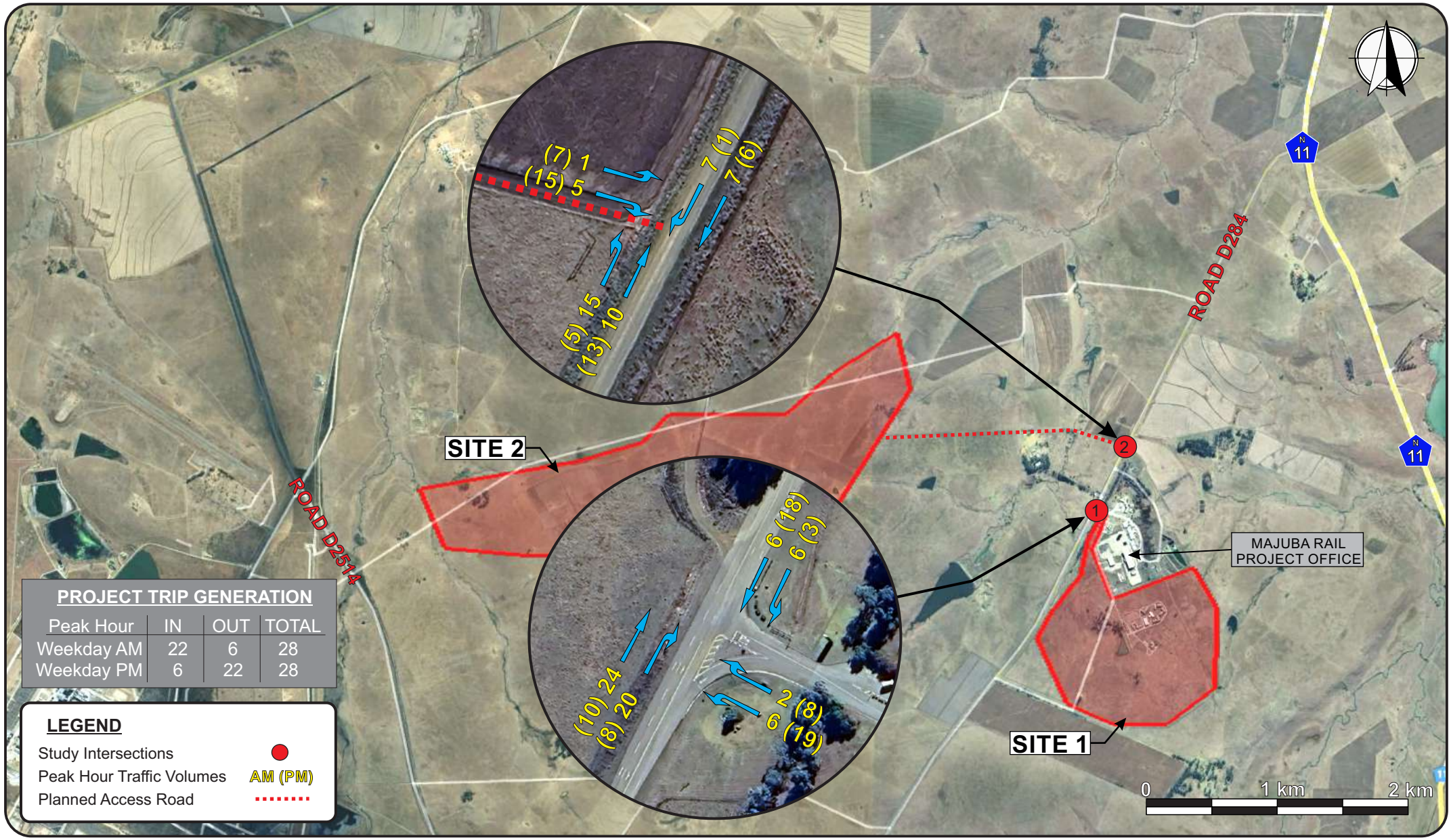
PROJECT:
Traffic Impact Study:
Sivutse Renewstable Plant,
Mpumalanga

FIGURE NAME:
Study Intersections & Existing 2023 Peak Hour Traffic Volumes

PROJECT NO.
435

FIGURE NO.
3



PROJECT TRIP GENERATION

Peak Hour	IN	OUT	TOTAL
Weekday AM	22	6	28
Weekday PM	6	22	28

LEGEND

- Study Intersections
- Peak Hour Traffic Volumes — AM (PM)
- Planned Access Road

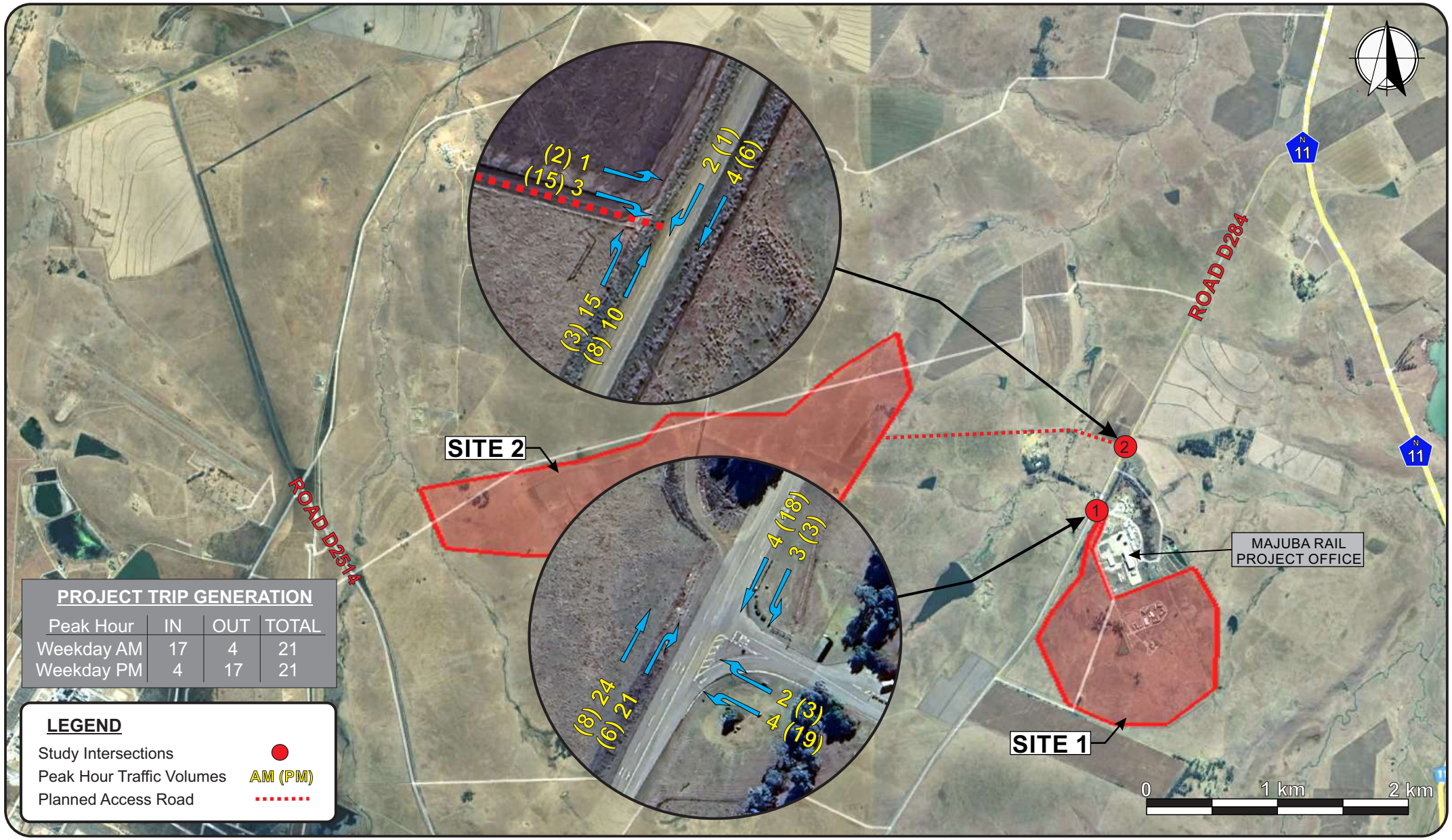
TRAFFIC SURVEYS
Traffic survey & Analysis Specialists

PROJECT:
Traffic Impact Study:
Sivutse Renewstable Plant,
Mpumalanga

FIGURE NAME:
Expected Peak Hour Traffic Volumes During Construction

PROJECT NO.
435

FIGURE NO.
4



PROJECT TRIP GENERATION

Peak Hour	IN	OUT	TOTAL
Weekday AM	17	4	21
Weekday PM	4	17	21

LEGEND

- Study Intersections
- Peak Hour Traffic Volumes — AM (PM)
- Planned Access Road

TRAFFIC SURVEYS
Traffic survey & Analysis Specialists

PROJECT:
Traffic Impact Study:
Sivutse Renewstable Plant,
Mpumalanga

FIGURE NAME:
Expected Peak Hour Traffic Volumes During Operations

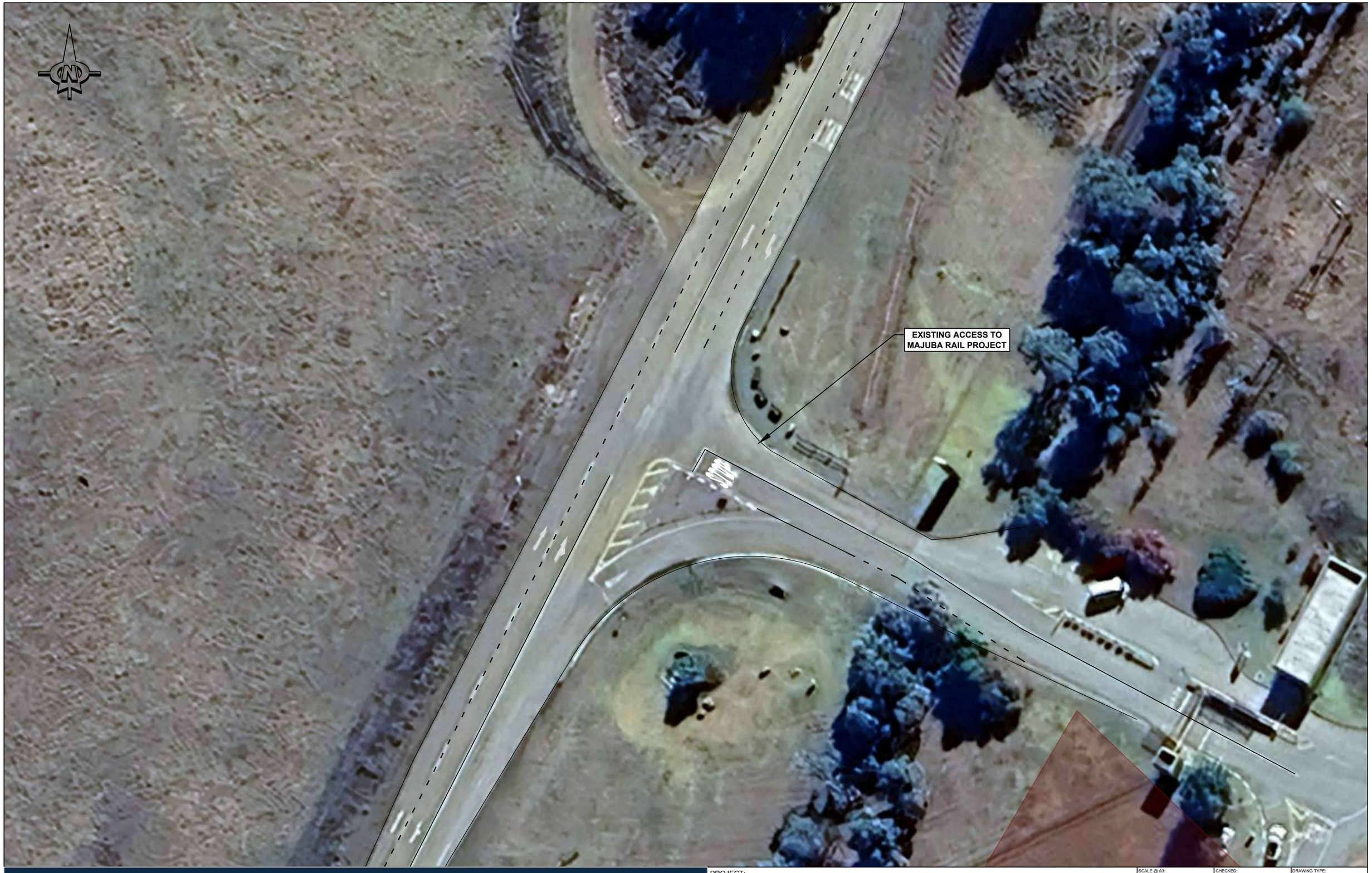
PROJECT NO.
435

FIGURE NO.
5

DRAWINGS

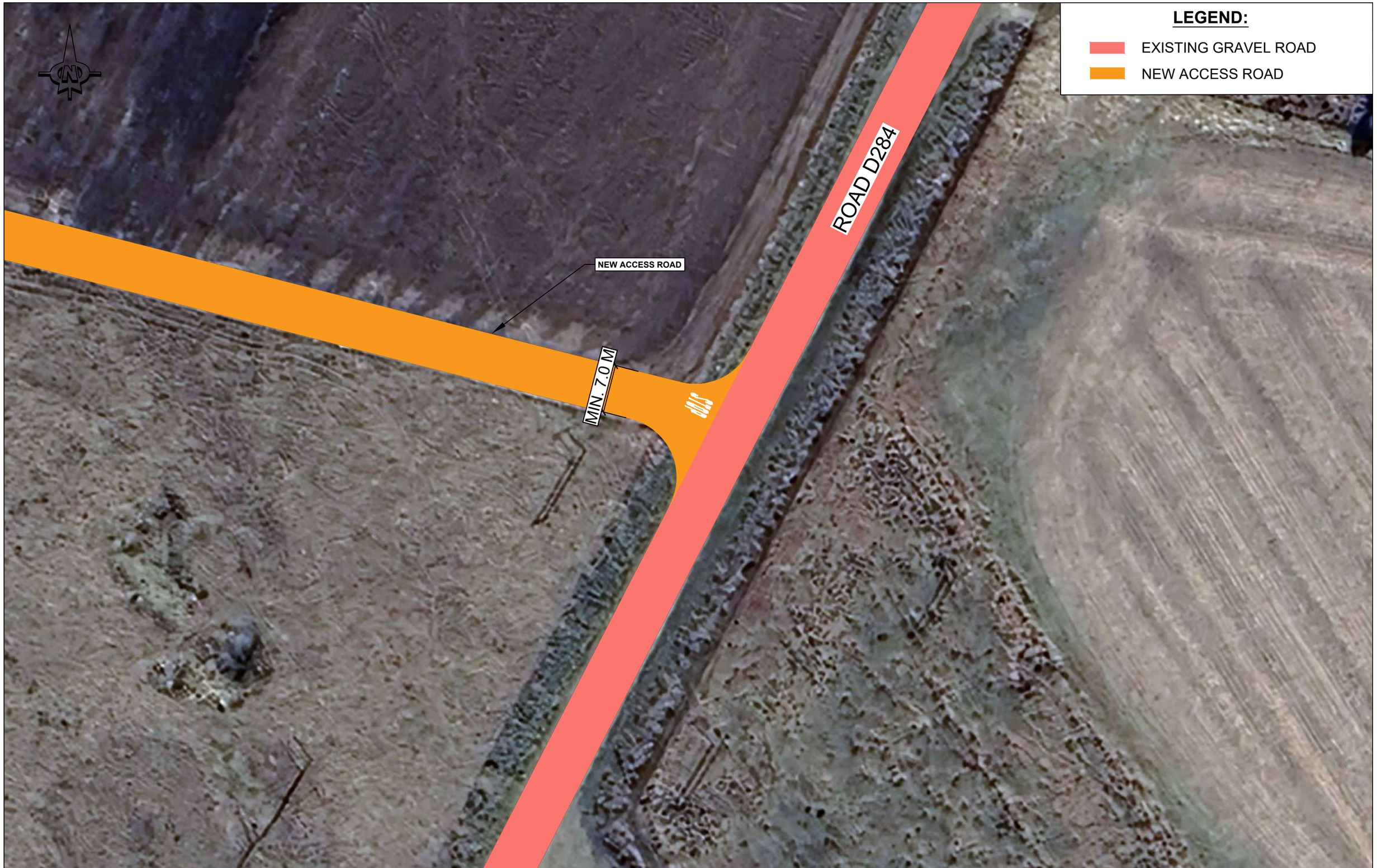
Drawing D001 Existing intersection to site

Drawing D002 Site portion 2 access intersection



TRAFFIC SURVEYS
TRAFFIC SURVEY & ANALYSIS SPECIALISTS

PROJECT: TRAFFIC IMPACT STUDY: SIVUTSE RENEWSTABLE PLANT	SCALE @ A3: N.T.S	CHECKED: PJ	DRAWING TYPE: CONCEPTUAL
	DESIGN: PJ	DRAWN: PJ	DATE: 18/09/2023
TITLE: EXISTING INTERSECTION TO SITE	PROJECT NO: 435	DRAWING NO: D001	REV: A



TRAFFIC SURVEYS
TRAFFIC SURVEY & ANALYSIS SPECIALISTS

PROJECT: TRAFFIC IMPACT STUDY: SIVUTSE RENEWSTABLE PLANT	SCALE @ A3: N.T.S	CHECKED: PJ	DRAWING TYPE: CONCEPTUAL
	DESIGN: PJ	DRAWN: PJ	DATE: 18/09/2023
TITLE: SITE PORTION 2 ACCESS INTERSECTION	PROJECT NO: 435	DRAWING NO: D002	REV: A

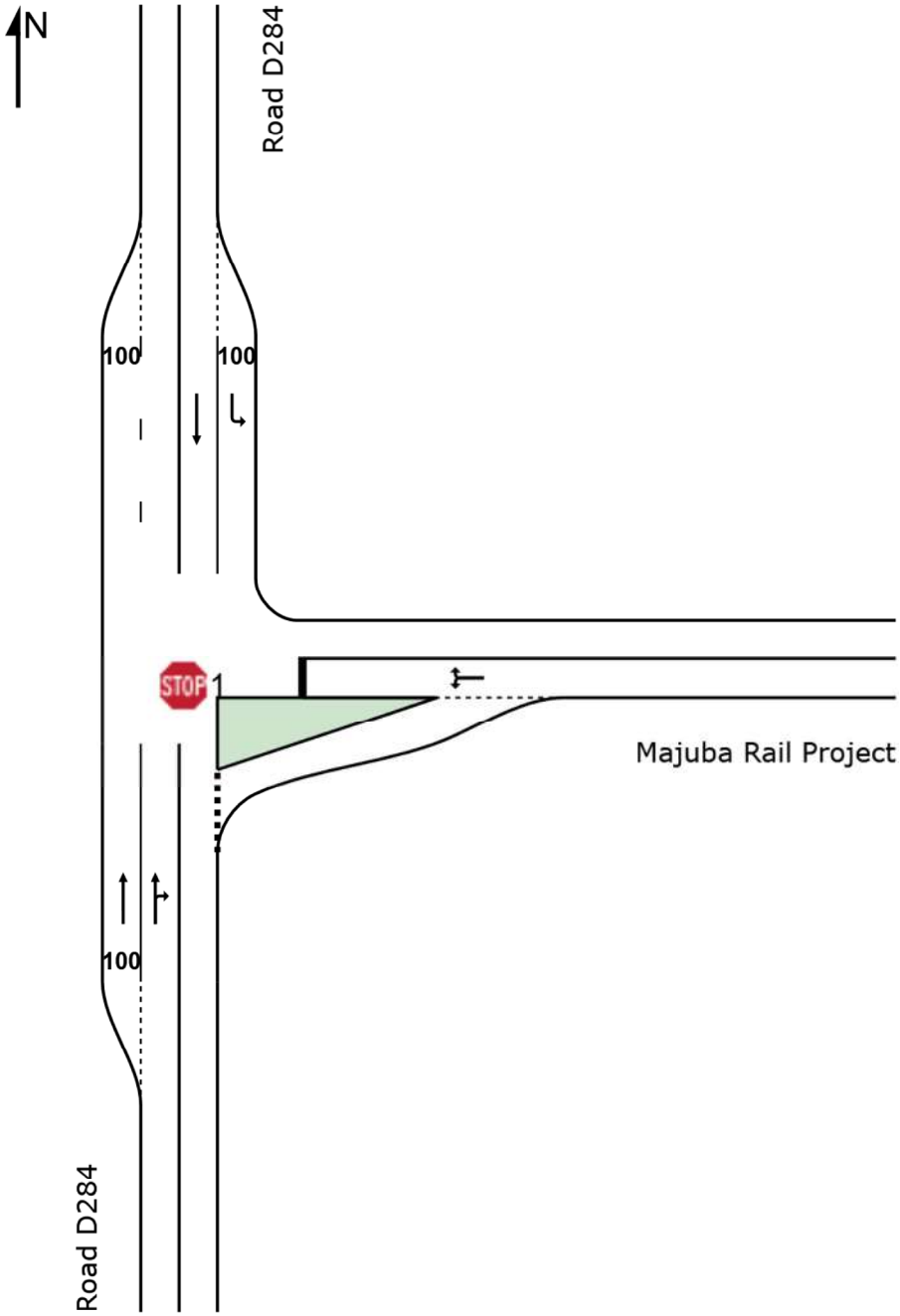
APPENDIX A

Output of SIDRA intersection capacity analyses

SITE LAYOUT

Site: 1 [01_2023 AM]

Site 1 (Majuba Rail Project)/ Road D284
Site Category: (None)
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 1 [01_2023 AM]

Site 1 (Majuba Rail Project)/ Road D284
Site Category: (None)
Stop (Two-Way)

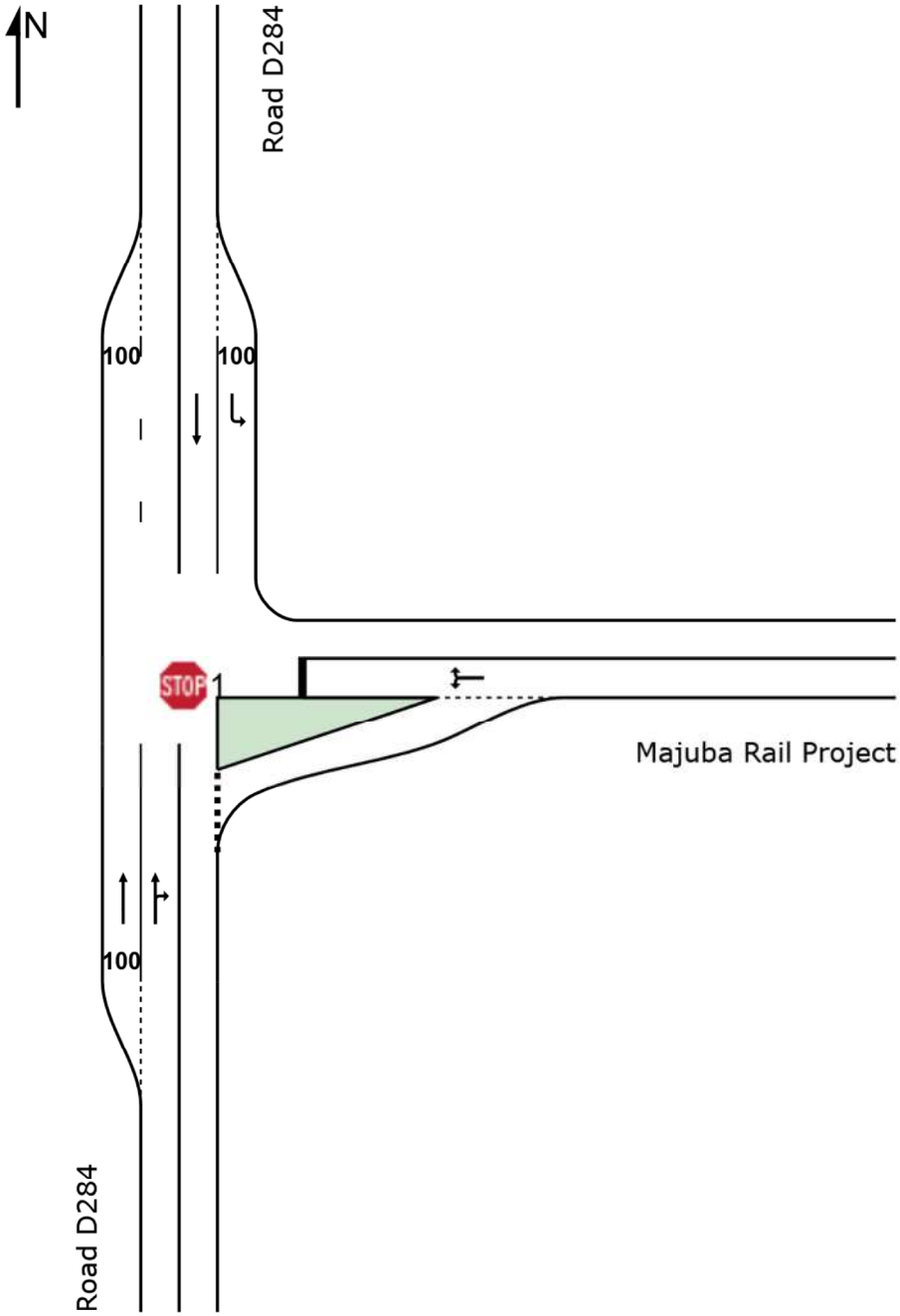
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road D284												
2	T1	11	30.0	0.008	0.0	LOS A	0.0	0.3	0.01	0.14	0.01	58.7
3	R2	7	30.0	0.008	5.8	LOS A	0.0	0.3	0.03	0.37	0.03	53.4
Approach		19	30.0	0.008	2.3	NA	0.0	0.3	0.02	0.23	0.02	56.6
East: Majuba Rail Project												
4	L2	1	30.0	0.003	5.9	LOS A	0.0	0.1	0.02	0.55	0.02	53.1
6	R2	1	30.0	0.003	6.1	LOS A	0.0	0.1	0.02	0.55	0.02	52.2
Approach		3	30.0	0.003	6.0	LOS A	0.0	0.1	0.02	0.55	0.02	52.6
North: Road D284												
7	L2	1	30.0	0.001	5.9	LOS A	0.0	0.0	0.00	0.57	0.00	52.4
8	T1	1	30.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		3	30.0	0.001	2.9	NA	0.0	0.0	0.00	0.29	0.00	55.9
All Vehicles		24	30.0	0.008	2.8	NA	0.0	0.3	0.01	0.27	0.01	56.0

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

SITE LAYOUT

Site: 1 [02_2023 PM]

Site 1 (Majuba Rail Project)/ Road D284
Site Category: (None)
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 1 [02_2023 PM]

Site 1 (Majuba Rail Project)/ Road D284
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

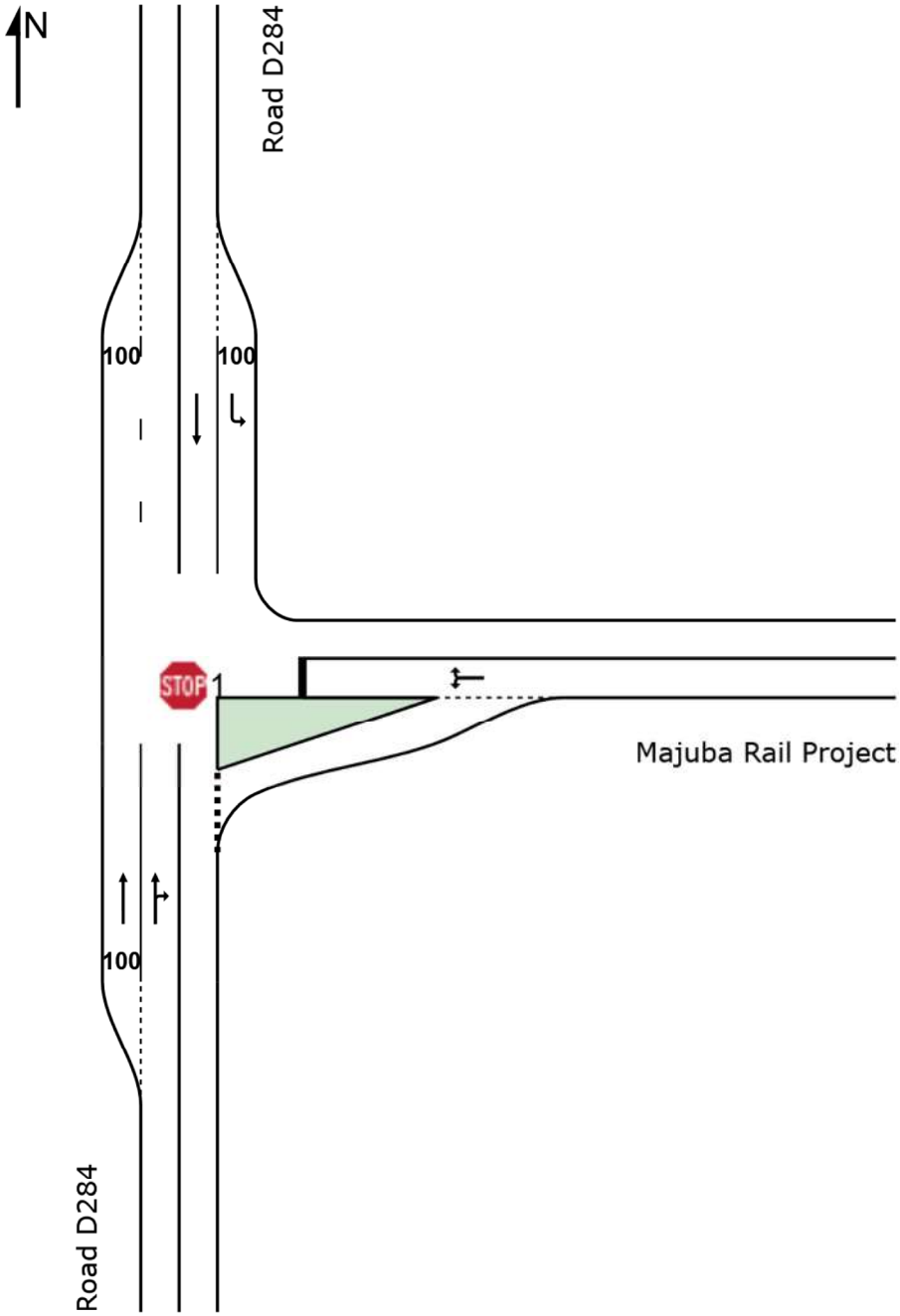
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road D284												
2	T1	7	30.0	0.005	0.0	LOS A	0.0	0.2	0.02	0.13	0.02	58.7
3	R2	4	30.0	0.005	5.9	LOS A	0.0	0.2	0.05	0.36	0.05	53.4
Approach		11	30.0	0.005	2.2	NA	0.0	0.2	0.03	0.22	0.03	56.6
East: Majuba Rail Project												
4	L2	6	30.0	0.007	5.9	LOS A	0.0	0.2	0.03	0.53	0.03	53.0
6	R2	1	30.0	0.007	6.0	LOS A	0.0	0.2	0.03	0.53	0.03	52.2
Approach		7	30.0	0.007	6.0	LOS A	0.0	0.2	0.03	0.53	0.03	52.8
North: Road D284												
7	L2	3	30.0	0.002	5.9	LOS A	0.0	0.0	0.00	0.57	0.00	52.4
8	T1	4	30.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		7	30.0	0.003	2.4	NA	0.0	0.0	0.00	0.23	0.00	56.7
All Vehicles		26	30.0	0.007	3.3	NA	0.0	0.2	0.02	0.31	0.02	55.5

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

SITE LAYOUT

Site: 1 [03_2025 AM + Construction]

Site 1 (Majuba Rail Project)/ Road D284
Site Category: (None)
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 1 [03_2025 AM + Construction]

Site 1 (Majuba Rail Project)/ Road D284
Site Category: (None)
Stop (Two-Way)

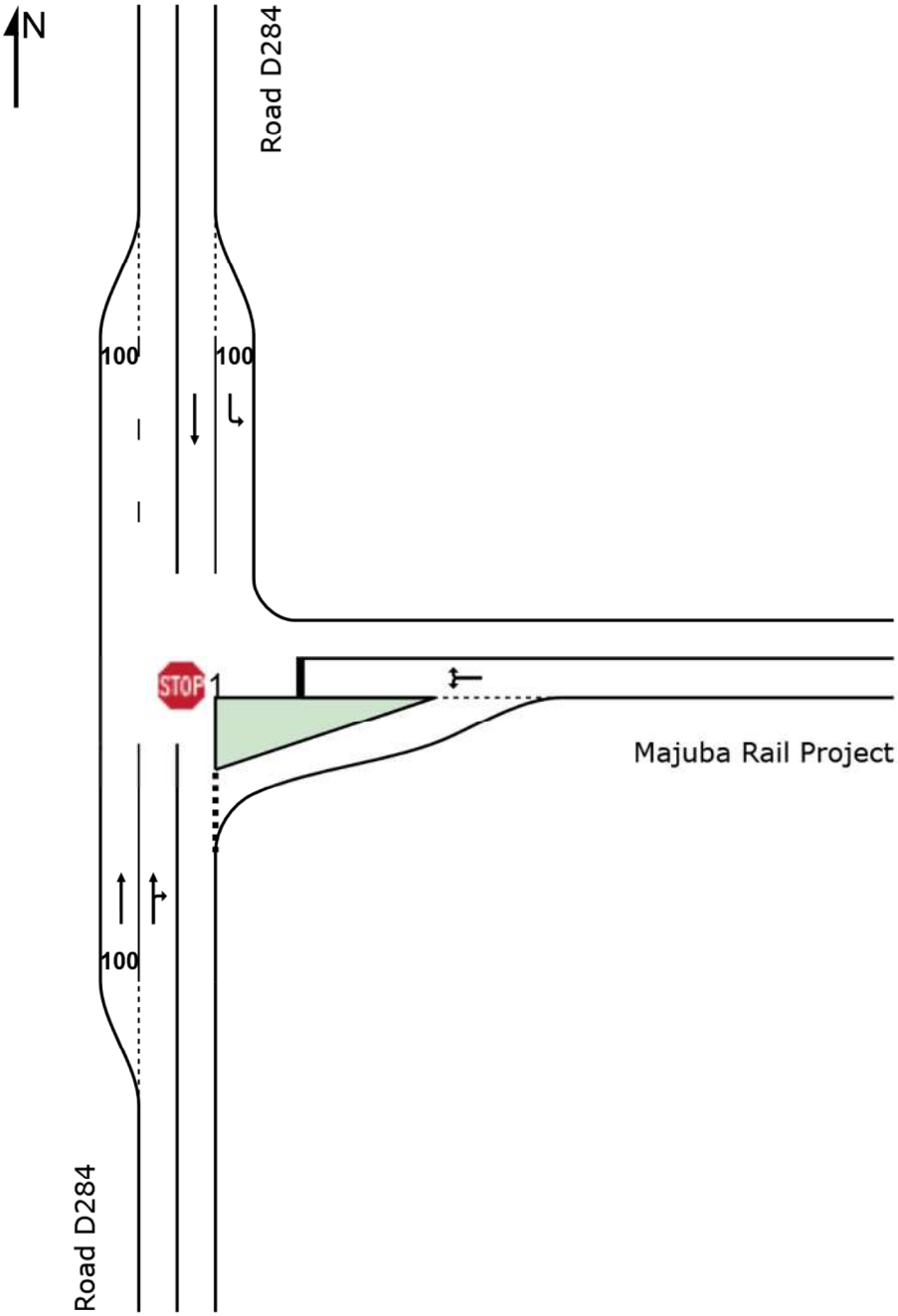
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road D284												
2	T1	34	30.0	0.029	0.0	LOS A	0.1	1.1	0.02	0.11	0.02	58.9
3	R2	29	30.0	0.029	5.9	LOS A	0.1	1.1	0.08	0.43	0.08	52.7
Approach		63	30.0	0.029	2.7	NA	0.1	1.1	0.05	0.26	0.05	55.9
East: Majuba Rail Project												
4	L2	9	30.0	0.011	6.0	LOS A	0.0	0.4	0.04	0.53	0.04	53.0
6	R2	3	30.0	0.011	6.7	LOS A	0.0	0.4	0.04	0.53	0.04	52.1
Approach		11	30.0	0.011	6.1	LOS A	0.0	0.4	0.04	0.53	0.04	52.7
North: Road D284												
7	L2	9	30.0	0.005	5.9	LOS A	0.0	0.0	0.00	0.57	0.00	52.4
8	T1	9	30.0	0.005	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		17	30.0	0.005	2.9	NA	0.0	0.0	0.00	0.29	0.00	55.9
All Vehicles		91	30.0	0.029	3.2	NA	0.1	1.1	0.04	0.30	0.04	55.5

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

SITE LAYOUT

Site: 1 [04_2025 PM + Construction]

Site 1 (Majuba Rail Project)/ Road D284
Site Category: (None)
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 1 [04_2025 PM + Construction]

Site 1 (Majuba Rail Project)/ Road D284
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

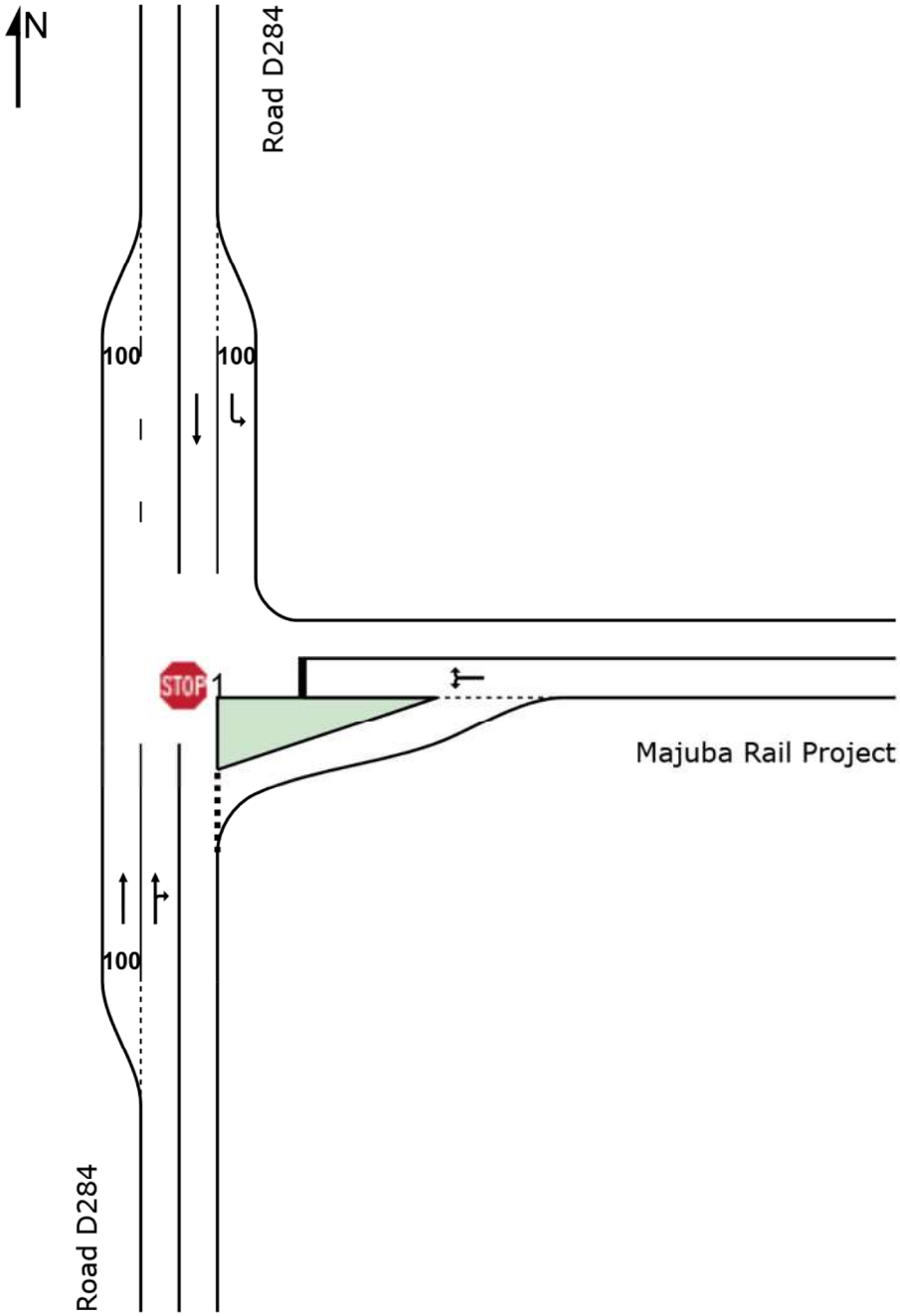
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road D284												
2	T1	14	30.0	0.012	0.0	LOS A	0.0	0.4	0.03	0.11	0.03	58.8
3	R2	11	30.0	0.012	6.0	LOS A	0.0	0.4	0.11	0.42	0.11	52.7
Approach		26	30.0	0.012	2.7	NA	0.0	0.4	0.07	0.25	0.07	55.9
East: Majuba Rail Project												
4	L2	27	30.0	0.039	6.1	LOS A	0.1	1.2	0.11	0.52	0.11	52.7
6	R2	11	30.0	0.039	6.4	LOS A	0.1	1.2	0.11	0.52	0.11	51.9
Approach		39	30.0	0.039	6.2	LOS A	0.1	1.2	0.11	0.52	0.11	52.5
North: Road D284												
7	L2	4	30.0	0.003	5.9	LOS A	0.0	0.0	0.00	0.57	0.00	52.4
8	T1	26	30.0	0.015	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		30	30.0	0.015	0.8	NA	0.0	0.0	0.00	0.08	0.00	58.8
All Vehicles		94	30.0	0.039	3.5	NA	0.1	1.2	0.06	0.31	0.06	55.3

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

SITE LAYOUT

Site: 1 [05_2028 AM + Operations]

Site 1 (Majuba Rail Project)/ Road D284
Site Category: (None)
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 1 [05_2028 AM + Operations]

Site 1 (Majuba Rail Project)/ Road D284
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

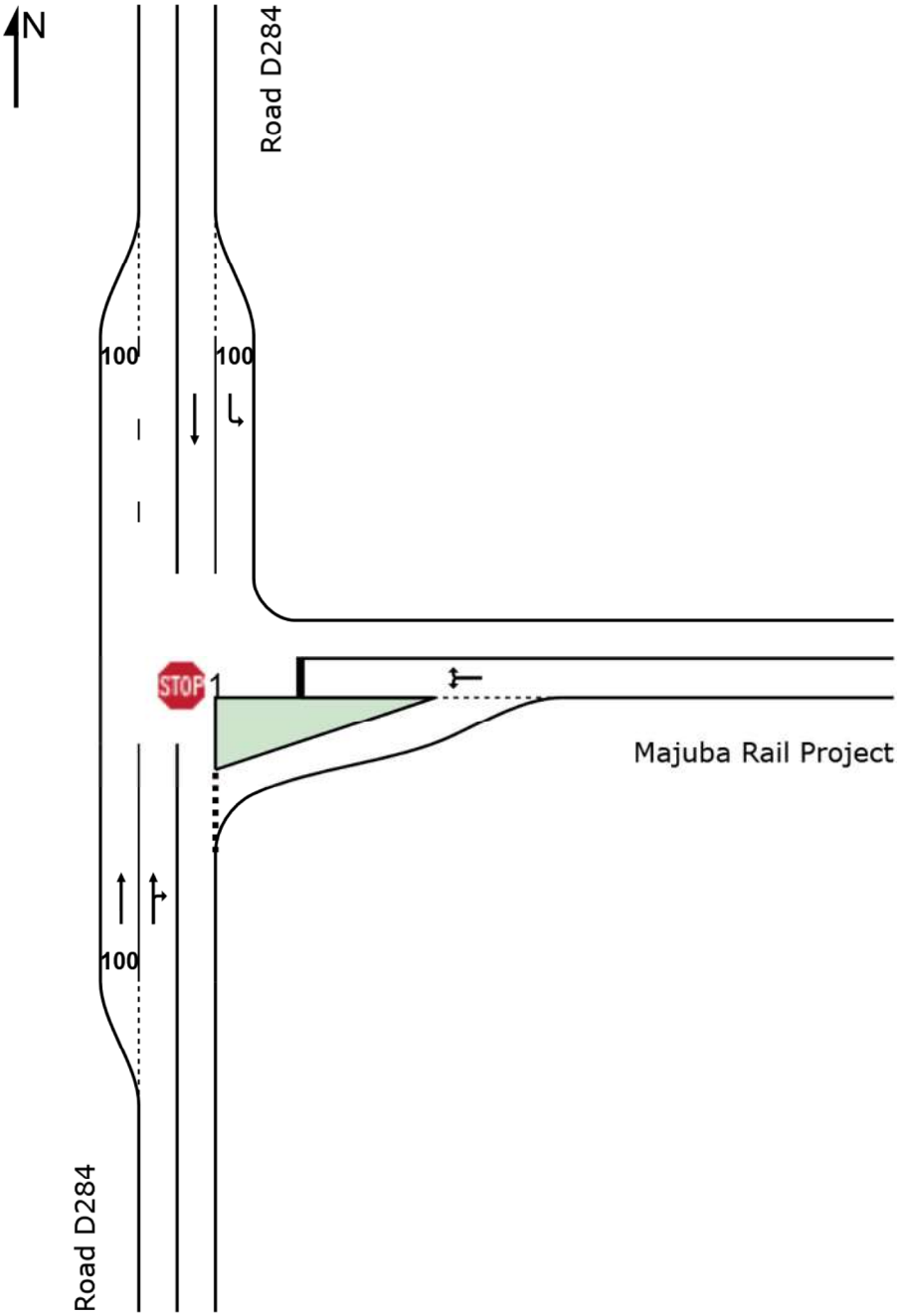
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road D284												
2	T1	34	30.0	0.029	0.0	LOS A	0.1	1.1	0.01	0.11	0.01	58.9
3	R2	30	30.0	0.029	5.9	LOS A	0.1	1.1	0.06	0.45	0.06	52.7
Approach		64	30.0	0.029	2.8	NA	0.1	1.1	0.04	0.27	0.04	55.8
East: Majuba Rail Project												
4	L2	6	30.0	0.009	6.0	LOS A	0.0	0.3	0.03	0.54	0.03	52.9
6	R2	3	30.0	0.009	6.6	LOS A	0.0	0.3	0.03	0.54	0.03	52.1
Approach		9	30.0	0.009	6.2	LOS A	0.0	0.3	0.03	0.54	0.03	52.6
North: Road D284												
7	L2	4	30.0	0.003	5.9	LOS A	0.0	0.0	0.00	0.57	0.00	52.4
8	T1	6	30.0	0.003	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		10	30.0	0.003	2.5	NA	0.0	0.0	0.00	0.24	0.00	56.5
All Vehicles		83	30.0	0.029	3.1	NA	0.1	1.1	0.03	0.29	0.03	55.6

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

SITE LAYOUT

Site: 1 [06_2028 PM + Operations]

Site 1 (Majuba Rail Project)/ Road D284
Site Category: (None)
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 1 [06_2028 PM + Operations]

Site 1 (Majuba Rail Project)/ Road D284
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

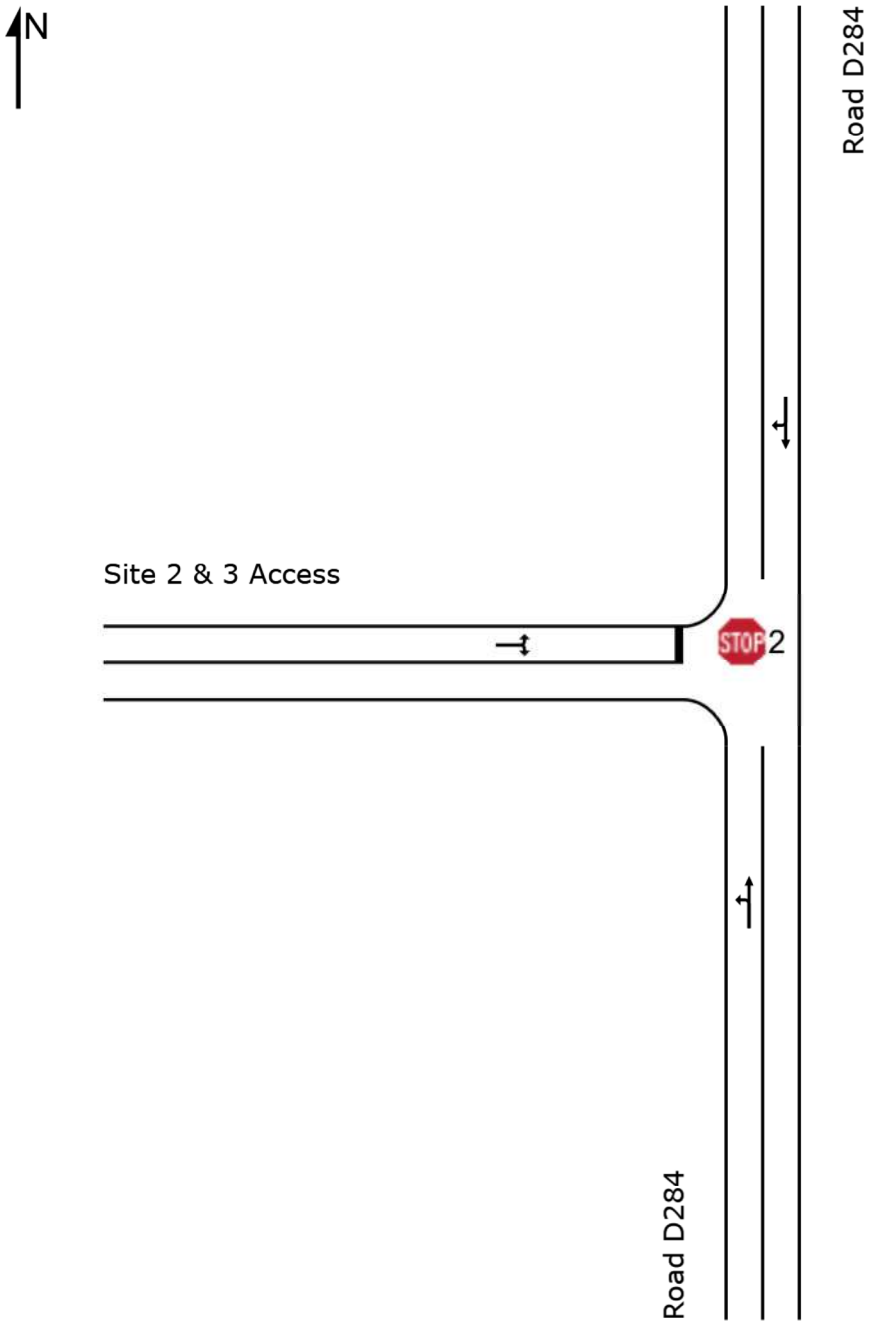
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road D284												
2	T1	11	30.0	0.009	0.0	LOS A	0.0	0.3	0.03	0.12	0.03	58.8
3	R2	9	30.0	0.009	6.0	LOS A	0.0	0.3	0.11	0.40	0.11	52.8
Approach		20	30.0	0.009	2.6	NA	0.0	0.3	0.07	0.24	0.07	56.0
East: Majuba Rail Project												
4	L2	27	30.0	0.029	6.1	LOS A	0.1	0.9	0.10	0.52	0.10	52.8
6	R2	4	30.0	0.029	6.4	LOS A	0.1	0.9	0.10	0.52	0.10	51.9
Approach		31	30.0	0.029	6.1	LOS A	0.1	0.9	0.10	0.52	0.10	52.7
North: Road D284												
7	L2	4	30.0	0.003	5.9	LOS A	0.0	0.0	0.00	0.57	0.00	52.4
8	T1	26	30.0	0.015	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		30	30.0	0.015	0.8	NA	0.0	0.0	0.00	0.08	0.00	58.8
All Vehicles		81	30.0	0.029	3.3	NA	0.1	0.9	0.06	0.29	0.06	55.6

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

SITE LAYOUT

Site: 2 [01_2025 AM + Construction]

Road D284/Site 2 & 3 Access
Site Category: (None)
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 2 [01_2025 AM + Construction]

Road D284/Site 2 & 3 Access
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

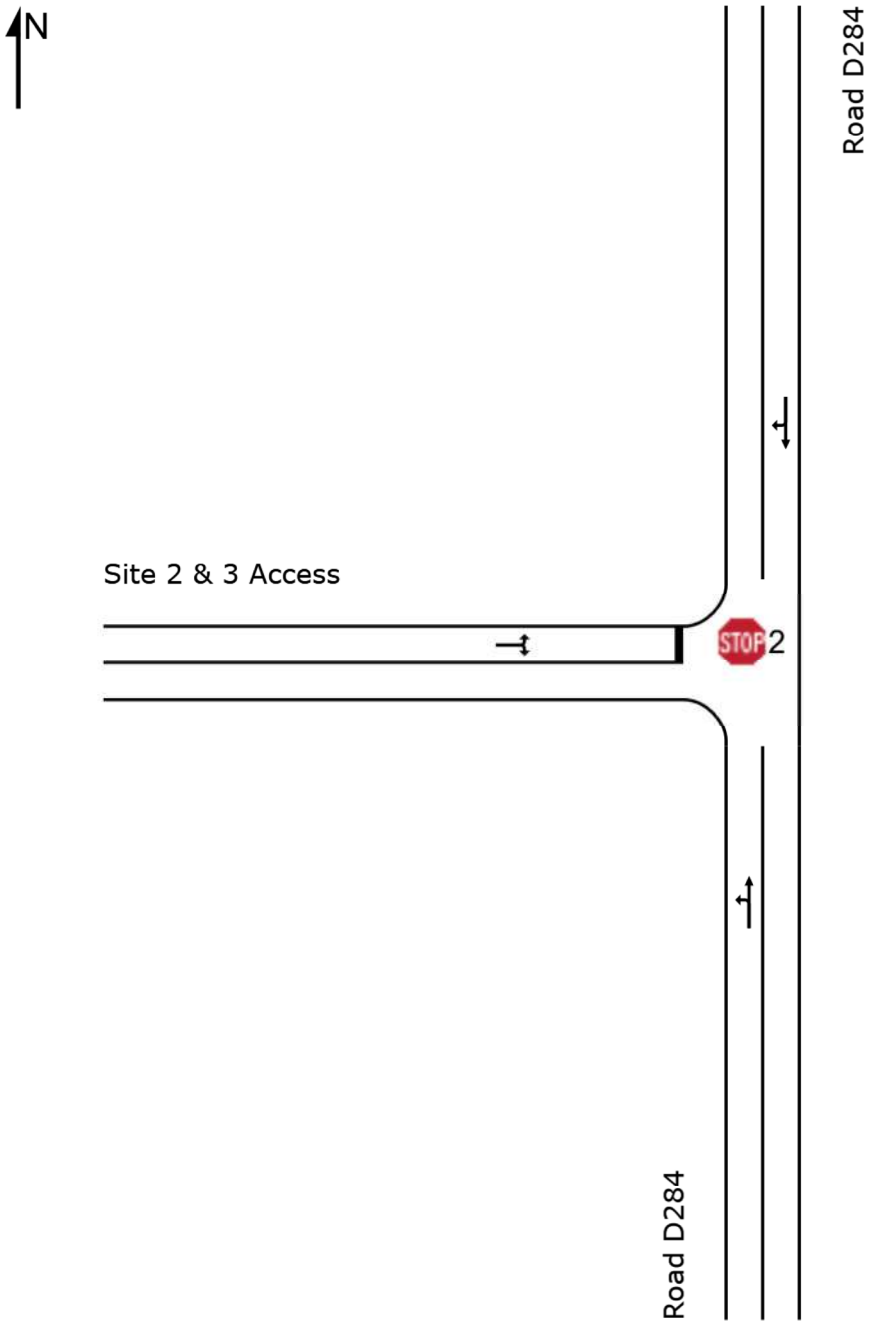
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road D284												
1	L2	21	30.0	0.023	5.9	LOS A	0.0	0.0	0.00	0.35	0.00	54.1
2	T1	14	30.0	0.023	0.0	LOS A	0.0	0.0	0.00	0.35	0.00	56.9
Approach		36	30.0	0.023	3.5	NA	0.0	0.0	0.00	0.35	0.00	55.2
North: Road D284												
8	T1	10	30.0	0.013	0.1	LOS A	0.1	0.5	0.11	0.28	0.11	57.0
9	R2	10	30.0	0.013	6.0	LOS A	0.1	0.5	0.11	0.28	0.11	53.6
Approach		20	30.0	0.013	3.0	NA	0.1	0.5	0.11	0.28	0.11	55.3
West: Site 2 & 3 Access												
10	L2	1	30.0	0.009	9.3	LOS A	0.0	0.2	0.10	0.98	0.10	50.8
12	R2	7	30.0	0.009	9.0	LOS A	0.0	0.2	0.10	0.98	0.10	50.3
Approach		9	30.0	0.009	9.1	LOS A	0.0	0.2	0.10	0.98	0.10	50.4
All Vehicles		64	30.0	0.023	4.1	NA	0.1	0.5	0.05	0.41	0.05	54.5

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

SITE LAYOUT

Site: 2 [02_2025 PM + Construction]

Road D284/Site 2 & 3 Access
Site Category: (None)
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 2 [02_2025 PM + Construction]

Road D284/Site 2 & 3 Access
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

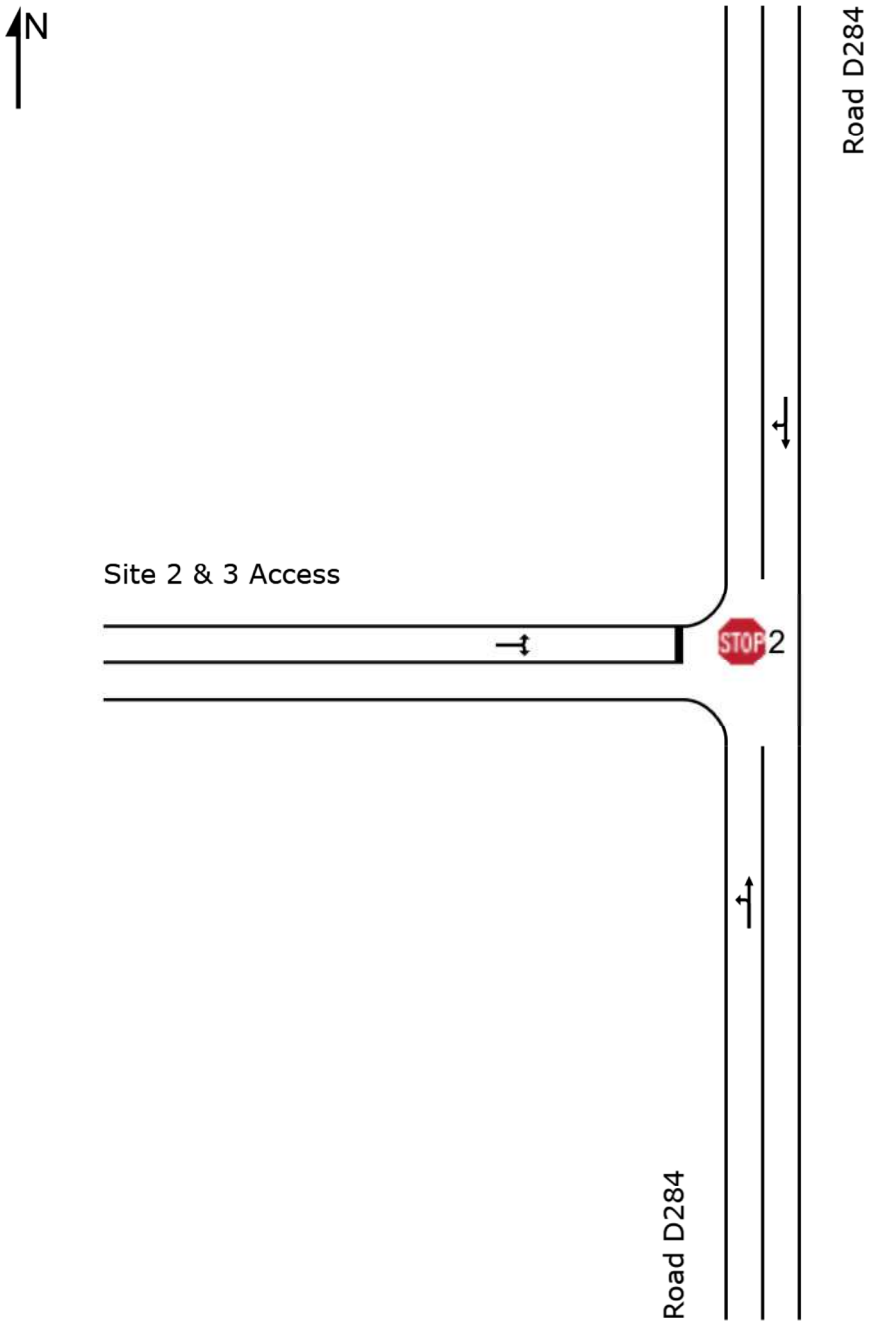
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road D284												
1	L2	7	30.0	0.016	5.9	LOS A	0.0	0.0	0.00	0.16	0.00	55.5
2	T1	19	30.0	0.016	0.0	LOS A	0.0	0.0	0.00	0.16	0.00	58.5
Approach		26	30.0	0.016	1.6	NA	0.0	0.0	0.00	0.16	0.00	57.7
North: Road D284												
8	T1	9	30.0	0.006	0.0	LOS A	0.0	0.1	0.03	0.09	0.03	59.1
9	R2	1	30.0	0.006	5.9	LOS A	0.0	0.1	0.03	0.09	0.03	55.5
Approach		10	30.0	0.006	0.9	NA	0.0	0.1	0.03	0.09	0.03	58.6
West: Site 2 & 3 Access												
10	L2	10	30.0	0.030	9.4	LOS A	0.1	0.9	0.10	0.98	0.10	50.8
12	R2	21	30.0	0.030	8.9	LOS A	0.1	0.9	0.10	0.98	0.10	50.3
Approach		31	30.0	0.030	9.1	LOS A	0.1	0.9	0.10	0.98	0.10	50.4
All Vehicles		67	30.0	0.030	5.0	NA	0.1	0.9	0.05	0.53	0.05	54.2

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

SITE LAYOUT

Site: 2 [03_2028 AM + Operations]

Road D284/Site 2 & 3 Access
Site Category: (None)
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 2 [03_2028 AM + Operations]

Road D284/Site 2 & 3 Access
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

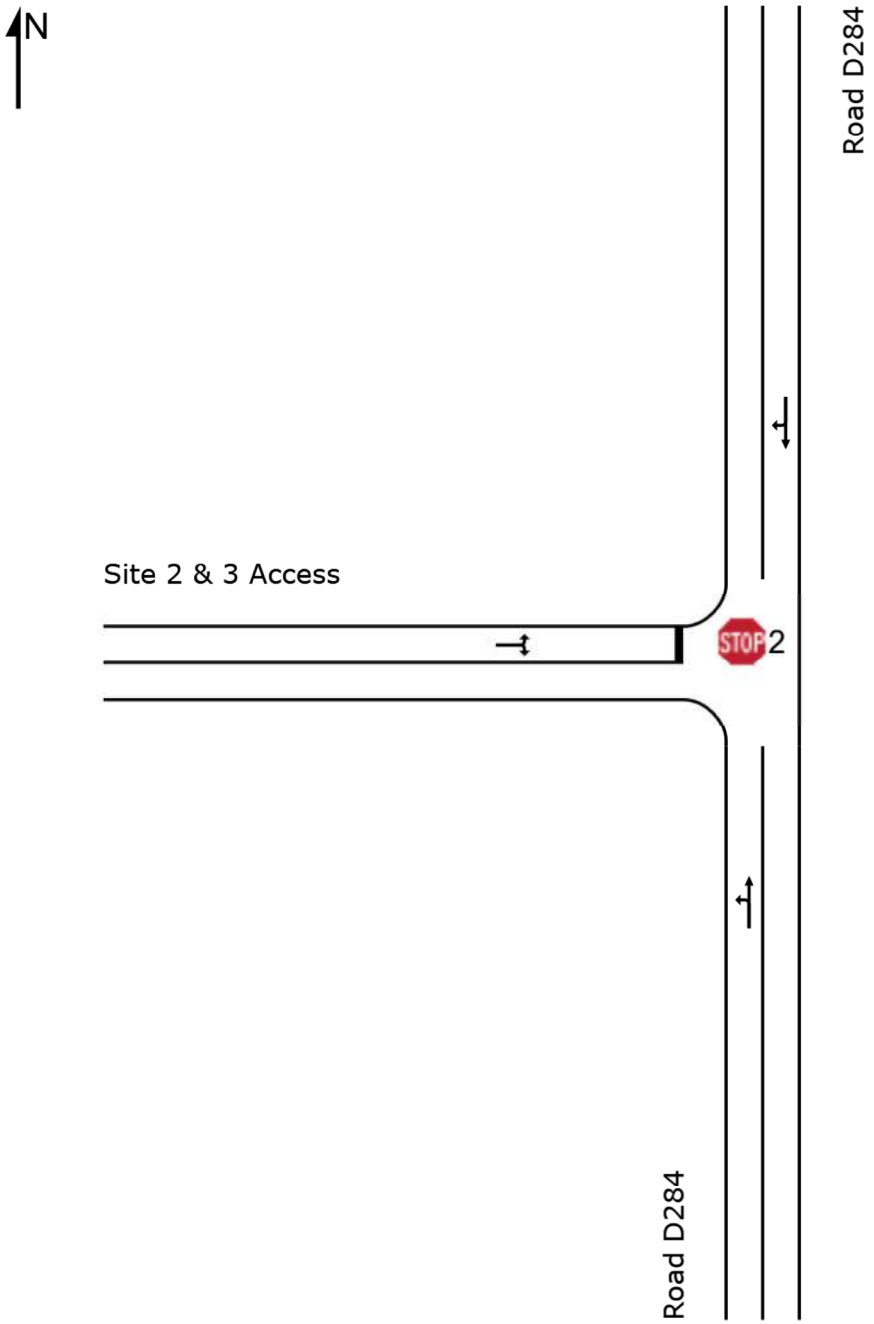
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road D284												
1	L2	21	30.0	0.023	5.9	LOS A	0.0	0.0	0.00	0.35	0.00	54.1
2	T1	14	30.0	0.023	0.0	LOS A	0.0	0.0	0.00	0.35	0.00	56.9
Approach		36	30.0	0.023	3.5	NA	0.0	0.0	0.00	0.35	0.00	55.2
North: Road D284												
8	T1	6	30.0	0.005	0.1	LOS A	0.0	0.1	0.08	0.19	0.08	57.9
9	R2	3	30.0	0.005	6.0	LOS A	0.0	0.1	0.08	0.19	0.08	54.4
Approach		9	30.0	0.005	2.0	NA	0.0	0.1	0.08	0.19	0.08	56.7
West: Site 2 & 3 Access												
10	L2	1	30.0	0.006	9.3	LOS A	0.0	0.2	0.09	0.98	0.09	50.8
12	R2	4	30.0	0.006	8.9	LOS A	0.0	0.2	0.09	0.98	0.09	50.3
Approach		6	30.0	0.006	9.0	LOS A	0.0	0.2	0.09	0.98	0.09	50.4
All Vehicles		50	30.0	0.023	3.9	NA	0.0	0.2	0.02	0.39	0.02	54.8

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

SITE LAYOUT

Site: 2 [04_2028 PM + Operations]

Road D284/Site 2 & 3 Access
Site Category: (None)
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 2 [04_2028 PM + Operations]

Road D284/Site 2 & 3 Access
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road D284												
1	L2	4	30.0	0.010	5.9	LOS A	0.0	0.0	0.00	0.16	0.00	55.6
2	T1	11	30.0	0.010	0.0	LOS A	0.0	0.0	0.00	0.16	0.00	58.5
Approach		16	30.0	0.010	1.6	NA	0.0	0.0	0.00	0.16	0.00	57.7
North: Road D284												
8	T1	9	30.0	0.006	0.0	LOS A	0.0	0.1	0.02	0.09	0.02	59.1
9	R2	1	30.0	0.006	5.9	LOS A	0.0	0.1	0.02	0.09	0.02	55.5
Approach		10	30.0	0.006	0.9	NA	0.0	0.1	0.02	0.09	0.02	58.6
West: Site 2 & 3 Access												
10	L2	3	30.0	0.024	9.3	LOS A	0.1	0.7	0.08	0.99	0.08	50.8
12	R2	21	30.0	0.024	8.9	LOS A	0.1	0.7	0.08	0.99	0.08	50.4
Approach		24	30.0	0.024	8.9	LOS A	0.1	0.7	0.08	0.99	0.08	50.4
All Vehicles		50	30.0	0.024	5.0	NA	0.1	0.7	0.05	0.55	0.05	54.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
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SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.