Environmental Consultants

Traffic Impact Assessment:

Matai Mining (Pty) Ltd Mining Right Application for Vanadium, Titanium and Iron Ore on various Farms within the Magisterial District of Mankwe, North West Province

kimopax

This transport impact assessment has been prepared by a suitable qualified and registered professional traffic engineer. Details of any of the calculations on which the results of this report are based will be made available on request.

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Specialist Declaration of Independence

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I, Andrew Mukanyiwa (Reg. 201370187), declare that –

General declaration:

- I act as the independent Traffic Impact Assessment practitioner in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting Traffic Impact Assessments, including knowledge of the Acts, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Acts, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the relevant provisions and requirements in the National Environmental Management Act (NEMA), the National Road Traffic Act, No. 93 of 1996, the National Land Transport Act (No. 5 of 2009) and other applicable legislation; when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;

- I will perform all other obligations as expected from a Traffic Impact Assessment practitioner in terms of the Acts and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.
- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

SIGNATURE:

Andrew Mukanyima

Transportation Engineer

Reg. 201370187

21st February 2019

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1 Introduction

Niara Environmental Consultants (Pty) Ltd (hereafter referred to as "Niara") was appointed by Kimopax (Pty) Ltd (hereafter referred to as "Kimopax") to undertake a Traffic Impact Assessment of the mining operations and associated activities of the proposed Matai Mining Project. The proposed project area is situated in the Moses Kotane Local Municipality within the Mankwe Magisterial District of Northwest Province. The mining right is held on the farm Wildebeestkuil 7 JQ, and certain portions of the farms Magazynskraal 3 JQ, Haakdoorn 6 JQ, Syferkuil 9 JQ and Middelkuil 8 JQ.

Kimopax (Pty) Ltd is undertaking Pre-Feasibility Studies for the potential new Iron Ore mine and plant in Matai, North West. As part of the specialist studies required Kimopax, appointed Niara Consultants to undertake a TIA, to inform authorisation processes required with the application.

This document seeks to determine the expected transport related impacts of the proposed Matai Mine, North West 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;
- Matai CS Mining Report
- Air Quality information (Matai Mining (Pty) Ltd
- 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)

LOS is a measure of intersection performance determined based on the average delay at intersections. In most rural and urban areas an overall LOS of A to D is acceptable. LOS E or F are considered to be undesirable. In short, LOS is defined in terms of delay. Delay is a measure of intersection or roadway performance which is measured based on the driver discomfort, frustration, fuel consumption and lost travel time. Delay at intersections depends on various factors such as the type of signal control, the volume of traffic and volume/capacity ratio of each approach at an intersection (C A O'Flaherty, 1997). The intersection performance

has been rated based on the average delay, i.e. the LOS of the intersections under investigation will be measured based on the intersection average delay.

The levels of service for intersections are defined in the Highway Capacity manual 2000 as shown in table 1 below.

Capacity

Capacity refers to 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

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

Volume to Capacity ratio (V/C)

Volume/capacity ratio (v/c) is a measure of intersection or roadway performance. It is the ratio of a number of vehicles on the road to the available capacity of the roadway. The road link capacity in the study area was rated based on the volume/capacity ratio. According to the National Department of Transport Manual for Traffic Impact Study (2012), the intersection capacity should be evaluated as follows:

- v/c<1: the intersection operates under capacity,
- v/c=1: the intersection operates at capacity,
- v/c>1: the intersection operates over capacity,

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

1.2. Details and Expertise of the Specialist

Andrew Mukanyima is a Transportation Engineer, with 13 years' Civil engineering experience from both the public and private sector having been involved in various civil and traffic engineering projects in contracting and consulting services covering traffic engineering and transportation planning, freight logistics, project management, feasibility studies, engineering design, project reports, construction supervision.

Andrew is a registered professional engineer and is currently a managing partner at Techno Design Solutions Consulting Engineers. His roles include technical and financial review and reporting on all transport and development planning, traffic signal projects, freight logistics, supply chain management, geometric design and multi-disciplinary project support.

2 Scope of Work

The scope of the TIA study considers inter alia the following aspects:

- Background information of the Environmental study;
- Transport elements / aspects within study area;
- Comment on access to the different mining areas proposed;
- Surrounding external roads;
- Assessing the public transport requirements of the mine;
- Estimating the peak hour trips expected to be generated by the mining operations during the operational phase - hauling by truck (transport option);
- Modelling of the relevant intersections and proposed access junctions to assess the mining impact on the surrounding road network; and
- Proposed improvements/ recommendations based on the traffic impact and public transport.

3 Objectives

The purpose of the TIA is to investigate and assess the feasibility of accommodating the impact of a proposed Matai MVT Mine in land-use rights on the road and transportation system.

The specific objectives of a TIA are to determine:

- The local impact of a proposed Matai Mining Project in land use on the road and transportation system surrounding the proposed development;
- Whether it is possible to accommodate the proposed Matai MVT Mine in land use, with or without the implementation of mitigation measures, within acceptable norms specified in this manual; and

- The mitigation measures and improvements (demand-side and supply-side) that may be required to accommodate the proposed Matai MVT Mine.

4 Definition and Approach

A Traffic Impact Assessments (TIA) is required to determine the traffic impact of a land development proposal and whether such development can be accommodated by the transportation system. A Traffic Impact Study (TIS) to estimate site-generated traffic and assess its impact on the public street system and on the ultimate development. For the purpose of this Report, these terms are used interchangeably by the author. Transportation and land development are inescapably related and Traffic Impact Assessments are required to ensure that the impact of land development can be accommodated by the transportation system. An inadequate transportation system will lead to congestion and result in deterioration of traffic safety, as well as a diminished quality of life and a reduced economic viability of development.

The purpose of traffic assessments is to support sustainable development by protecting the overall integrity of the transportation system for the benefit of all users. Neither public nor private interests are served if transportation systems are needlessly degraded due to poor development planning and control. An efficient, reliable and safe transportation system will, in effect, unlock and enhance land development potential.

4.1. Methodology

This TIA was conducted according to the requirements of the TMH 16 (COTO, 2012)[1], the Department of Transport Manual for Traffic Impact Studies published by the South Africa National Roads Agency Limited (SANRAL), 2012. In terms of the guideline, a fully-fledged traffic impact analysis was required to be carried out for the proposed Matai MVT development. This included conducting vehicle count surveys, intersection performance analysis and road safety assessment applicable. Measures such as level of service, delay, and volume or capacity ratio were used to quantify the performance of an intersection or a roadway facility. Based on this assessment, mitigation measures were recommended for the proposed development to minimize the potential impacts on the existing road network.

4.1.1 Site Visit

A site visit was conducted on the 6th of February 2019. The site visit focused on observing the general road network layout, road conditions, modes of transport available in the area, traffic safety and some land-use aspects that were relevant to this study.

[1] Committee of Transport Officials. Technical Methods for Highways, South African Traffic Impact and Site Traffic Assessment Manual. Volume 1. 2012

4.1.2 Traffic survey

On the 6th of February 2019, a traffic survey was conducted at the selected intersections surrounding the proposed development to determine the existing traffic volumes. The light vehicles, heavy vehicles (typically 2-4 axels) and very heavy vehicles (typically 5 and more axels) were all counted during the scoping process. The weekday AM and PM peak hour were determined based on the highest traffic volumes registered during the morning and afternoon periods respectively.

5 Regulatory Framework

Municipal development planning in South Africa is regulated by the Municipal Systems Act (Act No 32 of 2000). This act requires the preparation and adoption of Integrated Development Plans (IDPs) to guide and regulate all planning and development in the Municipality. A component of the IDP is an Integrated Transport Plan, as well as a Spatial Development Framework and associated Plans. These documents have been consulted in the preparation of this Traffic Impact Assessment report.

The National Land Transport Act NLTA (Act No 5 of 2009) requires the integration of land transport planning with the land development process and the preparation of integrated transport plans which constitutes the transport component of the integrated development plans of municipalities. These integrated transport plans include the regulation and provision of transport infrastructure for all modes of transport. According to the National Land Transport Act, property developments within a transport area are subject to traffic impact and transport assessments.

5.1. Environmental Regulations

In terms of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002), as amended (MPRDA), the Minister must grant a prospecting or mining right if among others the mining "will not result in unacceptable pollution, ecological degradation or damage to the environment".

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of Regulation 16(3) (b) of the Environmental Impact Assessment Regulations 2014, as amended in 2017, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of Regulation 17 (1) (c) the Competent Authority must check whether the application has considered any minimum requirements applicable or instructions or guidance provided by the Competent Authority to the submission of applications.

6 Location and Land Use

6.1. Locality

The proposed Matai Mine project is situated in the Moses Kotane Local Municipality within the Mankwe Magisterial District of Northwest Province. The mining right is held on the farm Wildebeestkuil 7 JQ, and certain portions of the farms Magazynskraal 3 JQ, Haakdoorn 6 JQ, Syferkuil 9 JQ and Middelkuil 8 JQ.

It is located about 13 km south-west of the closest town Northam, approximately, 70 km north of Rustenburg and 150 km north-west of Johannesburg.

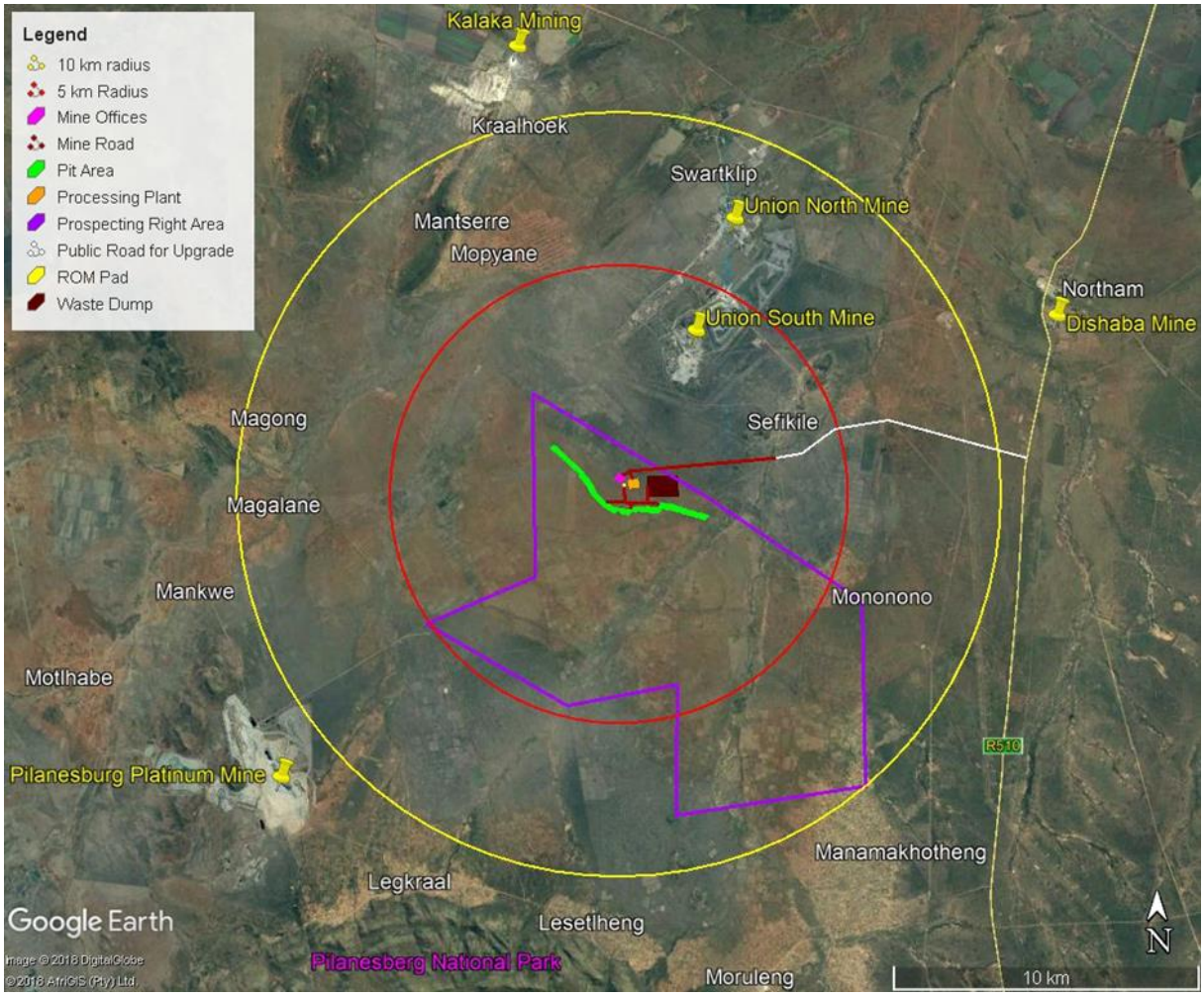

Figure 1: Location of the proposed Matai Mine (source: Niara 2019)

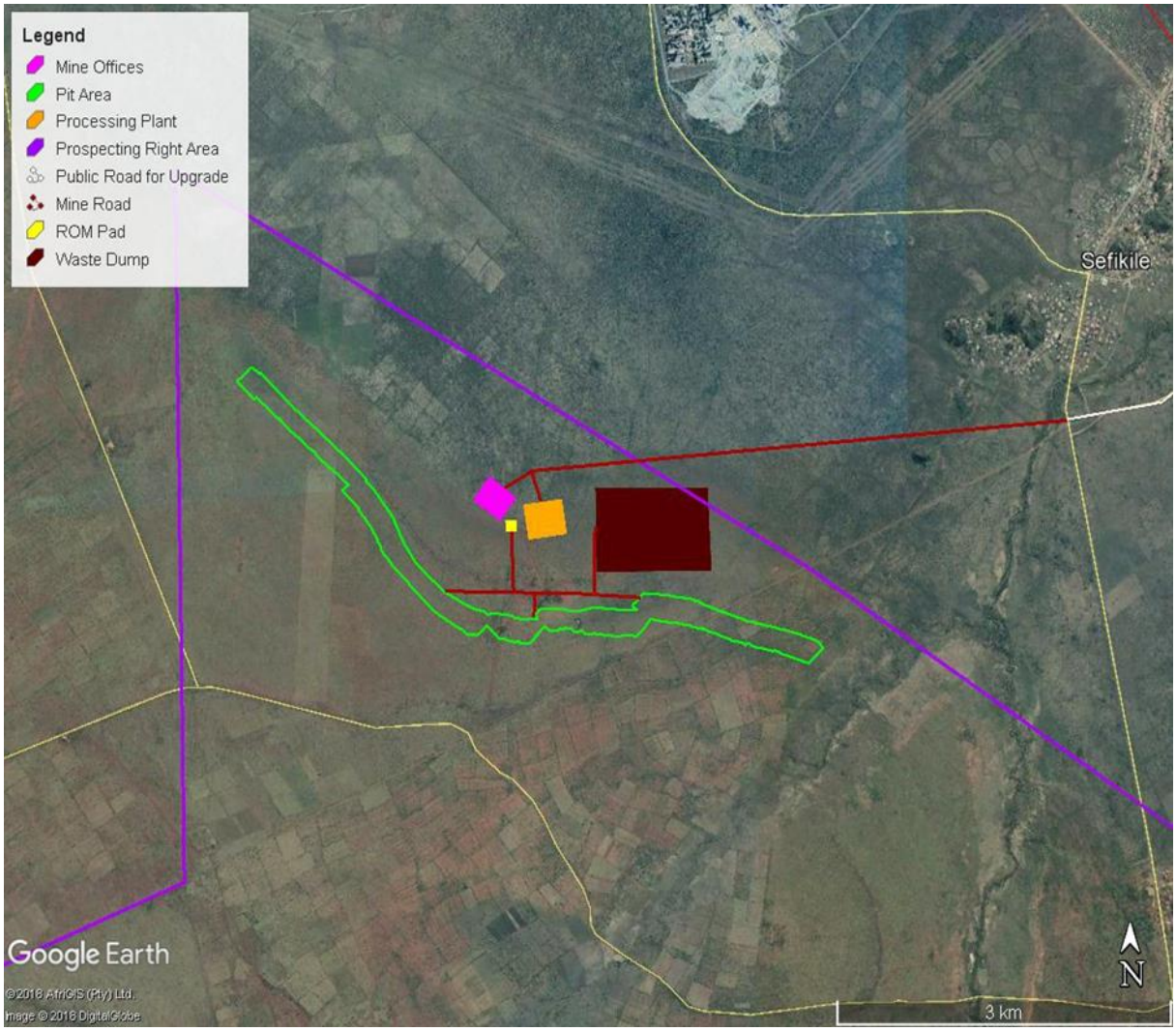

Figure 2: Aerial image of proposed mine layout (source: Niara 2019)

Figure **2** shows an aerial image of the proposed mine layout. The mine infrastructure will be located to the south-west of Sefikile.

6.2. Proposed Land use and infrastructure

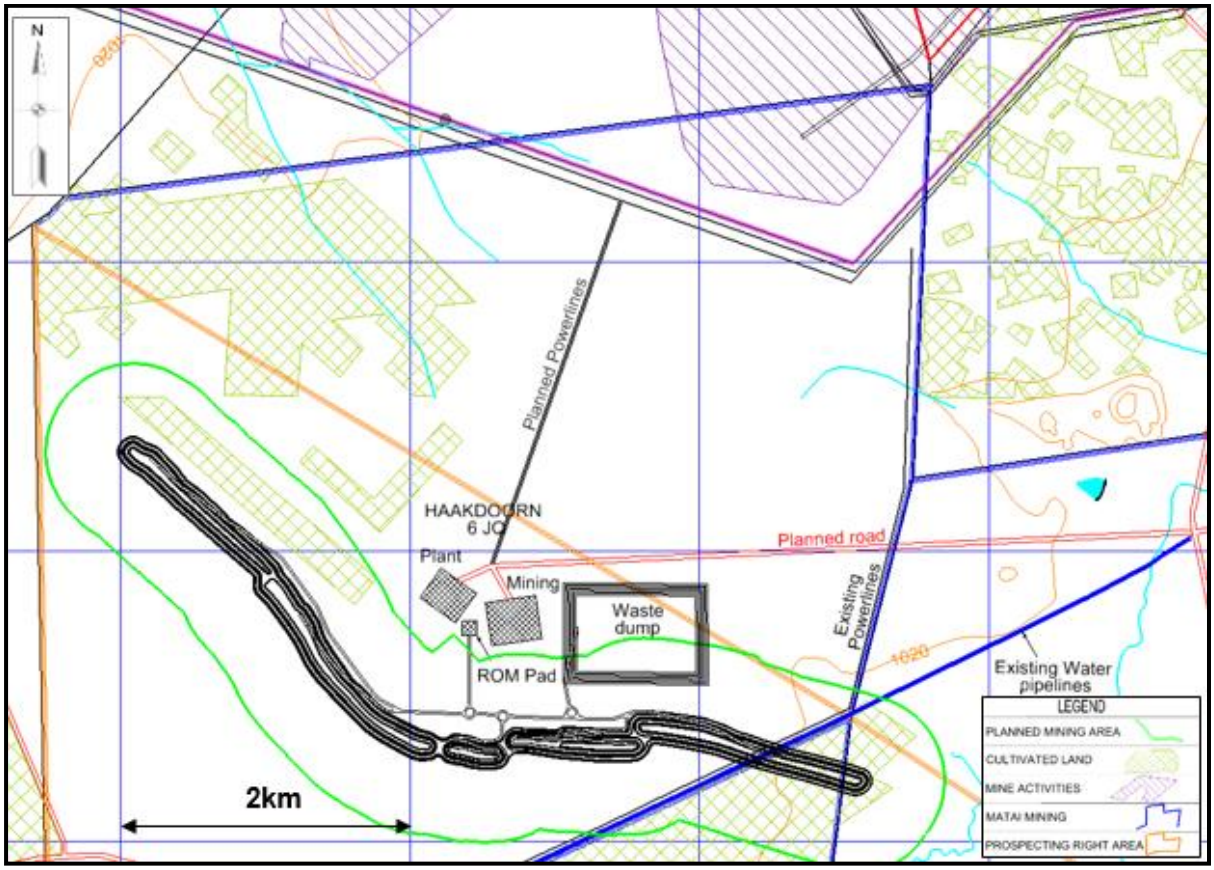

Figure 3: Surface mine layout

The application site is currently an agricultural area used to farm maize but it is proposed to develop the Matai Iron Ore mining operation. The ore extracted from the mine will be hauled for processing via the R510 either to Polokwane or Rustenburg at a processing plant. Below is a brief description of the activities involved in the construction and operation of the North West mine.

6.2.1 Construction

It is estimated that the mine infrastructure (offices and workshop facilities) will require an area of approximately 2 hectares. This is situated to the north of the mining operations, as shown in Figure 3. The infrastructure area will be linked to the mining operation using a 15.5m wide haul road.

Electrical power will be from the existing power line as part of the process plant infrastructure for workshops and office requirements.

A site access road will be required to link the site to the road network system. The nearest major road is the R510 which is approximately 15 kilometres to the east of the site.

Additionally construction will also include:

- Administrative buildings, stores and workshops;
- Product stockpiling and loading facilities; and
- Services such as substation, pipelines, conveyors, roads, sewage treatment plant, telephone lines, communication and lighting masts.

6.3. Mine equipment and operations

Error! Reference source not found., ssummaries all the primary and secondary equipment that was allowed for. The quantities in the table can vary during the life of mine depending on the average hauling distances and required tonnage throughput. The quantities indicated, are the requirements at steady state.

Table 2: Recommended fleet required (source: Ukwazi 2018)

Description	Quantity
Primary equipment	
CAT 374D loader	2
CAT 745C truck	8
Atlas Copco D65	1
Secondary equipment	
CAT D9 dozer	4
CAT 814H wheel dozer	1
CAT 140 road grader	2
CAT 725 23 000l water tanker	2
CAT 428E backhoe (TLB)	1
Nissan UD90 service truck	1
Man M2000 crane truck	1
CAT 725 23 000l diesel bowser	1
340 KVA FGD generator	1
Light plant	8
Waterpump	2
Atlas Copco D56	3
LDV	18

It is expected that the mine will produce on average 2Million tons of ore per annum for market. It is expected that the haul route will link up to the R510 with the ore being transported to either Polokwane or Rustenburg for processing.

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

It is estimated that once the mine once fully operational is expected to employ ±1000 and the professional team will be assumed to be 5 percent 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.

7 Road Network and Traffic Situation

7.1. Existing Road Network

This site enjoys very good regional accessibility via the R510, which is a regional route that connects to the Thabazimbi in the north (approximately 75km from site) and to Rustenburg in the south (approximately 90km from site).

Figure 4: Surrounding Road Network and site location

R510 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 a national road and strategically connects the North West and Limpopo provinces, it also offers network connectivity to the surrounding areas. The R510 is a single carriageway with separate turning lanes at some of its intersection with the minor street networks. The road has paved pedestrian sidewalks as well as demarcated pedestrian crossing areas

Figure 5: R 510 intersection with gravel road A

Road A can be classified as a class 4 providing a link from R510 from the surrounding areas. It forms a T-intersection with R510 which is controlled by a one way stop on Road A. The road is gravel and is a single carriageway

Figure 6: Gravel Road A

Swartklip road can be classified as a class 3 as it links the surrounding townships and developments. The road is a single carriageway with a one lane per direction. It has an intersection with Road A near the Ga-Ramosidi settlement and it is proposed to link this intersection with the mine link road to form a 4 way intersection.

Figure 7: Swartklip Road

7.2. Proposed Access

It is proposed to develop one main access point for proposed Iron Ore Mine from the proposed mine link road, which will connect to Road A and subsequently to R510.

8 Trip Generation

8.1. 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.

The South African Trip Data Manual (Version 1 September 2012) by the Committee of Transport Officials as well 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 Matai 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 1 000 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 3 models all the employees arriving in the AM peak hour and departing in the PM peak hour.

8.2. Mine operations traffic

10.2.1 Employee Traffic

It is estimated that once fully developed the mine will employee about 1 000 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 3 models all the employees arriving in the AM peak hour and departing in the PM peak hour.

Annual production	2 million tonnes*
Haul Days per Year	320
Tons per day	6 250t
Tons per Truck	32
Truck loads per day	195
Truck loads per hour (over 12hr haul period)	16

From the above calculation, it is therefore expected the hourly haul traffic shall be 16 trips per hour with a 50:50 directional split and thus will be evaluated in this report.

This amount of haulage trucks per hour is not anticipated to have that much impact from a traffic engineering point of view, however a review of the existing road network capacity will be done to determine if new network trips can be accommodated

8.3. Trip Generation Rates

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

Table 3: Employee trip generation

	Number	Split	Vehicles
Employees	650	Buses	9
	300	Walk/cycle	-
	50	cars	50
Expected total trips		Total number of expected vehicle cars	59 trips
Directional Split 90:10 AM	IN OUT 53 6		
Directional Split 10:90 PM	IN OUT 6 53		

Table 4: Haul trips

Directional Split			Number of Trucks
Directional Split AM (50:50)	IN OUT 8 8	Total Peak hour trips	16
Directional Split PM (50:50)	IN OUT 8 8	Total Peak hour trips	16

The trip calculation in Table 3 and Table 4 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.

Table 5: Total trip generation AM and PM peak hours

Period	In	Out	Total
Weekday AM	61	14	75
Weekday PM	14	61	75

Considering the worst case assumptions and scenario modelled, it is expected that the Matai mine will generate 75 peak hour trips within the AM and PM peak hours respectively.

9 Data Collection

Classified traffic counts were undertaken by JIW Professional Services on 6 February 2019 between AM and PM peak hours. Annexure A shows the trip existing trip volumes and distribution.

9.1. Counted Traffic Volumes

Traffic counts were conducted (refer to Figure 8) at the following locations:

- **Intersection 1:** R510 and Gravel Road A
- **Intersection 2:** Swartklip road and Gravel Road A

The counts were undertaken at 15-minute intervals and included turning movements at intersections and vehicles classification information.

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

- Fairly significant traffic volumes were observed on the R510 in the AM and PM peak hours.
- Low volumes of traffic were observed on Swartklip, Road A during the AM and PM peak hours.
- Overall no capacity problems were evident in the AM and PM peaks at the intersections.

The reduced data for the traffic counts undertaken is included as shown in Appendix A.

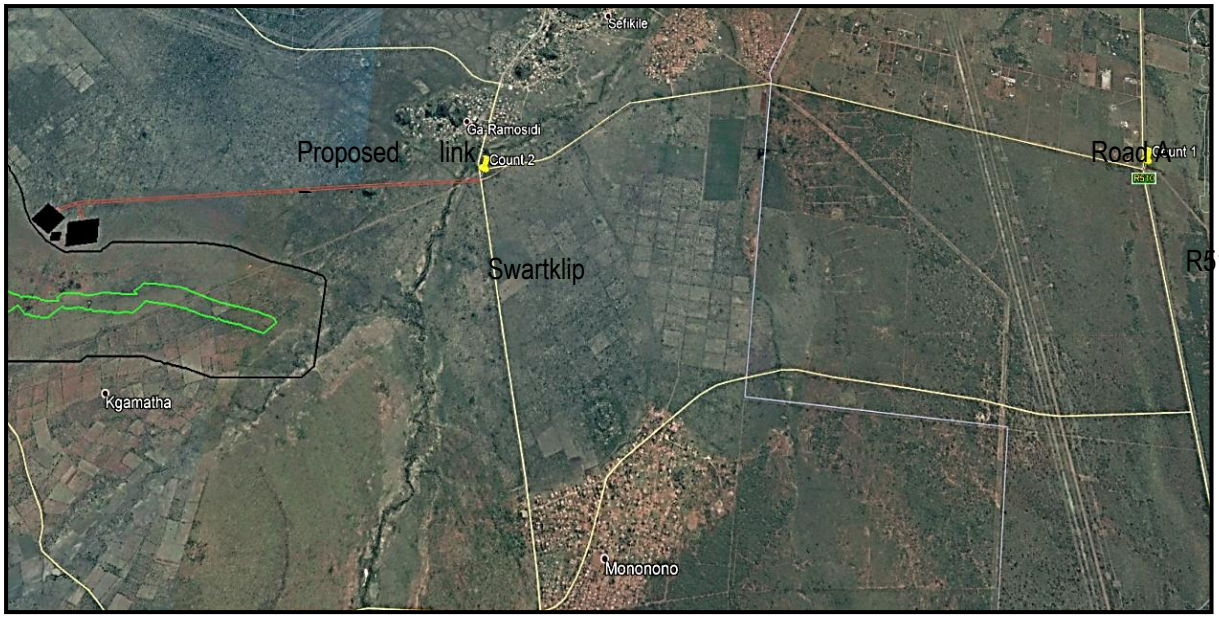

Figure 8: Intersections surveyed

9.2. Impact of the Latent rights on road network

No information of any known latent rights is readily available, however a growth rate of 2% has been assumed for the study area.

9.3. 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 2.0 % 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 (2024) through traffic volumes from the base year (2019) volumes.

9.4. 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:

- 5% North on Swartklip;
- 10% South on Swartklip;
- 35 % North on R510;
- 50 % South on R510;

See Annexure B for detailed trip assignments.

10 Capacity Analysis

10.1. 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:** R510 and Gravel Road A
- **Intersection 2:** Swartklip road and Gravel Road A

Based on the indicative site layout in Figure 8, it can be successively argued that this report has provided an adequate evaluation of the study area. The identified intersections form the core access network for the development linking to the wider road network.

10.2. 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

10.3. 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 2019:** This assessment will represent an indication of what the current traffic operations within the vicinity of this development are including the access conditions.
- **2024 traffic demand no development:** The expected future traffic demand within the next 5 years without the proposed development.
- **2024 traffic demand with the proposed development:** The expected future traffic demand within the next 5 years and impact of the proposed Matai Mine.

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

10.4. 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 6 below.

Table 6: Assessment Scenarios

SCENARIO	ASSESSMENT YEAR AND TRAFFIC DEMAND	ROAD NETWORK
1	Status Quo 2019	Existing 2019 road layout.
2	2024 traffic demand no development	Existing 2019 road layout
2	2024 traffic demand with the proposed development	Existing 2019 road layout PLUS proposed upgrades

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.

10.5. 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 7 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 7: 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 intersections analysed during the three scenarios are shown in the following table.

Scenario 1

Table 8: Status Quo 2019

INTERSECTION (APPROACH)		SCENARIO 1 – BASE YEAR (2019) Weekday AM Peak Hour			SCENARIO 1 – BASE YEAR (2019) Weekday PM Peak Hour		
		Av Delay (sec)	V/C	LOS	Av Delay (sec)	V/C	LOS
R510 / Road A (1 Way Stop)	South Approach	0.0	0.187-	N/A	0.0	0.098	N/A
	East Approach	-	-	-	-	-	-
	North Approach	1.8	0.059	N/A	1.2	0.244	N/A
	West Approach	12.9	0.01	B	13.4	0.012	B
OVERALL (LOS)		0.7	0.187	N/A	1.1	0.257	N/A
Swartklip/ Road A 1 WayStop)	South Approach	0.3	0.066	N/A	0.4	0.04	N/A
	East Approach	11.4	0.012	B	11.1	0.005	B
	North Approach	0.2	0.038	N/A	0.9	0.035	N/A
	West Approach	-	-	-	-	-	-
OVERALL (LOS)		1.0	0.066	N/A	1.0	0.04	N/A

The following is summarised from the above table:-

Intersection 1: R510 and Road A

The intersection currently is a 1way stop and as indicated by the AM and PM results in tables 8 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: Swartklip and Road A

Little traffic activity was observed on this intersection, Road A is a gravel road linking the R510 and Swartklip. 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.

10.6. Scenario 2

Table 9: 2024 no Development

INTERSECTION (APPROACH)		SCENARIO 2 – (2024) Weekday AM Peak Hour			SCENARIO 2 – (2024) Weekday PM Peak Hour		
		Av Delay (sec)	V/C	LOS	Av Delay (sec)	V/C	LOS
R510 / Road A (1 Way Stop)	South Approach	0.0	0.2-	N/A	0.0	0.109	N/A
	East Approach	-	-	-	-	-	-
	North Approach	2.0	0.065	N/A	1.4	0.269	N/A
	West Approach	13.1	0.01	B	13.6	0.014	B
OVERALL (LOS)		0.8	0.2	N/A	1.2	0.269	N/A
Swartklip/ Road A 1 WayStop)	South Approach	0.4	0.073	N/A	0.4	0.043	N/A
	East Approach	11.6	0.014	B	11.1	0.006	B
	North Approach	0.2	0.042	N/A	0.9	0.038	N/A
	West Approach	-	-	-	-	-	-
OVERALL (LOS)		1.0	0.073	N/A	1.0	0.043	N/A

The following is summarised from the above table:-

Intersection 1: R510 and Road A

With the growth in background traffic, the intersection continues to operate at acceptable Level of Service. The AM and PM results in tables 9 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: Swartklip and Road A

With the growth in background traffic, the intersection continues to operate at acceptable Level of Service. 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.

10.7. Scenario 3

Table 10: 2024 traffic plus Development

INTERSECTION (APPROACH)		SCENARIO 3 – (2024) plus Develop Weekday AM Peak Hour			SCENARIO 3 – (2024) plus Develop Weekday PM Peak Hour		
		Av Delay (sec)	V/C	LOS	Av Delay (sec)	V/C	LOS
R510 / Road A (1 Way Stop)	South Approach	0.7	0.218	N/A	0.3	0.112	N/A
	East Approach	-	-	-	-	-	-
	North Approach	3.5	0.089	N/A	1.5	0.274	N/A
	West Approach	13.6	0.028	B	14.9	0.104	B
OVERALL (LOS)		0.8	0.2	N/A	2.3	0.274	N/A
Swartklip/ Road A 2 WayStop)	South Approach	0.7	0.077	N/A	0.6	0.045	N/A
	East Approach	11.6	0.064	B	11.1	0.016	B
	North Approach	1.1	0.045	N/A	1.3	0.039	N/A
	West Approach	11.5	0.014	B	11.1	0.054	B
OVERALL (LOS)		3.7	0.077	N/A	4.4	0.054	N/A

The following is summarised from the above table:-

Intersection 1: R510 and Road A

With the growth in background traffic plus the development trips, the intersection continues to operate at acceptable Level of Service. The AM and PM results in tables 10 above indicates 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: Swartklip and Road A

The intersection will be upgraded to a four way intersection with the introduction of the mine traffic. With the growth in background traffic plus the development trips, Table 10 indicates that the upgraded intersection will operate at an acceptable Level of Service. 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.

Proposed upgrades

Intersection: Swartklip and Road A

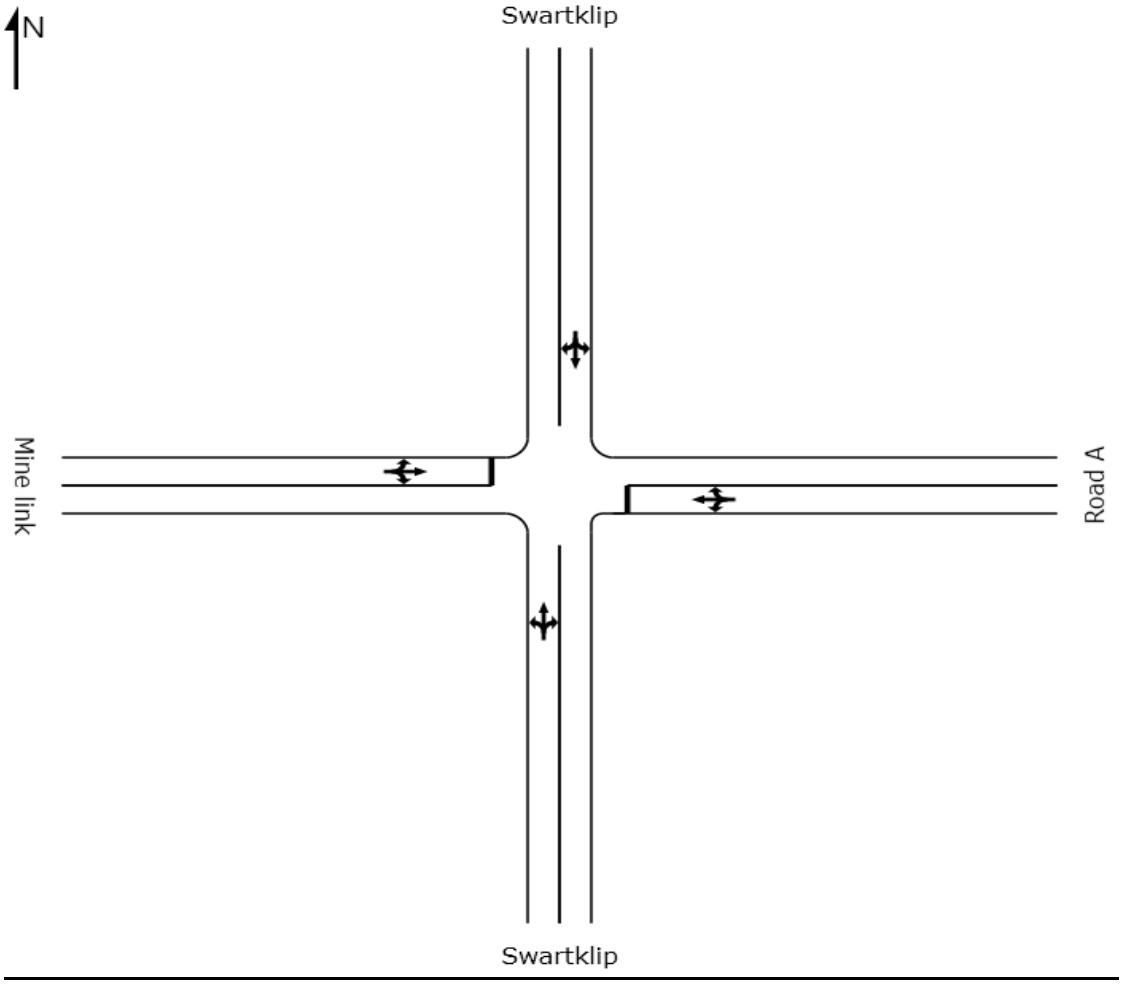

Figure 9: Swartklip and Road A

It is proposed to:

- Upgrade the existing T-junction to a four way intersection.
- Provide public transport laybys

The above road network configuration mitigates the addition of the development trips.

11 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 Swartklip and Road A
- Upgrade the existing T-junction to a four way intersection.
- Provide public transport laybys
- Construction of the Mine access link road which will link to Swartklip road at the existing intersection with Road A.
- Re-gravelling / tarring of existing surface of Road A linking to the R510.

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

12 Public Transport Assessment

This study assumes that the mine will provide transport to the employees of the mine. The vehicles are therefore assumed to drive into the mining areas and drop off employees at designated areas.

This study proposes that pedestrian walkways be provided from the mining areas to the location of the access gate leading into the mine. Pedestrian walkways should be 1.8m in width.

12.1. 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.

12.2. 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 Swartklip and Road A intersection.
- Proper drop off zones be constructed within the mine's internal roads.

13 Impact Assessment Methodology

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance. The methodology below will be used when determining the significance of impacts associated with the proposed Matai Mining Project.

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance.

The impact significance rating system is presented in Table 13-1, Table 13-2 and Table 13-3 and involves three parts:

1 **Part A**: Define impact consequence using the three primary impact characteristics of magnitude, spatial scale/ population and duration;
2 **Part B**: Use the matrix to determine a rating for impact consequence based on the definitions identified in Part A; and
3 **Part C**: Use the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from **Part B**) and the probability of occurrence.

13.1. Part A: Defining Consequence in Terms of Magnitude, Duration and Spatial Scale:

Use these definitions to define the consequence in Part B.

Table 13-1: Consequence Rating Methodology

Impact Characteristics	Definition	Criteria
Magnitude	Major -	Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded
	Moderate -	Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded
	Minor -	Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded

Impact Characteristics	Definition	Criteria
	Minor +	Minor improvement; change not measurable; or threshold never exceeded
	Moderate +	Moderate improvement; within or better than the threshold; or no observed reaction
	Major +	Substantial improvement; within or better than the threshold; or favourable publicity
Spatial scale or population	Site or local	Site specific or confined to the immediate project area
	Regional	May be defined in various ways, e.g. cadastral, catchment, topographic
	National/ International	Nationally or beyond
Duration	Short term	Up to 18 months.
	Medium term	18 months to 5 years
	Long term	Longer than 5 years

13.2. Part B: Determining Consequence Rating:

Rate consequence based on definition of magnitude, spatial extent and duration.

Table 13-2: Consequence Rating Methodology

			Spatial Scale/ Population		
			Site or Local	**Regional**	**National/ International**
MAGNITUDE					
Minor	**DURATION**	**Long term**	Medium	Medium	High
		Medium term	Low	Low	Medium
		Short term	Low	Low	Medium
Moderate	**DURATION**	**Long term**	Medium	High	High
		Medium term	Medium	Medium	High
		Short term	Low	Medium	Medium
Major	**DURATION**	**Long term**	High	High	High
		Medium term	Medium	Medium	High
		Short term	Medium	Medium	High

13.3. Part C: Determining Significance Rating:

Rate significance based on consequence and probability.

Table 13-3: Significance Rating Methodology

		Consequence		
		Low	**Medium**	**High**
PROBABILITY (of exposure to impacts)	**Definite**	Medium	Medium	High
	Possible	Low	Medium	High
	Unlikely	Low	Low	Medium

14 Potential Environmental Impacts Related to Traffic

The assessment rating for the potential impacts identified relating to traffic is shown in Table 14.

Table 4: Environmental Impact Assessment related to Traffic

Affected Environment	Activity	Impact Description	BEFORE MITIGATION						Cumulative Impact	Mitigation measures / Recommendations	AFTER MITIGATION					
			Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE			Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE
Construction Phase																
Road network	Construction materials being transported to site	Added traffic on the road network	*Minor -*	*Medium Term > 18 months < 5 years*	*Site or Local*	Low	*Definite*	Medium	No	Road network able to support additional trucks.	*Minor -*	*Medium Term > 18 months < 5 years*	*Site or Local*	Low	*Definite*	Medium
Road network	Employees and labourers transported to/ from site	Added traffic on the road network	*Minor -*	*Medium Term > 18 months < 5 years*	*Site or Local*	Low	*Definite*	Medium	No	Road network able to support additional commuter trips	*Minor -*	*Medium Term > 18 months < 5 years*	*Site or Local*	Low	*Definite*	Medium
Air quality	Vehicles travelling on gravel roads	Dust will increase with increased traffic flow along gravel roads	*Minor -*	*Short Term < 18 months*	*Site or Local*	Low	*Definite*	Medium	No	Ensure that gravel roads are kept watered to prevent dust (other dust suppression measures may also be used).	*Minor -*	*Short Term < 18 months*	*Site or Local*	Low	*Possible*	Low
Access road	Construction of	New access	*Minor -*	*Short Term <*	*Site or*	Low	*Definite*	Medium	No	As per EMP	*Minor -*	*Short Term <*	*Site or Local*	Low	*Definite*	Medium

Affected Environment	Activity	Impact Description	BEFORE MITIGATION						Cumulative Impact	Mitigation measures / Recommendations	AFTER MITIGATION					
			Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE			Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE
	access roads	roads		*18 months*	*Local*							*18 months*				
Operation Phase																
Road network	Haulage to/ from site; and mine staff to/from site	Added traffic on the road network	*Moderate*	*Long Term > 5 years*	*Site or Local*	Medium	*Definite*	Medium	No	Road network able to support additional trucks.	*Minor -*	*Long Term > 5 years*	*Regional*	Medium	*Possible*	Medium
Air quality	Vehicles travelling on gravel roads	Dust will increase with increased traffic flow along gravel roads	*Minor -*	*Long Term > 5 years*	*Site or Local*	Medium	*Possible*	Medium	No	Ensure that gravel roads are kept watered to prevent dust (other dust suppression measures may also be used).	*Minor -*	*Long Term > 5 years*	*Site or Local*	Medium	*Possible*	Medium
Noise	Haulage to/ from site; and mine staff to/from site	Noise levels affecting sensitive areas including residential areas	*Major*	*Long Term > 5 years*	*Site or Local*	High	*Possible*	High	No	Speed limits to be kept low, and define routes away from residential areas.	*Minor -*	*Long Term > 5 years*	*Site or Local*	Medium	*Possible*	Medium
Decommissioning and Closure Phase																

Affected Environment	Activity	Impact Description	BEFORE MITIGATION						Cumulative Impact	Mitigation measures / Recommendations	AFTER MITIGATION					
			Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE			Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE
Road Network	Rubble and other materials being removed from site	Added traffic on the road network	*Minor -*	*Medium Term > 18 months < 5 years*	*Site or Local*	Low	*Definite*	Medium	No	Road network able to support additional trucks.	*Minor -*	*Medium Term > 18 months < 5 years*	*Regional*	Low	*Unlikely*	Low

15 Conclusion and Recommendations

The objective of the report was to assess the traffic impact on the surrounding road network due to the proposed Matai Mine in North West. From the traffic impact investigation and discussions in the report the following conclusion can be made, the proposed Matai Mine and the expected increase in traffic due to the development can be accommodated on the road network.Certain mitigation measures have been recommended to accommodate the traffic demand and any adverse effects on the environment. Based on the conclusions of this assessment, it is recommended that the proposed development should be favourably considered from a traffic engineering point of view by the relevant authorities.

In view of the traffic impact investigation and discussion in the report, it is recommended that the proposed Matai 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 approves the recommendations in this Report, pertaining to the proposed Matai MVT Mine in North West from a Traffic Engineering point of view.

16. Legal Requirements: Specialist Checklist

In terms of the NEMA 2014 EIA Regulations contained in GN R982 of 04 December 2014 all specialist studies must comply with Appendix 6 of the NEMA 2014 EIA Regulations (GN R982 of 04 December 2014). The table below show the requirements as indicated above.

Table 5: Specialist Checklist

EIA REGULATIONS 2017 GNR 327, 325 and 324 Appendix 6 CONTENT OF THE SPECIALIST REPORTS	Completed according to the EIA Regulations	Cross-reference in this scoping report
(a) details of— the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a curriculum vitae;	X	Section 1.2
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	X	Page iii
(c) an indication of the scope of, and the purpose for which, the report was prepared	X	Section 2
(CA) an indication of the quality and age of Base Data used for the specialist report	X	Section 7
(CB) a description of existing impacts on the site, cumulative impacts of the proposed development and the levels of acceptable change	X	Section 14
(d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	X	Section 4.1.1
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	X	Section 4
(f) Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives.	X	Section 13
(g) an identification of any areas to be avoided, including buffers;	X	N/A
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	X	Section 6
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	X	Section 9.4
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities	X	Sections 10 and 14
(k) any mitigation measures for inclusion in the EMPr	X	Section 14

EIA REGULATIONS 2017 GNR 327, 325 and 324 Appendix 6 CONTENT OF THE SPECIALIST REPORTS	Completed according to the EIA Regulations	Cross-reference in this scoping report
(l) any conditions for inclusion in the environmental authorisation;	X	N/A
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	X	N/A
(n) a reasoned opinion— i. whether the proposed activity, activities or portions thereof should be authorised; and (iA) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	X	Section 15
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	X	No comments and responses, relating to traffic, we received from the stakeholder engagement process.
(p) any other information requested by the competent authority	X	N/A

17 References

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Committee of Transport Officials. August 2012. "TRH 26 - South African Road Classification and Access Management Manual." Version 1.0, Pretoria, South Africa.

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