

# TRAFFIC IMPACT STUDY

PROPOSED QHAKAZA HDF RENEWSTABLE POWER PLANT,  
MPUMALANGA PROVINCE

SEPTEMBER 2024

# REPORT INFORMATION SHEET

<b>REPORT TYPE</b>	Traffic Impact Study
<b>TITLE</b>	Proposed Qhakaza HDF Renewable Power Plant, Mpumalanga Province
<b>DATE</b>	September 2024
<b>VERSION</b>	1

<b>STUDY PROPERTIES</b>	The remainder of Portion 10 of the farm Schurveoort 63-HS
<b>MUNICIPAL AREA</b>	Dr Pixely Ka Isaka Seme Local Municipality, part of the greater Gert Sibande District Municipality
<b>PROVINCE</b>	Mpumalanga

<b>PROJECT NUMBER</b>	435
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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 Pixely Ka Isaka Seme Local Municipality, Mpumalanga Province.

The plant is referred to as the Qhakaza 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:

- The remainder of Portion 10 of the farm Schurveoort 63-HS.

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

### 2.3 Development details

The Qhakaza 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 maximise 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<sup>(1)</sup>*, 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 P48/3: This gravel 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.

The classification of this road is based on the *TRH 26, South African Road Classification and Access Management Manual<sup>(2)</sup>*. 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*<sup>(1)</sup> 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 P48/3) 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 intersection was deemed relevant for investigation:

- Road P48-3/Existing access to the site.

The boundaries of the study area are therefore limited to the location of this intersection.

### 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 intersection 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 intersection 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 Qhakaza HDF site is proposed as follows:

- The existing access road from Road P48/3 will be used. The planned access to the site is shown in **Figure 2**.

The layout and traffic flow control for this access intersection is shown in **Drawing D001**.

It can be confirmed that the access location is in line with the *TRH 26, South African Road Classification and Access Management Manual<sup>(2)</sup>* 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 intersection 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 intersection are summarized in **Table 4.3** below, with the detailed SIDRA outputs attached as **Appendix A**. These operating conditions are based on the 2023 peak hour traffic volumes (as per Figure 3) and consider the existing intersection layout 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/ Road P48-3 Approach 1: Site S Approach 2: P48/3 E Approach 3: P48/3 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** indicate that good traffic operating conditions are currently experienced at the key study intersection. 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 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 lifespan 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 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 5.4** below.

**Table 5.4 – Expected traffic to be generated 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 intersection 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 intersection during the construction phase are summarized in **Table 5.5** below, 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 consider the proposed intersection layout and traffic control as per **Drawing D001**.

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

**Table 5.5 – 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
<b>Site Access/ Road P48-3</b> Approach 1: Site S Approach 2: P48/3 E Approach 3: P48/3 W	Week AM	V/C	0.01	-	0.01	0.01	0.01	-	-	0.02	0.02
		Delay (s)	9	-	9	6	0	-	-	0	6
		LOS	A	-	A	A	A	-	-	A	A
	Week PM	V/C	0.03	-	0.03	0.01	0.01	-	-	0.01	0.01
		Delay (s)	9	-	9	6	0	-	-	0	6
		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*<sup>(3)</sup> does not provide vehicle trip data for renewable power plants. To determine project-specific trip generation data, information regarding the operational characteristics of renewable power plants was obtained and the following assumptions were made:

- A maximum of 50 employees will be employed on the 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 5.6** below.

**Table 5.6 – Expected traffic to be generated 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 intersection 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 intersection during the future operational phase are summarized in **Table 5.7** overleaf, 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 consider the proposed intersection layout and traffic control as per **Drawing D001**.

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

**Table 5.7 – 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
<b>Site Access/ Road P48-3</b> Approach 1: Site S Approach 2: P48/3 E Approach 3: P48/3 W	Week AM	V/C	0.01	-	0.01	0.01	0.01	-	-	0.02	0.02
		Delay (s)	9	-	9	6	0	-	-	0	6
		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)	9	-	9	6	0	-	-	0	6
		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 5.8** 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 5.8 – 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 5.9** below a rating of 4 can be allocated to the probability of the traffic impact during both the construction and operational phases.

**Table 5.9 – 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:

$$\text{Significance} = (\text{Extent} + \text{Duration} + \text{Magnitude}) \times \text{Probability}$$

**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 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 project. 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 P48-3. The following minor mitigation measures are, however, recommended:

- Dust control along all gravel roads on site and the gravel section of road P48-3 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;
- Controls should be in place to ensure that vehicles exiting the site are not overloaded, and
- Where feasible, heavy vehicles should not operate on public roads during peak traffic hours.

## 8 SUMMARY AND CONCLUSIONS

In summary and based on the contents of this document the following key conclusions are made regarding the proposed Qhakaza renewable power plant to be located near the Majuba power station in the Dr Pixely 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 road from Road P48/3 will be used.
- 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 intersection:
  - Road P48-3/Existing access to the site.
- No vulnerabilities or sensitivities currently exist 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 intersection;
- 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.

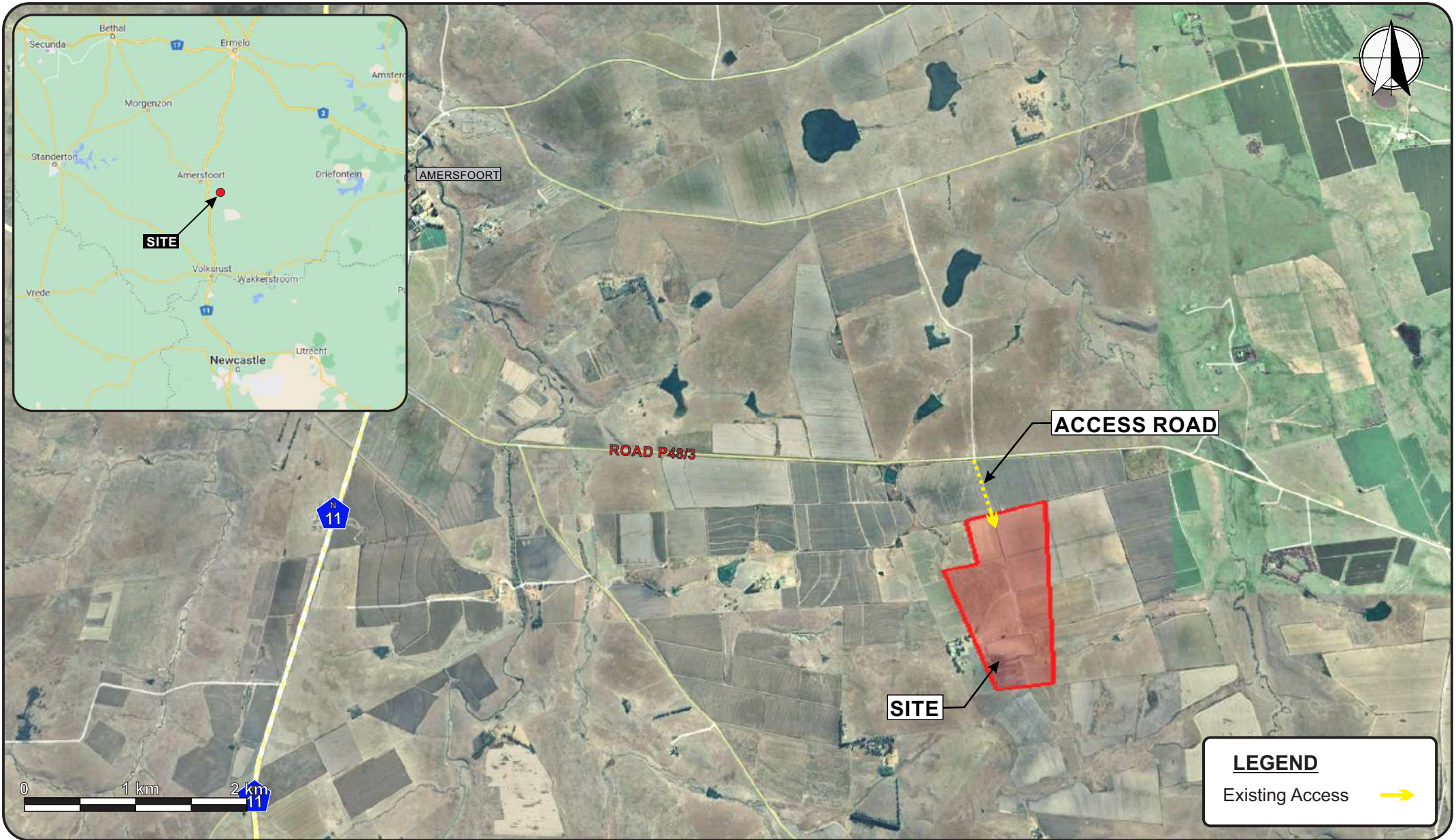
## 9 REFERENCES

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.

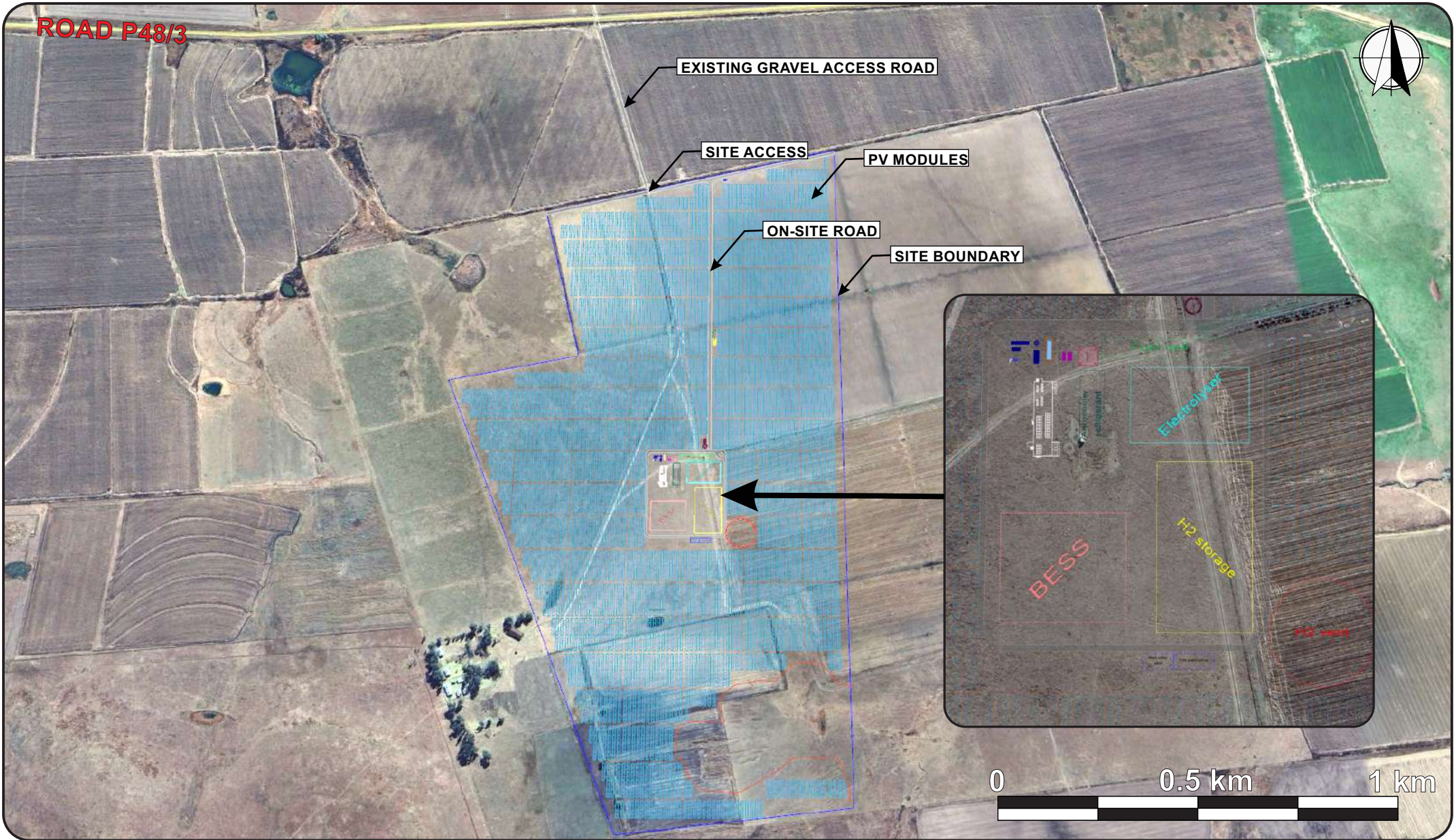
# FIGURES

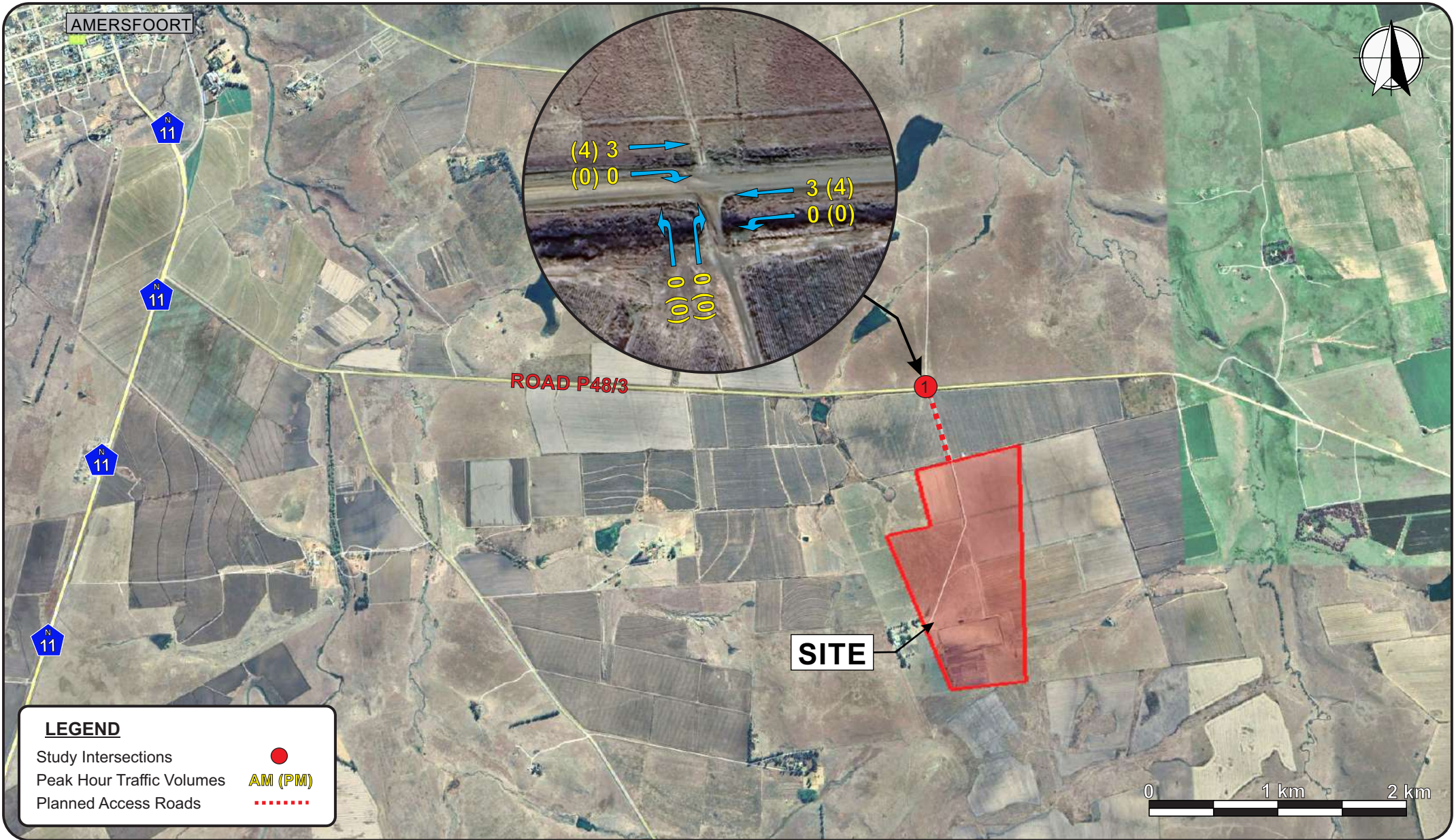
Figure 1	Locality Map
Figure 2	Proposed Plant Layout
Figure 3	Study Intersections & Existing 2023 Peak Hour Traffic Volumes
Figure 4	Expected Peak Hour Traffic Volumes During Construction
Figure 5	Expected Peak Hour Traffic Volumes During Operations

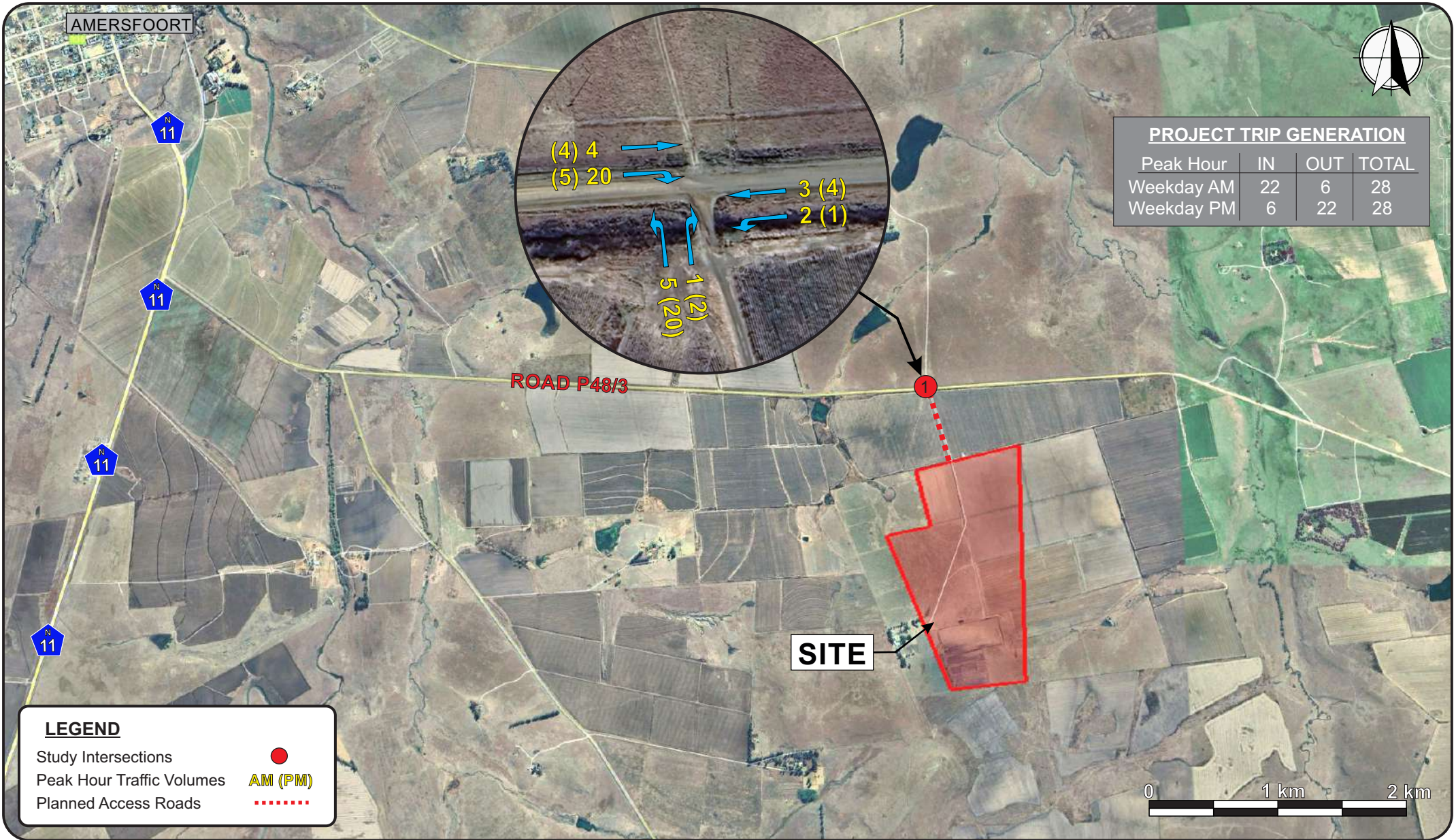


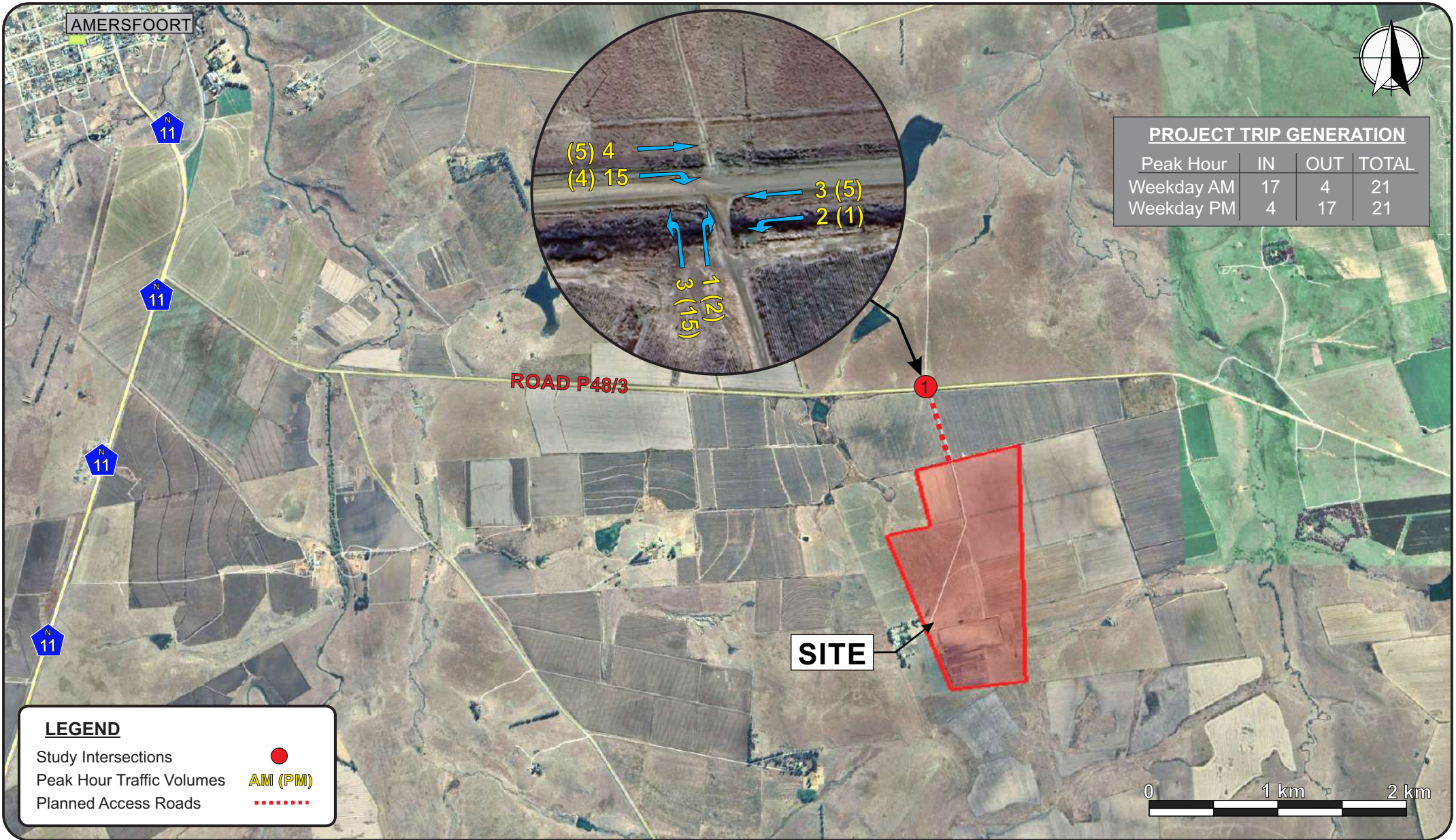


**LEGEND**  
 Existing Access →









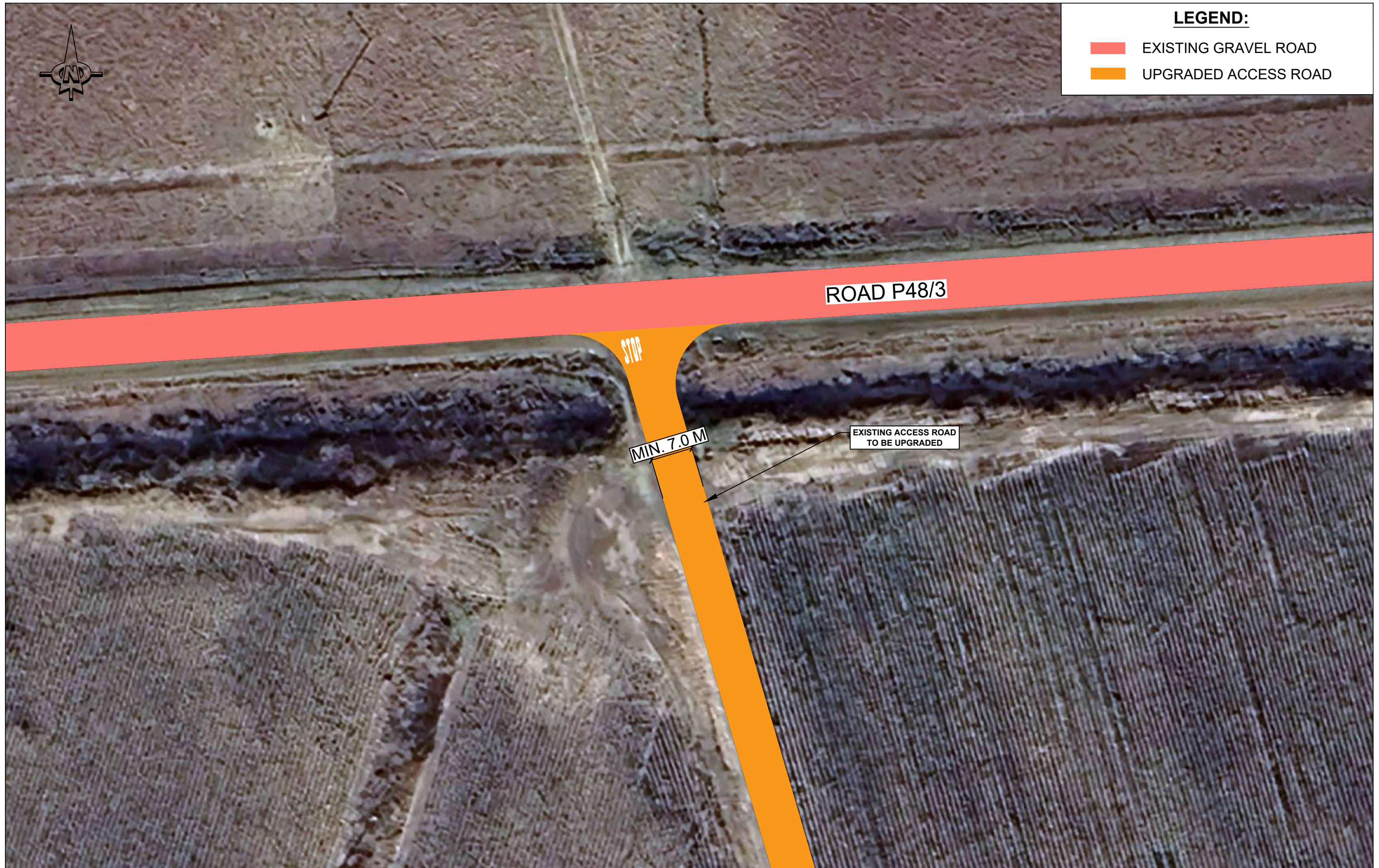
# DRAWINGS

Drawing D001 Site Access Intersection



**LEGEND:**

- EXISTING GRAVEL ROAD
- UPGRADED ACCESS ROAD



PROJECT:	TRAFFIC IMPACT STUDY: QHAKAZA RENEWSTABLE PLANT		SCALE @ A3:	N.T.S	CHECKED:	PJ	DRAWING TYPE:	CONCEPTUAL
TITLE:	SITE ACCESS INTERSECTION		DESIGN:	PJ	DRAWN:	PJ	DATE:	09/09/2024
	PROJECT NO:	435	DRAWING NO:	D001		REV:	A	

# **APPENDIX A**

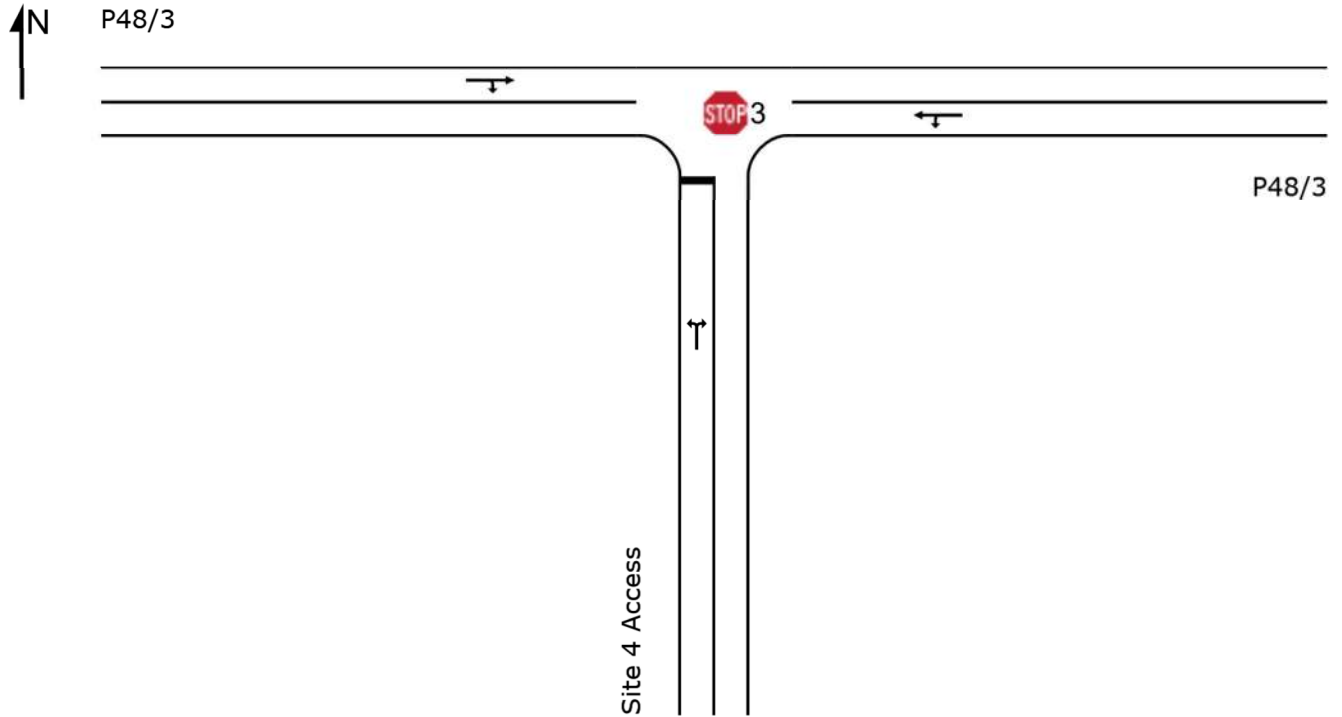
Output of SIDRA intersection capacity analyses



# SITE LAYOUT

 **Site: 3 [01\_2025 AM + Construction]**

P48-3/Site 4 Access  
Site Category: -  
Stop (Two-Way)



# MOVEMENT SUMMARY

 **Site: 3 [01\_2025 AM + Construction]**

P48-3/Site 4 Access

Site Category: -

Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Site 4 Access												
1	L2	7	30.0	0.007	9.3	LOS A	0.0	0.2	0.03	1.02	0.03	50.6
3	R2	1	30.0	0.007	9.0	LOS A	0.0	0.2	0.03	1.02	0.03	50.1
Approach		9	30.0	0.007	9.2	LOS A	0.0	0.2	0.03	1.02	0.03	50.5
East: P48/3												
4	L2	3	30.0	0.004	5.9	LOS A	0.0	0.0	0.00	0.23	0.00	55.0
5	T1	4	30.0	0.004	0.0	LOS A	0.0	0.0	0.00	0.23	0.00	57.9
Approach		7	30.0	0.004	2.4	NA	0.0	0.0	0.00	0.23	0.00	56.7
West: P48/3												
11	T1	6	30.0	0.022	0.0	LOS A	0.1	0.9	0.05	0.48	0.05	55.7
12	R2	29	30.0	0.022	5.9	LOS A	0.1	0.9	0.05	0.48	0.05	52.4
Approach		34	30.0	0.022	4.9	NA	0.1	0.9	0.05	0.48	0.05	52.9
All Vehicles		50	30.0	0.022	5.3	NA	0.1	0.9	0.04	0.54	0.04	53.0

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.

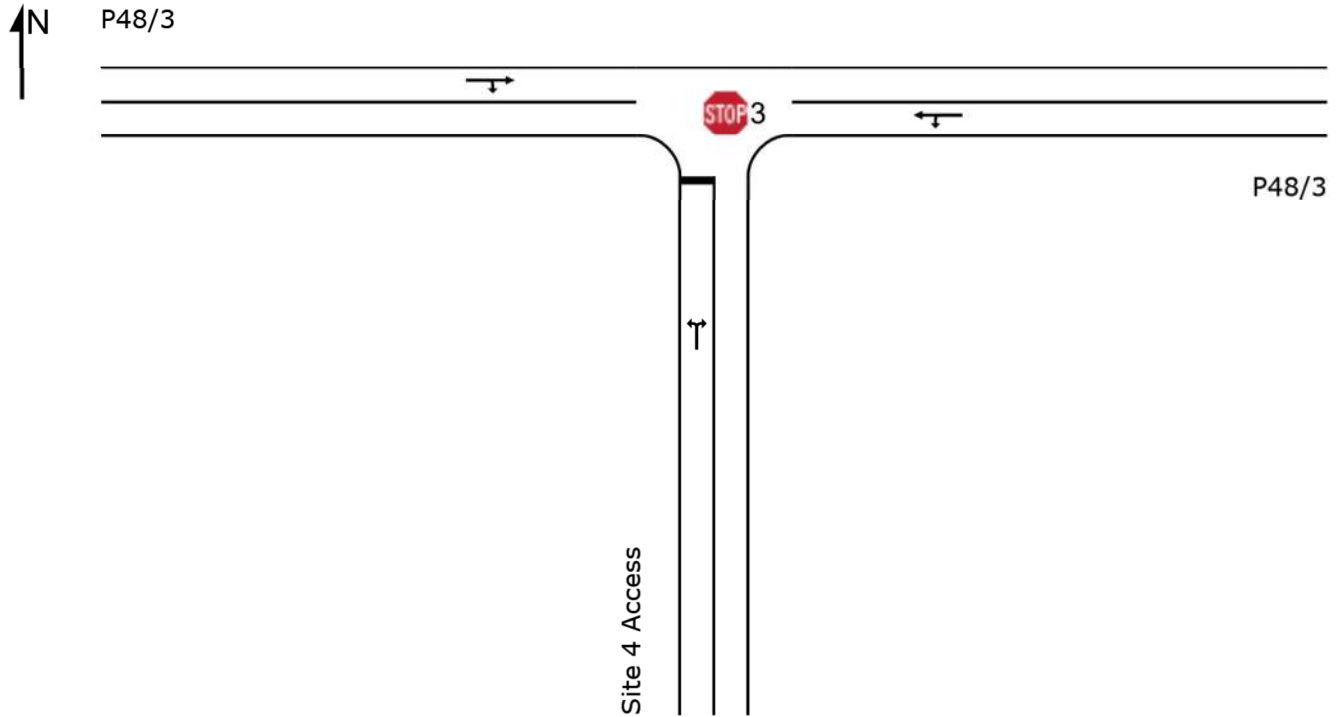
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

# SITE LAYOUT

 **Site: 3 [02\_2025 PM + Construction]**

P48-3/Site 4 Access  
Site Category: -  
Stop (Two-Way)



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Organisation: INFRATRANS TRAFFIC AND TRANSPORTATION ENGINEERING | Created: Wednesday, 27 September 2023 22:23:15  
Project: Not Saved

# MOVEMENT SUMMARY

 Site: 3 [02\_2025 PM + Construction]

P48-3/Site 4 Access

Site Category: -

Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Site 4 Access												
1	L2	29	30.0	0.026	9.3	LOS A	0.1	0.9	0.04	1.01	0.04	50.6
3	R2	3	30.0	0.026	8.9	LOS A	0.1	0.9	0.04	1.01	0.04	50.1
Approach		31	30.0	0.026	9.3	LOS A	0.1	0.9	0.04	1.01	0.04	50.6
East: P48/3												
4	L2	1	30.0	0.004	5.9	LOS A	0.0	0.0	0.00	0.12	0.00	55.9
5	T1	6	30.0	0.004	0.0	LOS A	0.0	0.0	0.00	0.12	0.00	58.9
Approach		7	30.0	0.004	1.2	NA	0.0	0.0	0.00	0.12	0.00	58.3
West: P48/3												
11	T1	6	30.0	0.008	0.0	LOS A	0.0	0.3	0.04	0.33	0.04	57.0
12	R2	7	30.0	0.008	5.8	LOS A	0.0	0.3	0.04	0.33	0.04	53.6
Approach		13	30.0	0.008	3.3	NA	0.0	0.3	0.04	0.33	0.04	55.0
All Vehicles		51	30.0	0.026	6.6	NA	0.1	0.9	0.04	0.72	0.04	52.6

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.

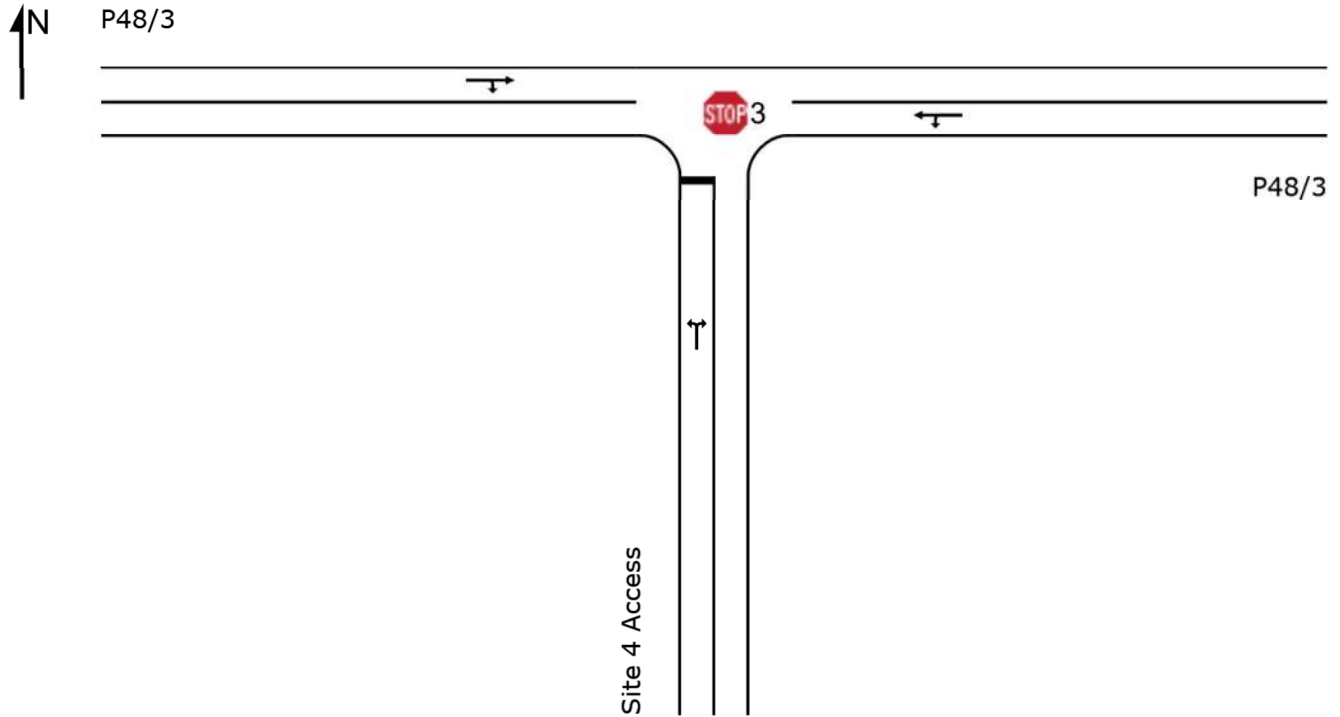
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

# SITE LAYOUT

 **Site: 3 [03\_2028 AM + Operations]**

P48-3/Site 4 Access  
Site Category: -  
Stop (Two-Way)



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Organisation: INFRATRANS TRAFFIC AND TRANSPORTATION ENGINEERING | Created: Wednesday, 27 September 2023 22:23:29  
Project: Not Saved

# MOVEMENT SUMMARY

 Site: 3 [03\_2028 AM + Operations]

P48-3/Site 4 Access

Site Category: -

Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Site 4 Access												
1	L2	4	30.0	0.005	9.3	LOS A	0.0	0.2	0.03	1.02	0.03	50.6
3	R2	1	30.0	0.005	8.9	LOS A	0.0	0.2	0.03	1.02	0.03	50.2
Approach		6	30.0	0.005	9.2	LOS A	0.0	0.2	0.03	1.02	0.03	50.5
East: P48/3												
4	L2	3	30.0	0.004	5.9	LOS A	0.0	0.0	0.00	0.23	0.00	55.0
5	T1	4	30.0	0.004	0.0	LOS A	0.0	0.0	0.00	0.23	0.00	57.9
Approach		7	30.0	0.004	2.4	NA	0.0	0.0	0.00	0.23	0.00	56.7
West: P48/3												
11	T1	6	30.0	0.017	0.0	LOS A	0.1	0.7	0.05	0.46	0.05	55.9
12	R2	21	30.0	0.017	5.9	LOS A	0.1	0.7	0.05	0.46	0.05	52.6
Approach		27	30.0	0.017	4.6	NA	0.1	0.7	0.05	0.46	0.05	53.2
All Vehicles		40	30.0	0.017	4.9	NA	0.1	0.7	0.04	0.50	0.04	53.4

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.

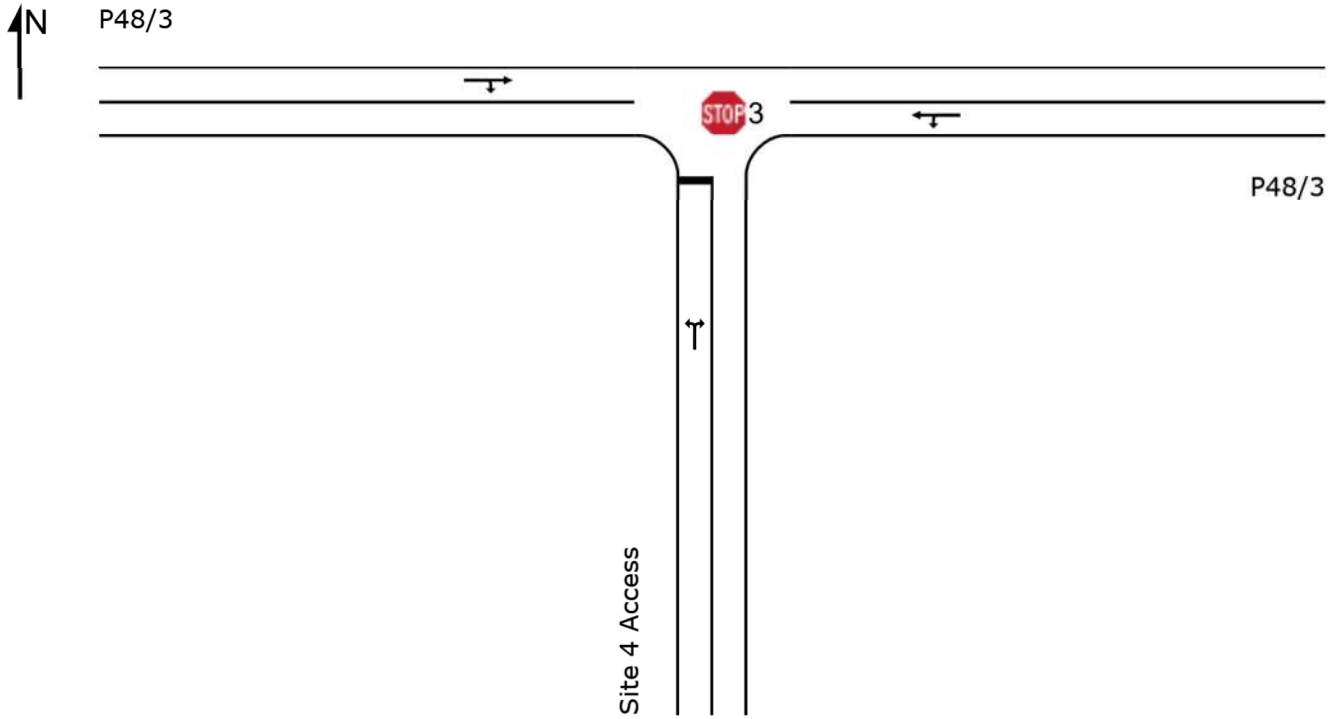
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

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

# SITE LAYOUT

 **Site: 3 [04\_2028 PM + Operations]**

P48-3/Site 4 Access  
Site Category: -  
Stop (Two-Way)



# MOVEMENT SUMMARY

 **Site: 3 [04\_2028 PM + Operations]**

P48-3/Site 4 Access

Site Category: -

Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Site 4 Access												
1	L2	21	30.0	0.020	9.3	LOS A	0.1	0.7	0.05	1.01	0.05	50.6
3	R2	3	30.0	0.020	8.9	LOS A	0.1	0.7	0.05	1.01	0.05	50.1
Approach		24	30.0	0.020	9.3	LOS A	0.1	0.7	0.05	1.01	0.05	50.6
East: P48/3												
4	L2	1	30.0	0.005	5.9	LOS A	0.0	0.0	0.00	0.10	0.00	56.1
5	T1	7	30.0	0.005	0.0	LOS A	0.0	0.0	0.00	0.10	0.00	59.1
Approach		9	30.0	0.005	1.0	NA	0.0	0.0	0.00	0.10	0.00	58.6
West: P48/3												
11	T1	7	30.0	0.007	0.0	LOS A	0.0	0.2	0.04	0.22	0.04	57.9
12	R2	4	30.0	0.007	5.9	LOS A	0.0	0.2	0.04	0.22	0.04	54.4
Approach		11	30.0	0.007	2.2	NA	0.0	0.2	0.04	0.22	0.04	56.5
All Vehicles		44	30.0	0.020	5.8	NA	0.1	0.7	0.04	0.63	0.04	53.4

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.