Traffic Impact Assessment Mokopane Platinum Mine Limpopo Summary	
LOCATION	The proposed Mokopane Platinum Mine is situated in Limpopo area
LAND USE	Proposed development is to establish a Platinum Mine
TIME FRAME FOR ANALYSIS	Scenario 1: 2013 status quo Scenario 2: 2013 existing traffic plus the development Scenario 3: 2018 Horizon traffic plus development.
STUDY AREA	The following intersections were evaluated: 1. Intersection of N11 and D3502 2. Intersection of N11 and Village Access Road A 3. Intersection of N11 and Road B 4. Intersection of N11 and Road R518 5. Intersection of N11 and Mine Access A 6. Intersection of N11 and Mine Access B
TRIP GENERATION	The trip generation rates were calculated from the mine's operations and ships as there is no direct rate obtainable from the South African Trip Generation Rates, DOT 1995 on the applied land use. The following primary vehicle trips are expected to be generated by the proposed development; AM and PM Peak Hour Trips 95 trips respectively
TRIP DISTRIBUTION	The proposed mine employees are come from the surrounding areas. It is expected that 70 % of the trips will distribute from the south on N11 30% of the trips will distribute from the north on N11
CAPACITY ANALYSIS	Refer to Chapter 6, Results Capacity Analysis.
UPGRADING PROPOSED	The current road network has capacity to accommodate trips on the network and those generated by the development. However road upgrades are proposed in chapter 7 to ensure the sustainability of the development traffic on the network.
RECOMMENDATION	The proposed development should be considered favourably from a traffic engineering point of view by the relevant authorities.

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PROPOSED MOKOPANE PLATINUM MINE LIMPOPO

TRAFFIC IMPACT STUDY

1. INTRODUCTION

Platreef Resources (Pty) Ltd has recently completed a Pre-Feasibility Study (PFS) for potential new Platinum mine and plant in Mokopane, Limpopo. As part of the BFS, Platreef Resources (Pty) Ltd appointed **IMPOFU** Engineers to undertake a traffic impact study, to inform authorisation processes required with the application.

This document seeks to determine the expected transport related impacts of the proposed Mokopane Platinum Mine, Limpopo on the surrounding road network and propose any road and/or intersection improvements where necessary to ensure sustainable and safe functionality of development trips on the network.

Reference was made to the following documents in the preparation of this traffic study:

- Manual for Traffic Impact Study;
- South African Trip Generation Manual;
- Project Terms of Reference
- Institute of Transportation Engineering, Transportation and Traffic Engineering

1.1 Existing and Proposed Land use

The following definitions from the Highway Capacity Manual 2000 are applicable to this report:

Level of Service (LOS)

Level of Service is defined in terms of delay. Delay is a measure of driver discomfort, frustration, fuel consumption and lost travel time. The levels of service for intersections are defined in the Highway Capacity manual 2000 as shown in table 1 below.

Capacity

The maximum hourly rate at which vehicles can reasonably be expected to traverse a lane or roadway during a given period under prevailing roadway, traffic and control conditions.

Volume

The hourly rate (vehicles/hour), the actual flow rate for an approach or lane.

Volume to Capacity ratio (V/C)

The ratio of the existing lane volume to the expected capacity on an individual lane.

Table 1: Level of Service Definitions

Level of Service	Signalised intersections Stopped delay (seconds)	Unsignalised intersections Total delay (seconds)
A	< 10	< 10
B	> 10 and < 20	> 10 and < 15
C	> 20 and < 35	> 15 and < 25
D	> 35 and < 55	> 25 and < 35
E	> 55 and < 80	> 35 and < 50
F	> 80	> 50

2. LOCATION AND LAND USE

2.1 Locality

The proposed Mokopane Platinum Mine is situated in Limpopo area. The proposed infrastructure area is located on either side of the N11 in the Mokopane area.

See Figure 1 for an indication of the location of the Limpopo area.

A locality plan is attached as Annexure A.

2.2 Existing and Proposed Land use

The application site is currently an Agricultural area used to farm maize but it is proposed to develop a Platinum mining operation. The ore extracted from the mine will be hauled for processing in Polokwane or Rustenburg at a processing plant. Below is a brief description of the activities involved in the construction and operation of the Limpopo mine.

Construction will include:

- All surface infrastructures will be located in the Limpopo 1 area (refer to Annexure A for an indication of the location of the surface infrastructure);
- There will be the development of internal haul roads;
- Establishing surface infrastructure;
- Construction of a tailings facility

2.3 Mine Operations

The mine once fully operational is expected to employ ±2000 and the professional team will be assumed to be 7 to 10 per cent of the total labour force.

It is expected that the mine will have 3 production shifts of Mining operations Dayshift 5h00 – 13h00, Afternoon shift 13h00 – 21h00, Night Shift 21h00 – 5h00.

It is expected that 100 tons of concentrate of ore per day, resulting in 4- 5 haul trucks per day of approximately 30tonnes will be generated by the mine. It is expected that the haul route will link up to the N1 with the ore being transported to either Polokwane or Rustenburg for processing.

There will be a fair amount of routine and regular traffic to and from the mine, from light delivery vehicles, to passenger cars, trucks and buses.

3. ROAD NETWORK AND TRAFFIC SITUATION

3.1 Existing Road Network

This site enjoys very good regional accessibility in that it is located close to the N11, which is a major route that connects to the N1 and runs north to **Polokwane**, the proposed site also enjoys connectivity with the R518 and R101 forming the backbone of the surrounding road network.

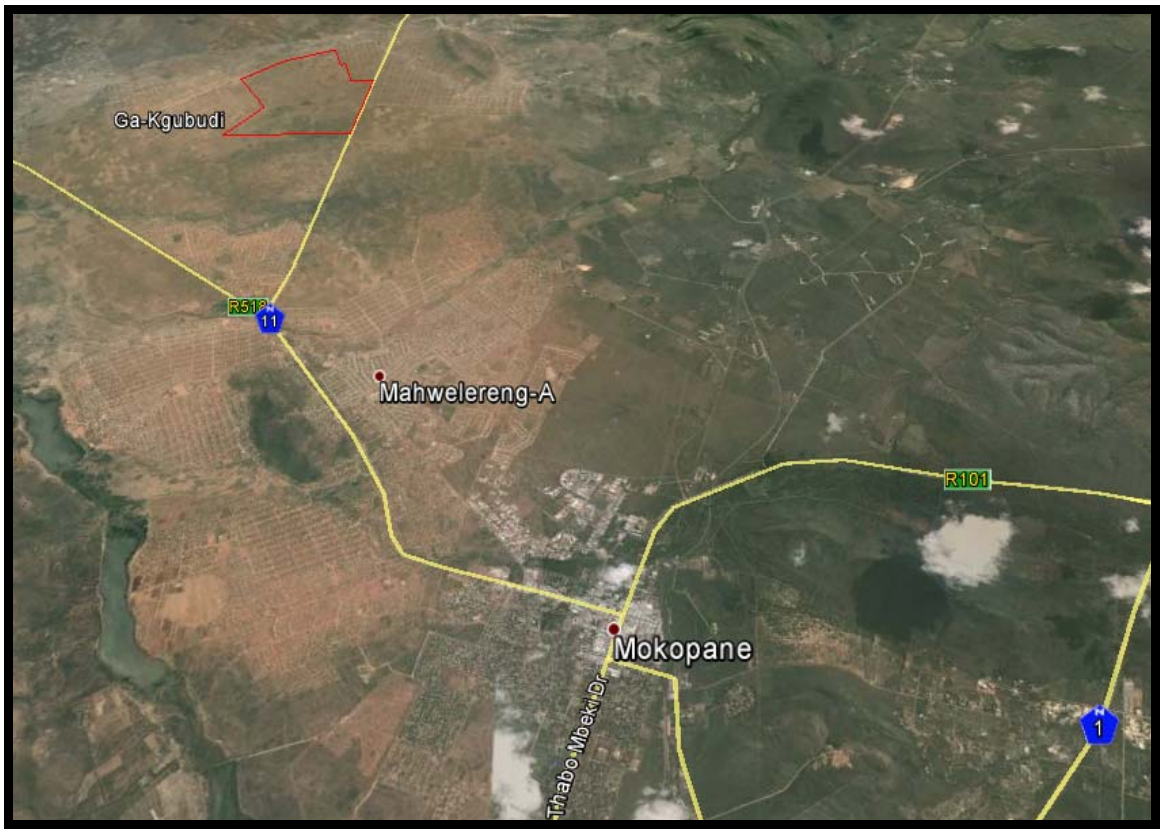

Figure 1: Surrounding Road Network and site location

N11 can be described as a primary distributor (Class 2), i.e. a road that:

> *"...forms the primary network for the urban area as a whole. All long distance traffic movements to, from and within the city should be focussed onto such roads. Characteristics are high volumes, restricted access and fairly high speeds. Continuity of route is important."*

It is the major road offering network connectivity to Mokopane and the surrounding areas. The N11 is a single carriageway with separate turning lanes at its intersection with the minor street networks. The road has paved pedestrian sidewalks as well as demarcated pedestrian crossing areas

Figure 2: N11 route

Road D3502 can be classified as a class 3 providing a link to the N11 from the surrounding areas. It forms a T-intersection with N11 which is controlled by a one way stop on D3502. Road D3502 has a single lane in each direction with no paved pedestrian sidewalks.

Figure 3: Road D3502

Road A can be classified as a class 4 as it is a collector for the local street network. The intersection with N11 is a one way stop, with a single lane in each direction on Road A

Figure 4: Road A

Road B is a gravel road which can be classified as a class 3 minor arterial; it provides connectivity between the N11 and the R101. The intersection with N11 is a one way stop

Figure 5: Road B

Road R518 can be classified as a class 2 as it provides a regional link to the surrounding areas. The intersection with N11 is a three way stop, with a single lane approaches.

Figure 6: Road R518

3.2 Proposed Access

It is proposed to develop two access points for proposed Platinum Mine off the N11. The access positions are marked in the kmz file attached.

According to the Roads Access Management (RAM) document the minimum spacing between intersections on a class 2 road is 600m, therefore it is recommended that the new proposed access point should be located 600m either from the existing intersection marked Road A. The positions are depicted in Figure 7 below as Main Entrance (Mine Access A) and Secured Truck Entrance (Mine Access B)

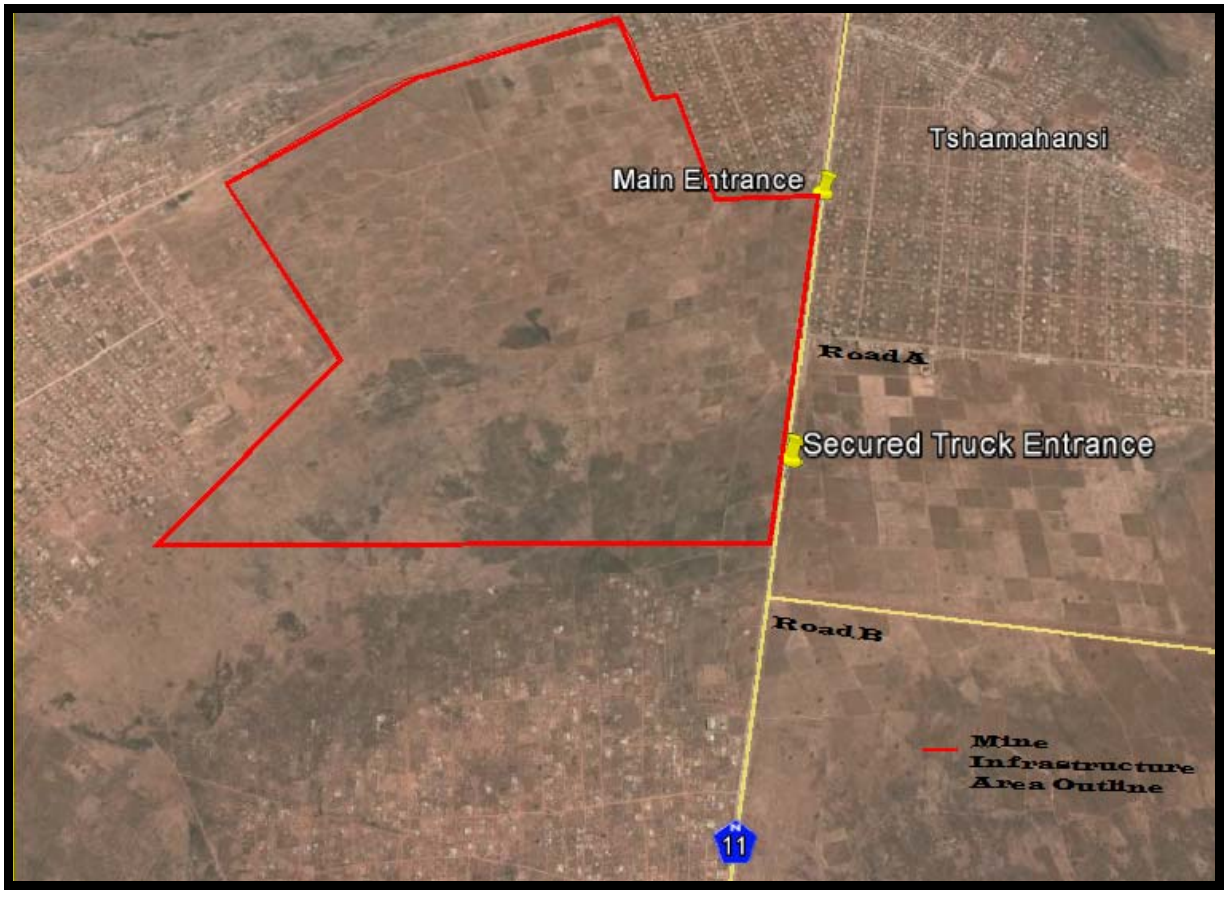

Figure 7: Proposed Access Positions

3.3 Status Quo and Study Area

The following intersections forms part of the study area:

1. Intersection of N11 and D3502
2. Intersection of N11 and Village Access Road A
3. Intersection of N11 and Road B
4. Intersection of N11 and Road R518

The following is evident from visual observations and traffic survey data:

- Fairly high traffic volumes were observed on the N11 and the R518 in the AM and PM peak hours.
- Low volumes of traffic were observed on D3502, Village Access Road A and Road B during both the peak hours.
- Overall no capacity problems were evident in the AM and PM peaks at the intersections.

4. TRIP GENERATION

4.1 Background

Trip generation is a critical step in the determination of traffic impact from proposed developments and therefore plays a key role in this study.

However, the South African Trip Generation Manual (SATGM) (2nd Edition 1995) by the Department of Transport does not provide rates for Mining Operations. In this study literature from past studies as well as operations data from the proposed Mokopane Platinum Mine have been used in estimating the expected trip generation of the proposed mine.

It is estimated that once fully developed the mine will employee about 2 000 workers, most of them will be the surrounding areas. The mine will provide transportation through provision of buses to ferry the workers for the different shifts. Although the mine will operate in shifts as detailed in **Section 2.3** in order to model the worst case scenario Table 2 models all the employees arriving in the AM peak hour and departing in the PM peak hour.

4.2 Trip Generation Rates

Table 2: Trip Generation of the Proposed Mokopane Platinum Mine

Based on the above information and the proposed development trips will be calculated as follows:

	Number	Split	Vehicles
Employees	1200	Buses	15
	700	Walk/cycle	-
	100	cars	75
Mine Haul Operations			5
Expected total trips		Total number of expected vehicle cars	95 trips
Directional Split 90:10 AM	IN 85 OUT 10		
Directional Split 10:90 PM	IN 10 OUT 85		

The trip calculation in Table 2 above assumes that all these trips happen within the typical peak hour duration, so as to model the worst case scenarios however as clearly set out in section 2.3 the mine will operate under 3 different shifts starting as early as 0500hrs which falls outside the typical peak hour. Also the 5 haul trips are expected for the day however they have all been modeled in the peak hour

5.0 DATA COLLECTION

Classified traffic counts were undertaken by Impofu Professional Services on the 5th of September 2013 between: 06h00 hrs to 18h00 hrs. Annexure A shows the trip existing trip volumes and distribution.

5.1 COUNTED TRAFFIC VOLUMES

Traffic counts were conducted (refer to **Figure 4**) at the following locations:

- **Intersection 1:** N11 and D3502
- **Intersection 2:** N11 and Village Access Road A
- **Intersection 3:** N11 and Road B
- **Intersection 4:** N11 and Road R518

The counts were undertaken at 15-minute intervals and included turning movements at intersections and vehicles classification information. The reduced data for the traffic counts undertaken is included as shown in **Appendix B**.

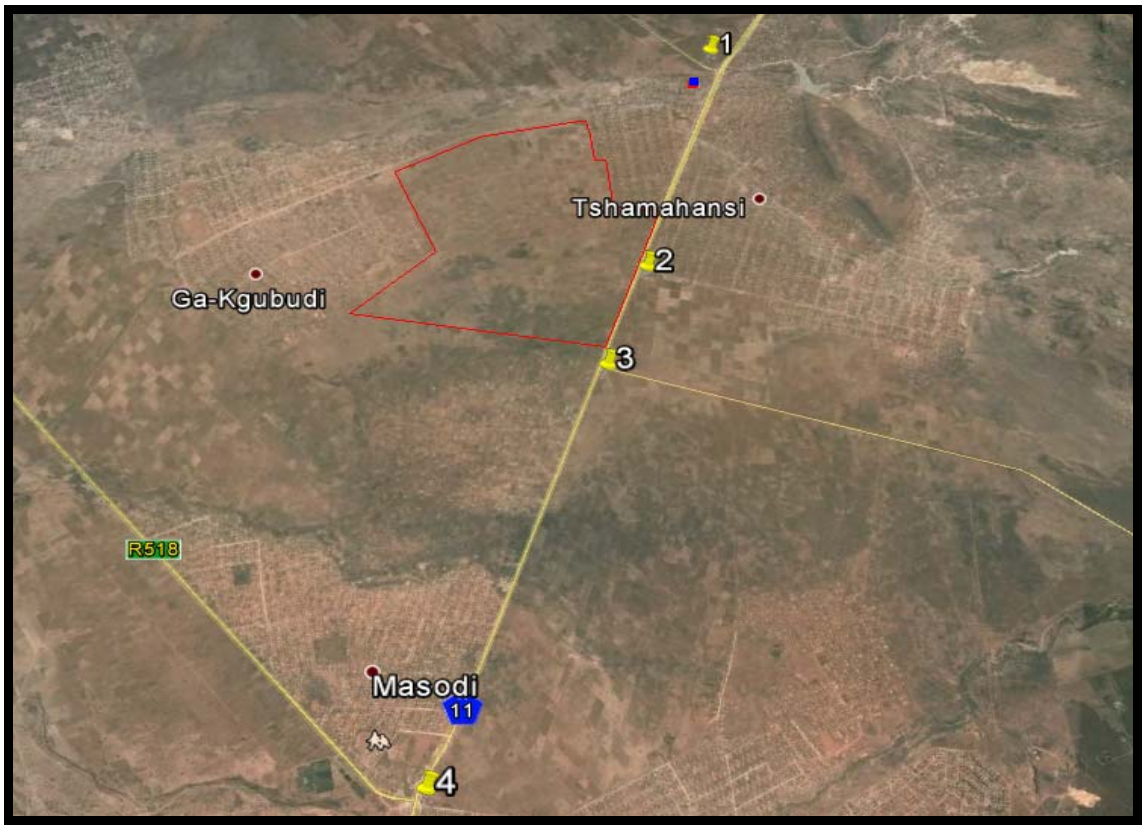

Figure 8:Intersections Surveyed

5.2 Impact of the Latent rights on road network

No information of any known latent rights is readily available, however a growth rate of 3% has been assumed for the study area.

5.3 Growth Rate

Although the study area is semi developed, it is assumed that even these traffic volumes will experience some growth over the next few years. An annual growth rate of 3.0 % was considered for the purpose of this application. This rate is fairly high but might be justifiable in the event of the area experiencing a boom as a result of the new mine.

The growth rate was used to determine the expected future target year (2018) through traffic volumes from the base year (2013) volumes.

5.4 Trip Distribution

Assumptions about the expected trip distribution were based on the location of the site, the existing traffic volumes, traffic patterns and on site observations.

It is assumed, backed by the current observations that traffic would most likely distribute as below:

- **30 % North on** N11;
- **70 %, South on** N11;

See Annexure C for detailed trip assignments

6.0 CAPACITY ANALYSIS

6.1 Intersections and Accesses Evaluated

Based on a consideration of the likely impact of the proposed access into the development, the following intersections were evaluated:

- **Intersection 1:** N11 and D3502
- **Intersection 2:** N11 and Village Access Road
- **Intersection 3:** N11 and Road B
- **Intersection 4:** N11 and Road R518

Based on the indicative site layout in Figure 5, it can be successively argued that this report has provided an adequate evaluation of the study area.

6.2 Relevant Peak Hours

The critical peak hour from a road capacity point of view, occurs when the traffic generated by the development is at a maximum or when the highest combination of existing road traffic and traffic generated by the development occurs.
Based on a consideration of the relevant land use, it was decided to consider the following peak hours for analyses:

- Weekday AM Peak hour
- Weekday PM Peak hour

6.3 Assessment Years

The assessment years that was considered relevant for the type of development and the area within which it is located is:

- **Status Quo 2013:** This assessment will represent an indication of what the current traffic operations within the vicinity of this development are including the access conditions.

- **2013 with the proposed development:** The expected traffic demand and possible impact of the proposed Mokopane Platinum Mine.

- **2018 traffic demand with the proposed development:** The expected future traffic demand plus development and the expected traffic operations within the next five years.

In terms of the guideline document, no additional forecasting is warranted and has not been considered.

Assessment Scenarios

The traffic scenarios that were considered relevant in order to determine the expected traffic impact of the proposed development are as indicated in **Table 9.1** below.

Table 3: Assessment Scenarios

SCENARIO	ASSESSMENT YEAR AND TRAFFIC DEMAND	ROAD NETWORK	FIGURES
1	Status Quo 2013	Existing 2013 road layout.	**-**
2	2013 traffic demand with the proposed development	**Existing 2013 road layout PLUS the proposed development**	**-**
3	2018 traffic demand with the proposed development	**Horizon Year 2018 PLUS the proposed development**	**-**

Determination of Road upgrading

The National Department of Transport (NDoT) guidelines for Traffic Impact Studies stipulates that:

“the determination of the necessary upgrading and improvement of the road infrastructure needs to be determined for both the “with” and “without development” scenarios for the opening year and horizon year. The following should be followed to determine the necessary road upgrading:

- Calculate the LOS, v/c ratio and the site traffic as a percentage of the critical flows at the critical nodes for every scenario.
- If the LOS is worse than D for the with-development scenario but not for the without-development scenario, the developer is responsible for all the required road upgrading.

- If the LOS is worse than D for both the with and without-development scenarios, then the developer is responsible for the incremental road upgrading due to the development's impact to obtain the same LOS and v/c ratio as for the without-development scenario.

6.4 CAPACITY ANALYSIS SUMMARY

The performance of intersections in urban road networks is defined by the level of service (LOS) for each approach to the intersection. These levels of service have been defined in the Highway Capacity Manual (HCM) as shown in **Table 4** below. During the peak hours, the road infrastructure capacity provided should ensure that the intersection approach level of service should ideally not exceed LOS D; for example the average delay for a signalised intersection should not exceed 52 seconds as predicted by the model.

Table 4: Level of Service Criteria (HCM)

Level of Service	Average Approach Delay for Signalised Intersections (seconds)	Rounded	Average Approach Delay for Priority Intersections (seconds)	Rounded
A	< 6.5	6	< 5.0	4
B	6.6 to 19.5	7 – 19	5.0 to 10.0	5 – 10
C	19.6 to 32.5	20 – 32	10.1 to 20.0	11 – 20
D	32.6 to 52.0	33 – 52	20.1 to 30.0	21 – 30
E	52.1 to 78	53 – 78	30.1 to 45.0	31 – 45
F	> 78.0	79 +	> 45	46 +

The intersection approach performance for the intersections within the study area was determined using the Sidra Intersection 5.1 software.

The detailed capacity analyses results for the five intersections analysed during the two scenarios (as described in **Section 9**) are shown in the following table

Scenario 1

Table 5: Status Quo 2013

INTERSECTION (APPROACH)		SCENARIO 1 – BASE YEAR (2013) Weekday AM Peak Hour			SCENARIO 1 – BASE YEAR (2013) Weekday PM Peak Hour		
		Av Delay (sec)	V/C	LOS	Av Delay (sec)	V/C	LOS
N11 / Road D3502 (1 Way Stop)	South Approach	0.4	0.287-	A	1.0	0.089	A
	East Approach	-	-	-	-	-	-
	North Approach	0.3	0.084	B	0.2	0.257	A
	West Approach	21	0.084	C	18.7	0.071	C
OVERALL (LOS)		1.1	0.287	N/A	1.1	0.257	N/A
N11/ Road A 1 WayStop)	South Approach	0.5	0.271	A	0.6	0.145	B
	East Approach	16.5	0.088	C	16.5	0.064	C
	North Approach	0.7	0.11	A	0.1	0.278	A
	West Approach	-	-	-	-	-	-
OVERALL (LOS)		0.9	0.118	N/A	0.8	0.276	N/A
N11/ Road B 1 WayStop)	South Approach	0.1	0.292	A	0.2	0.169	B
	East Approach	21.9	0.079	C	19.5	0.041	C
	North Approach	0.2	0.118	A	0.3	0.271	A
	West Approach	-	-	-	-	-	-
OVERALL (LOS)		0.7	0.292	N/A	0.6	0.271	N/A
N11/ R518 (All Way Stop)	South Approach	346.5	-	-	47.2	-	-
	East Approach	-	-	-	-	-	-
	North Approach	77.1	-	-	39.9	-	-
	West Approach	41.6	-	-	29.6	-	-
OVERALL (LOS)		-	-	N/A	-	-	N/A

The following is summarised from the above table:-

Intersection 1: N11 and Road D3502

The intersection currently is a 1way stop and as indicated by the AM and PM results in tables 5 above all of the approaches are operating at acceptable Level of Service. The v/c ratios are very low and indicate spare capacity within the existing road infrastructure.

Intersection 2: N11 and Road A

The intersection currently has a 1way stop on Road A, with freeflow movements on the N11. The AM and PM capacity results indicate that all of the approaches are operating at acceptable Level of Service. The v/c ratios are very low and indicate

spare capacity within the existing road infrastructure.

Intersection 3: N11 and Road B

Little traffic activity was observed on this intersection, Road B is a gravel road linking the N11 and R101. There is a stop on Road B and free flow on N11, the AM and PM capacity results indicate that all of the approaches are operating at acceptable Level of Service. The v/c ratios are very low and indicate spare capacity within the existing road infrastructure.

Intersection 4: N11 and R518

The intersection currently is an all way stop. Sidra cannot be used solely for the computation of the Level of Service for a all way stop. However the delays associated per each approach were computed. Using table 4 the delays indicate low levels of Service at the intersection associated with the heavy queues.

Scenario 2

Table 6: 2013 plus Development

INTERSECTION (APPROACH)		SCENARIO 2 - (2013) plus Develop Weekday AM Peak Hour			SCENARIO 2 – (2013) plus Develop Weekday PM Peak Hour		
		Av Delay (sec)	V/C	LOS	Av Delay (sec)	V/C	LOS
N11 / Road D3502 (1 Way Stop)	South Approach	0.5	0.288	A	1.1	0.1	A
	East Approach	-	-	-	-	-	-
	North Approach	0.2	0.095	B	0.2	0.259	A
	West Approach	21.9	0.104	C	19.7	0.089	C
OVERALL (LOS)		1.2	0.288	N/A	1.2	0.259	N/A
N11/ Road A 1 WayStop)	South Approach	0.4	0.299	A	0.6	0.148	B
	East Approach	18.2	0.114	C	19.4	0.102	C
	North Approach	0.7	0.113	A	0.2	0.306	A
	West Approach	-	-	-	-	-	-
OVERALL (LOS)		1.4	0.299	N/A	1.0	0.306	N/A
N11/ Road B 1 WayStop)	South Approach	0.1	0.322	A	0.2	0.173	B
	East Approach	24.1	0.099	C	23.7	0.080	C
	North Approach	0.2	0.122	A	0.3	0.30	A
	West Approach	-	-	-	-	-	-
OVERALL (LOS)		0.8	0.322	N/A	0.8	0.30	N/A
N11/ R518 (Signalised)	South Approach	16.7	0.854	B	10.5	0.484	B
	East Approach	-	-	-	-	-	-
	North Approach	8.8	0.475	A	11.7	0.741	B
	West Approach	33.1	0.88	C	23.8	0.762	C
OVERALL (LOS)		18.3	0.88	B	13.6	0.762	B

N11/ Mine Access A (1Way Stop)	South Approach	0.8	0.287	A	0.3	0.09	A
	East Approach	-	-	-	-	-	-
	North Approach	1.5	0.084	B	0.1	0.257	A
	West Approach	20.9	0.018	C	18.8	0.218	C
OVERALL (LOS)		1.1	0.287	N/A	2.1	0.257	N/A
N11/ Mine Access B (1Way Stop)	South Approach	0.1	0.321	A	0	0.172	A
	East Approach	-	-	-	-	-	-
	North Approach	0.1	0.121	B	0	0.299	A
	West Approach	23.1	0.021	C	0.2	0.023	A
OVERALL (LOS)		0.2	0.321	N/A	0.2	0.299	N/A

The following is summarised from the above table:-

Intersection 1: N11 and Road D3502

With the addition of the development trips, the intersection continues to operate at acceptable Level of Service. The v/c ratios are very low and indicate spare capacity within the existing road infrastructure for both the AM and PM peaks.

Intersection 2: N11 and Road A

The AM and PM capacity results indicate that all of the approaches are operating at acceptable Level of Service. The v/c ratios are very low and indicate spare capacity within the existing road infrastructure.

Intersection 3: N11 and Road B

With the addition of the development trips, the intersection continues to operate at acceptable Level of Service. The v/c ratios are very low and indicate spare capacity within the existing road infrastructure for both the AM and PM peaks.

Intersection 4: N11 and R518

It is proposed to convert the existing all way stop to a signalised intersection. The results in Table 6 indicate marked improvement in the Level of Service and indicate acceptable v/c ratios with little delay for the traffic movements.

Intersection 5: N11 and Mine Access A

The proposed intersection is a one way stop controlled. The AM and PM capacity results indicate that all of the approaches are operating at acceptable Level of Service. The v/c ratios are very low and there is little delay on all movements.

Intersection 6: N11 and Mine Access B

The proposed intersection is a one way stop controlled. The AM and PM capacity results indicate that all of the approaches are operating at acceptable Level of Service. The v/c ratios are very low and there is little delay on all movements

Proposed upgrades

Intersection: N11 and R518

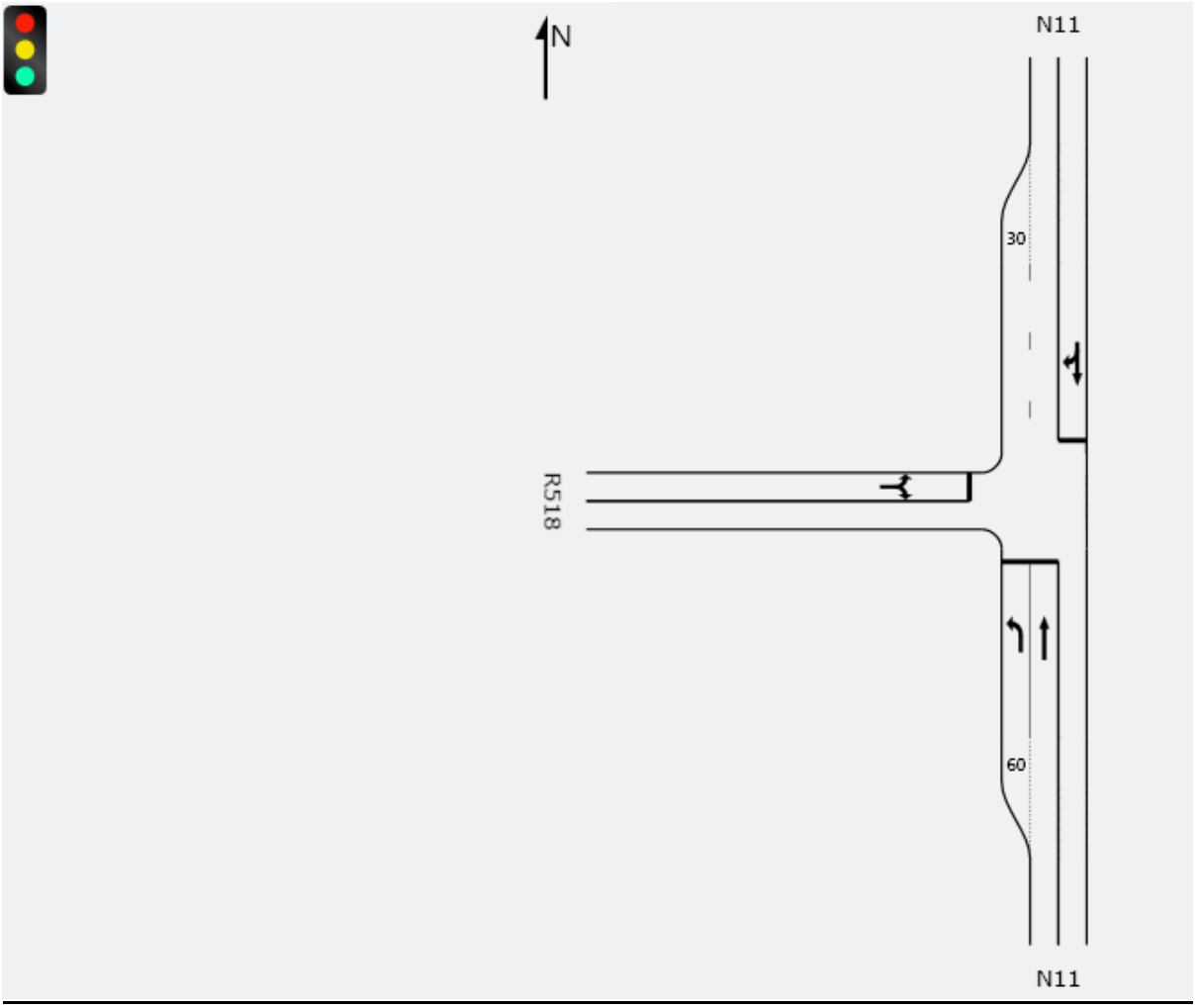

Figure 9: N11 and Proposed Mine Access A

It is proposed to provide:

- A Traffic Signal must be provided at this intersection

Intersection: N11 and Proposed Mine Access A

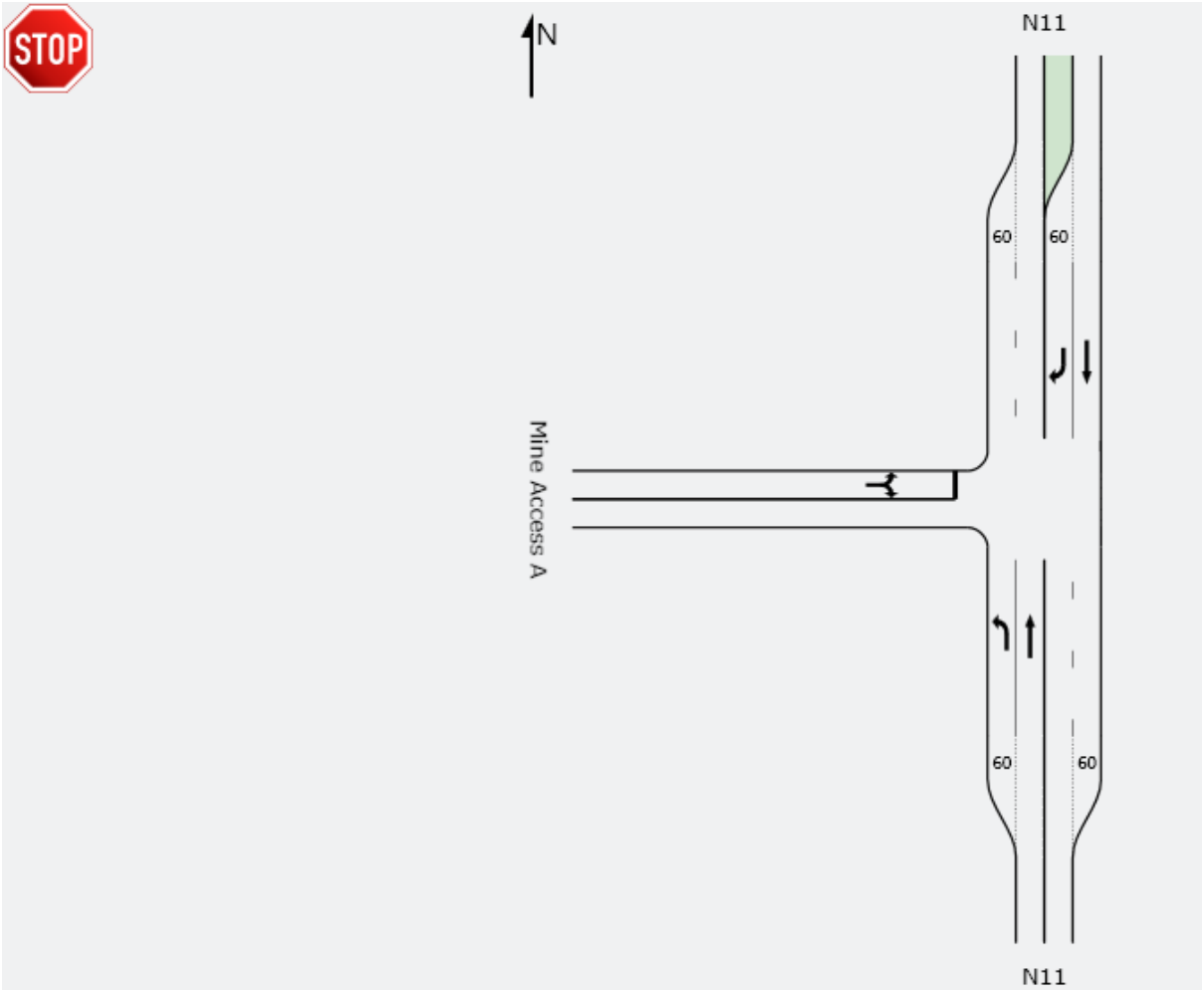

Figure 10: N11 and Proposed Mine Access A

It is proposed to provide:

- A deceleration lane of 60m and acceleration lane of 60m to cater for the heavy vehicle movements on the N11;
- A separate right turn 60m on the N11;
- A pass by lane on the N11, 60m in length.
- Public Transport laybyes

The above access configuration mitigates the addition of the development trips and allows for increased safety maneuvers at the intersection taking into consideration the use by buses and heavy trucks.

Intersection: N11 and Proposed Mine Access B

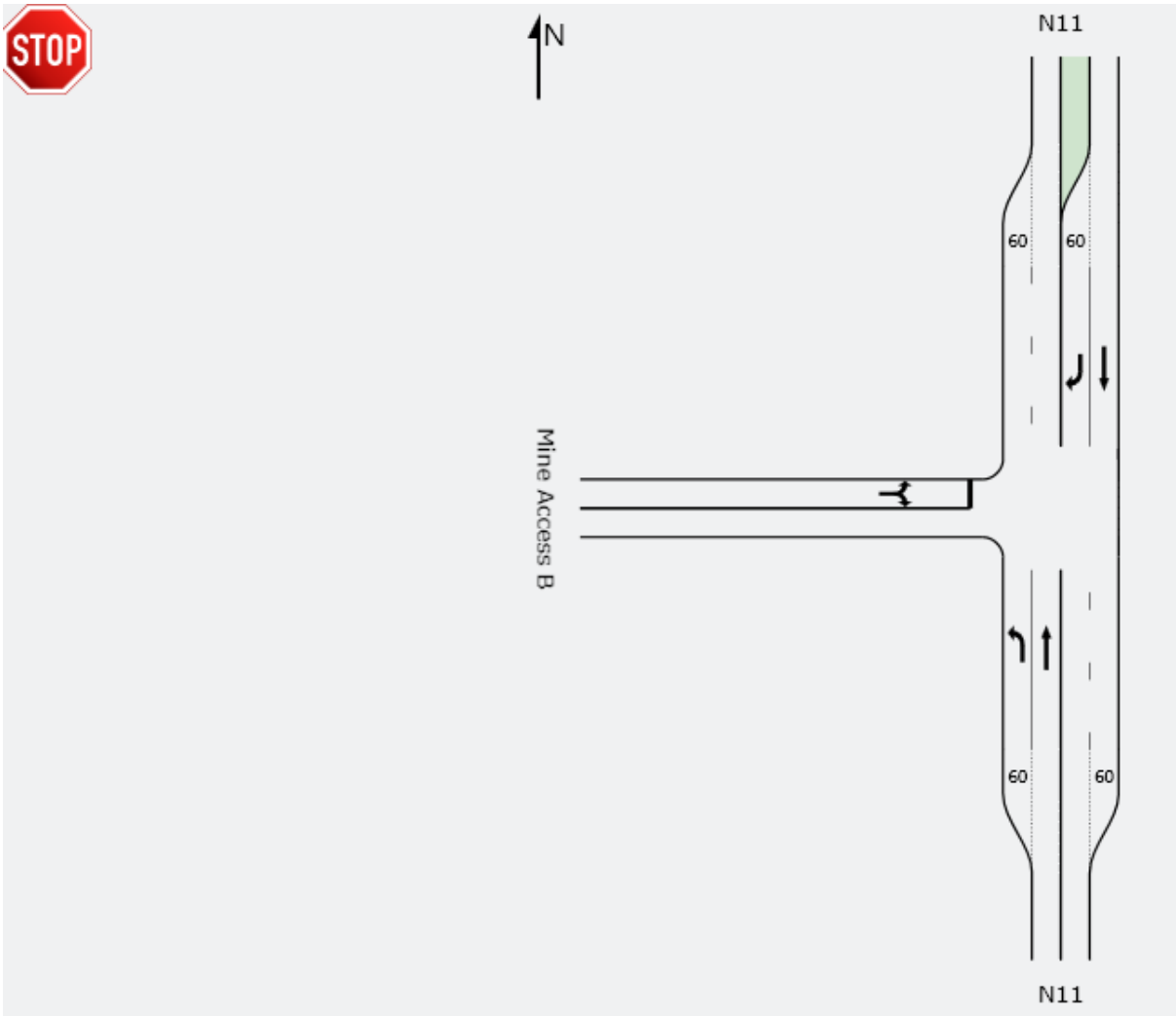

Figure 11: N11 and Proposed Mine Access B

It is proposed to provide:

- A deceleration lane of 60m and acceleration lane of 60m to cater for the heavy vehicle movements on the N11;
- A separate right turn 60m on the N11;
- A pass by lane on the N11, 60m in length.

The above access configuration mitigates the addition of the development trips and allows for increased safety maneuvers at the intersection taking into consideration the use by buses and heavy trucks

Table 7: 2018 +Development

INTERSECTION (APPROACH)		SCENARIO 2 - (2018) plus Develop Weekday AM Peak Hour			SCENARIO 2 – (2018) plus Develop Weekday PM Peak Hour		
		Av Delay (sec)	V/C	LOS	Av Delay (sec)	V/C	LOS
N11 / Road D3502 (1 Way Stop)	South Approach	0.4	0.334	A	1.1	0.114	A
	East Approach	-	-	-	-	-	-
	North Approach	0.2	0.109	B	0.2	0.299	A
	West Approach	27.4	0.224	C	22.0	0.105	C
OVERALL (LOS)		1.8	0.334	N/A	1.2	0.299	N/A
N11/ Road A 1 WayStop)	South Approach	0.5	0.342	A	0.7	0.171	B
	East Approach	20.4	0.156	C	21.9	0.141	C
	North Approach	0.7	0.13	A	0.2	0.35	A
	West Approach	-	-	-	-	-	-
OVERALL (LOS)		1.5	0.342	N/A	1.1	0.35	N/A
N11/ Road B 1 WayStop)	South Approach	0.1	0.368	A	0.2	0.20	B
	East Approach	28.6	0.148	D	28.2	0.113	D
	North Approach	0.2	0.141	A	0.3	0.343	A
	West Approach	-	-	-	-	-	-
OVERALL (LOS)		0.9	0.368	N/A	0.9	0.343	N/A
N11/ R518 (Signalised)	South Approach	16.7	0.854	B	10.5	0.484	B
	East Approach	-	-	-	-	-	-
	North Approach	8.8	0.475	A	11.7	0.741	B
	West Approach	33.1	0.88	C	23.8	0.762	C
OVERALL (LOS)		18.3	0.88	B	13.6	0.762	B
N11/ Mine Access A (1Way Stop)	South Approach	0.8	0.287	A	0.3	0.09	A
	East Approach	-	-	-	-	-	-
	North Approach	1.5	0.084	B	0.1	0.257	A
	West Approach	20.9	0.018	C	18.8	0.218	C
OVERALL (LOS)		1.1	0.287	N/A	2.1	0.257	N/A
N11/ Mine Access B (1Way Stop)	South Approach	0.1	0.321	A	0	0.172	A
	East Approach	-	-	-	-	-	-
	North Approach	0.1	0.121	B	0	0.299	A
	West Approach	23.1	0.021	C	0.2	0.023	A
OVERALL (LOS)		0.2	0.321	N/A	0.2	0.299	N/A

The following is summarised from the above table:-

Intersection 1: N11 and Road D3502

With the addition of the development trips and the growth rate the intersection continues to operate at acceptable Level of Service. The v/c ratios are very low and indicate spare capacity within the existing road infrastructure

Intersection 2: N11 and Road A

With the addition of the Development trips and escalation of the trips with the growth rate intersection continues to function at very high levels of service within the AM and PM peak periods. The v/c ratios are very low and indicate spare capacity on the road network.

Intersection 3: N11 and Road B

With the addition of the Development trips and escalation of the trips with the growth rate intersection continues to function at very high levels of service within the AM and PM peak periods. The v/c ratios are very low and indicate spare capacity on the road network.

Intersection 4: N11 and R518

The intersection continues to function at very high levels of service within the AM and PM peak periods. The v/c ratios are very low and indicate spare capacity on the road network.

Intersection 5: N11 and Mine Access A

The AM and PM capacity results for the future indicate that all of the approaches are operating at acceptable Level of Service. The v/c ratios are very low and there is little delay on all movements.

Intersection 6: N11 and Mine Access B

The AM and PM capacity results for the future indicate that all of the approaches are operating at acceptable Level of Service. The v/c ratios are very low and there is little delay on all movements.

7.0 PROPOSED ROAD NETWORK UPGRADING

From the summarized intersection detail above the proposed additional development trips can be accommodated on the existing road network with the road upgrading of the following;

It is proposed to provide:

- Upgrading of N11 and Proposed Mine Access A
  1. A deceleration lane of 60m and acceleration lane of 60m to cater for the heavy vehicle movements on the N11
  2. A separate right turn 60m on the N11;
  3. A pass by lane on the N11, 60m in length.
  4. Public Transport laybyes

- Upgrading of N11 and Proposed Mine Access B
  1. A deceleration lane of 60m and acceleration lane of 60m to cater for the heavy vehicle movements on the N11
  2. A separate right turn 60m on the N11;
  3. A pass by lane on the N11, 60m in length.

- Upgrading of N11 and R518
  1. Installation of a Traffic Signal

- Surfacing of the internal Access roads linking the development

The upgrades mitigates the addition of the development trips and allows for increased safety maneuvers at the intersections taking into consideration the use by buses and heavy trucks.

7.1 INTERNAL ROADS

The mine shall construct internal service roads with adequate geometric considerations for the movement of tipper trucks, tankers, low bed carriers and flat bed trucks. Any unpaved roads within the development shall be sprayed with water to reduce dust pollution.

8.0 PUBLIC TRANSPORT ASSESSMENT

8.1 Background

In terms of the National Land Transport Act (NLTA) (Act No 5 of 2009) Section 35, it is requirement that assessment of public transport be included in traffic impact assessments. The following comments are relevant in respect to the public transport availability at the proposed development.

8.2 Availability of Public Transport

Public transport is available on all the roads surrounding the development, as per this applications' assumption a significant percentage of the employees will use buses to the mine. This should increase the demand for additional public transport facilities in the area. Therefore, it is recommended that

- Bus laybyes should be provided on both sides of the N11 and Propose Mine Access A intersection.
- Proper drop off zones be constructed within the mine's internal roads.

9.0 CONCLUSIONS AND RECOMENDATIONS

The objective of the report was to assess the traffic impact on the surrounding road network due to the proposed Mokopane Platinum Mine in Limpopo. From the traffic impact investigation and discussions in the report the following conclusion can be made, the proposed Mokopane Mine and the expected increase in traffic due to the development can be accommodated on the road network.

In view of the traffic impact investigation and discussion in the report, it is recommended that the proposed Mokopane Mine be approved from a Traffic Engineering point of view, subject to the developer implementing the proposals in Section 7 of this report;

From a traffic engineering point of view, <u>it is recommended that</u>:

(i) Based on the contents and findings contained in this report, the responsible Road Agency approve the recommendations in this report, pertaining to the proposed Mokopane Platinum Mine in Limpopo from a Traffic Engineering point of view.

10. REFERENCES

1. South African Trip Generation Manual (2nd Edition) by the Department of Transport, 1995.
2. Manual for Traffic Impact Studies, Department of Transport, October1995.
3. Institute of Transportation Engineering, Transportation and Traffic Engineering Handbook, 2nd Edition
4. DRAFT UTG 7, Geometric Design of Urban Local Residential Streets, Committee of Urban Transport Authorities, 1988.
5. Project Terms of Reference

APPENDIX A

LOCALITY PLAN

APPENDIX B

TRAFFIC COUNTS

APPENDIX C

DEVELOPMENT TRIP VOLUMES AND DISTRIBUTION

APPENDIX D

SIDRA