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PROPOSED GYPSUM QUARRY MINE, KANAKIES 332, CALVINIA

Transport Impact Study (TIS)

LOCATED ON KANAKIES 332 OVER PORTION 0 (REMAINING EXTENT) NEAR CALVINIA, NORTHERN CAPE

Project No.: STUR0220

Final Report

July 2018

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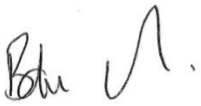
		SIGNATURE 	SIGNATURE 
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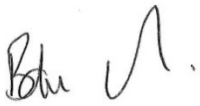
		SIGNATURE 	SIGNATURE 

TITLE:
STUR0220: PROPOSED GYPSUM QUARRY MINE (KANAKIES 332), CALVINIA: TRANSPORT IMPACT STUDY

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SYNOPSIS:
This report assesses the key transportation issues pertaining to the proposed future Kanakies Gypsum Quarry Mine development near Calvinia in the Northern Cape Province.

DECLARATION OF INDEPENDANCE

This report was compiled by Mr Barend Du Preez and Mrs Sarah Larratt of Sturgeon Consulting, both who hereby declare that they acted as independent consultants and have no business, financial, personal or other interest in the proposed development project, application or appeal in respect of which we were appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of our performing such work. CVs of the applicable specialists that performed the core duties are contained in Annexure A.

Barend Du Preez, Pr Eng

Sarah Larratt, Pr TechEng

July 2018

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ACRONYMS:

TIS – Transport Impact Study

TIA – Transport Impact Assessment

EIA – Environmental Impact Assessment

SANRAL – South African National Road Agency

NEMA – National Environmental Management Act

NMT – Non-Motorised Transport

NLTA – National Land Transport Act

vph – Vehicles per Hour

vpd – Vehicles per Day

AADT – Annual Average Daily Traffic

ADTT – Average Daily Truck Traffic

COTO – Committee of Transport Officials

1. INTRODUCTION

1.1 BACKGROUND

Sturgeon Consulting (Pty) Ltd has been appointed by Cabanga Environmental to provide specialist input on the Transport Impact in support of the EIA application for the proposed Kanakies Gypsum Quarry Mine Project. This study is undertaken as part of the Environmental Impact Assessment (EIA) process facilitated by Cabanga Environmental in terms of the National Environmental Management Act 107 of 1998 (NEMA).

Witkop Fluorspar Mine (Pty) Ltd intends to apply for mining rights in terms of NEMA over Portion 0 (the Remaining Extent), Farm Kanakies 332, Calvinia Rd. It is proposed that a new gypsum quarry mine and associated infrastructure be established on the Farm.

Property and Mining Summary:

Farm Name:	Kanakies
Farm Number and registration division:	332 Calvinia Rd
Farm subdivision and number:	0 (RE)
Magisterial District:	Calvinia
Local Municipality:	Hantam Municipality
SG21 – digit code:	C01500000000033200000
Title Deed Number:	T37913/2016
Total area (ha):	7456.6974
Farm owner:	PPC Cement SA (Pty) Ltd
Type of mineral(s) to be mined:	Gypsum (Gy)
Life of Mine:	30 years plus
Mining Method:	Surface trench mining
Depth of the mineral below surface	The deposit consists of 2 layers of gypsum i.e. a powder layer of approximate thickness 0.4 meter, which lies approximately 0.2 to 0.7 meter under the surface, followed by a nodular crystalline layer of gypsum of approximate thickness 0.9 to 1.3 meter.

Source: Cabanga Environmental

This report aims to assist with the Environmental Impact Assessment (EIA) undertaken for the proposed development with the objective to facilitate informed decision-making as it relates to the desirability of the proposed mine in context of the statutory obligation to ensure long-term environmental sustainability with specific reference to the Transport Impact.

1.2 METHODOLOGY

The broad methodology adopted for this specialist study is as follows:

1. Site visit – 14 February 2018
2. Literature review and Internet research.
3. Traffic data collection (AADT, ADTT etc. from SANRAL and Mikros Traffic Monitoring data)
4. Data analysis
5. Evaluation of initial proposed access configurations
6. Liaison with client and/or project team
7. Fine tune analysis
8. Preparation of draft report and figures
9. Review comments on draft report
10. Amend report and finalise

It must be noted that at the time of the site visit on 14 February 2018, there were adverse weather conditions, which made several of the routes (R355, Transnet service road, etc.) un-passable due to flooding.

1.3 LEGISLATION WITH REGARDS TO TRANSPORT IMPACT STUDIES

A Transport Impact Study (TIS) is required to determine what impact a new development's traffic will have on the existing road network and whether or not this development can be accommodated by the existing transport system. The purpose of a TIS is to support sustainable development by protecting the overall integrity of the transport system for the benefit of all users.

The South African Committee of Transport Officials (COTO), TMH 16 Manual, Volume 1, states that in terms of the manual, a TIS must be undertaken when "*An Application is submitted for a change in land use*".

The TMH16 also states that the National Land Transport Act 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.

The National Land Transport Act 5 of 2008 (NLTA) Section 38 does not set out any regulation as to what is required in a TIS. However, Section 38(2b) of the act states that "*developments on property within a transport area are subject to traffic impact assessments and public transport assessments as prescribed by the MEC*"

National Road Traffic Act 93 of 1996 (NRTA) provides for road traffic matters to be applied uniformly throughout the Republic and for matters connected therewith.

1.4 STUDY PURPOSE

The primary purpose of this report is to evaluate the expected traffic impact of the proposed gypsum mine with the main focus on access and traffic distribution during the Construction and Operational phases of the project. In other words, the objective of the TIS is to assess the impact of the proposed gypsum mine activities on the existing external road network surrounding the development during both phases. The report identifies the preferred access route to the site, comments on the condition of the existing roads in the vicinity of the site, identifies possible access points to the site and recommends road improvements to minimise the impact on the surrounding road network where necessary.

This TIS addresses the following traffic and transportation related implications of the proposed mining facility:

- Locality of proposed site for the mine
- Existing traffic volumes on the N7, R27 and R355 in the vicinity of the site and the Western Cape proclaimed roads MR737, DR2226, OP9839, OP9850, OP9852 and OP9854 (where relevant)
- Acceptability from a traffic safety point of view of the location of the access/es to the proposed facility

- Impact on Sishen-Saldanha railway line service road, R355 and the rail siding at station (Kanakies/LUS6)
- Risk posed by construction and operational vehicles
- Limitation of this Transport Impact Study
- Based on existing volumes of traffic, recommendations for mitigations measures for traffic impacts

It should be noted that this report does not address the internal traffic circulation for the mine.

As part of the EIA the TIS will be developed in line with the guidelines of the *Manual of Traffic Impact Studies (RR93/635)* published by the Department of Transport in 1995 and *TMH16 Volume 1 & Volume 2, South African Traffic Impact and Site Assessment Manual, August 2012* published by the Committee of Transport Officials (COTO).

2. LOCATION OF THE PROPOSED MINE

The Farm Kanakies 332, is located approximately 45km west-south-west of the town of Loeriesfontein and 40km north-north-west of the town of Nieuwoudtville with access off the R355 in the Northern Cape Province via the Transnet service road. The proposed gypsum mine site is situated in the Hantam Local Municipality (NC065) of the Namakwa District Municipality (DC6). The proposed mine is on the border between the Northern and Western Cape Provinces. The mining right area (MRA) is currently zoned for agricultural purposes and is utilised for grazing.

The property is bisected by the Sishen–Saldanha railway line (owned by Transnet Freight Rail), also known as the Ore Export Line (OREX), which is an 861-kilometre-long heavy-haul railway line in South Africa. It connects iron-ore mines near Sishen in the Northern Cape with the port at Saldanha Bay in the Western Cape. It is used primarily to transport iron ore (60 million tonnes per year) and does not carry passenger traffic.

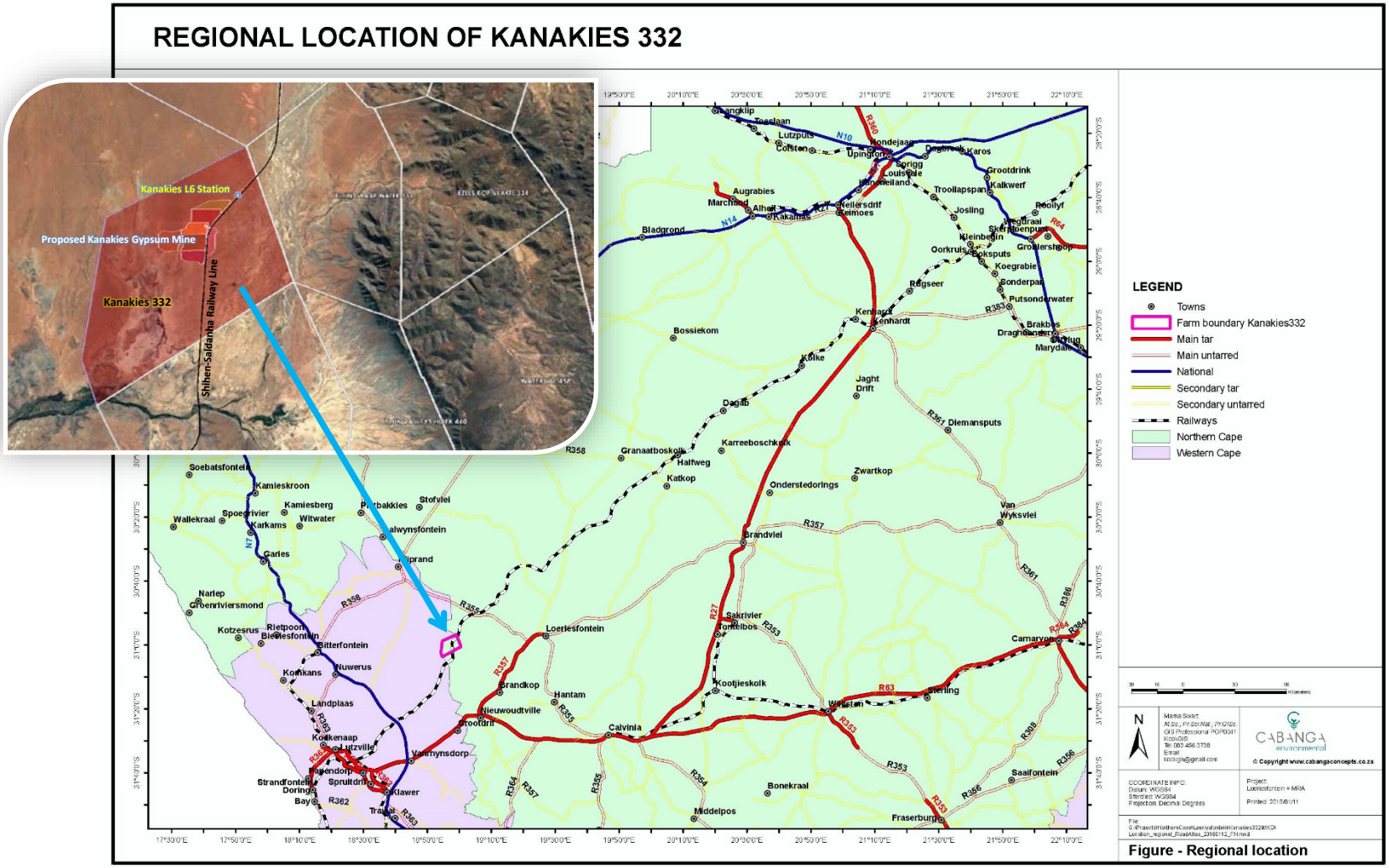
Existing infrastructure at the Kanakies Loop 6 station includes a small rail siding, power lines, sub-station, cellular (MTN) tower, farmsteads and associated infrastructure.

The project includes the establishment of associated activities and the development of the infrastructure area and services to run the mine as well as the mining areas. This document deals with the specialist transport study relating to the mine.

The project site can be reached via the existing Transnet service road off the R355, to the north of the site. The R355 runs northwest-southeast to the north of the site. **Figure 1** and **2** provides a view of the regional location of the proposed gypsum mine site.

Figure 1: Locality Plan

Figure 2: Regional Location

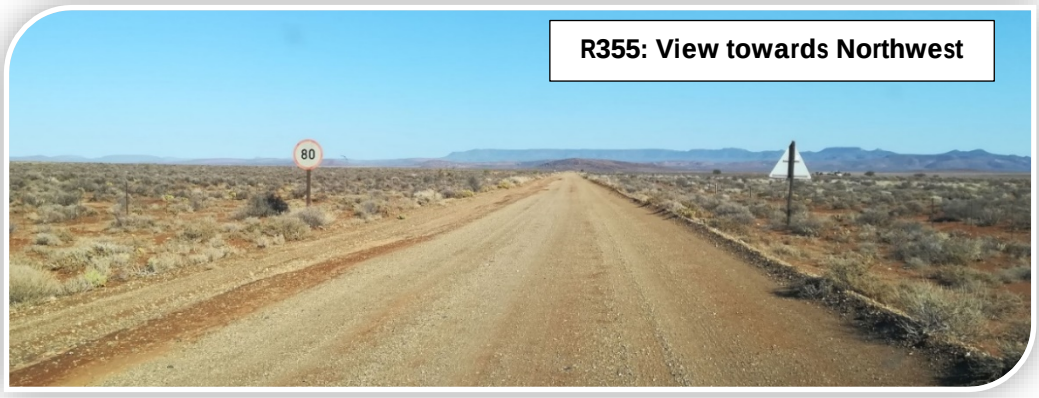


3. EXISTING ROAD NETWORK AND TRAFFIC CONDITIONS

The main roads that are directly affected by the proposed mine are the R355 and existing Transnet service road.

R355 (Class 3 Road):

The R355 is gravel road that connects the R357 with the R358. The turn off from the R355 to the site is 41.7km from the R358 intersection and 35.8km from R357. To the east the R355 provides access to Brandvlei going north via Loeriesfontein or Calvinia to the southeast and to Vanrhynsdorp to the south via the R357 (paved road) and R27. To the west it provides access to the R358 (also a gravel road) which provides access to the N7 just north of Bitterfontein and Kliprand to the north.



Transnet Service Road:

The Transnet service road is a gravel road parallel to the Sishen-Saldanha railway line, owned and maintained by Transnet. The section (approximately 19.4km) of the road between the R355 and the proposed mining site is the only road that could provide easy vehicular access to the site and the Kanakies Rail Siding (LUS6).

Generally, the paved main roads are in a fair condition. Road freight, transport, specifically mining transport, significantly contributes to the deterioration of main road surfaces and maintenance of these roads is not always adequate. The main gravel roads are not in a good condition, especially in the wet season.

The Hantam Municipality focus on normal maintenance, re-gravel and reseal of roads. The District municipality with Public Works is responsible for maintenance, repair, protect and manage the proclaimed provincial roads in the area. Challenges facing the municipality are the maintenance of potholes due to insufficient funds.

Existing road infrastructure is well developed in the area and thus well connected to surrounding major centres via regional routes. The combination of national roads and first and second order roads provides good inter- and intra- regional accessibility. The South African National Roads Agency (SANRAL) are responsible for the maintenance of the national roads which are in a reasonable condition, however heavy traffic contribute significantly to the deterioration of the road surfaces. Upgrades and extensions to the existing infrastructure will be implemented to accommodate the additional traffic volumes, if necessary. This means, possible upgrading of certain

municipal, district and provincial routes, associated intersections and construction of new link roads, access roads and intersections where required.

The condition of the roads along the haulage routes must be left in a reasonable state following the construction phase and any maintenance required will need to be undertaken by the developer. Any road upgrades/improvements will be the responsibility of the developer/client. The major impact on the road network will be during the construction phase. During the operational phase the impact will decrease.

The access routes to the proposed development will be discussed in more detail in **Section 4.2**.

3.1 FUTURE ROAD NETWORK

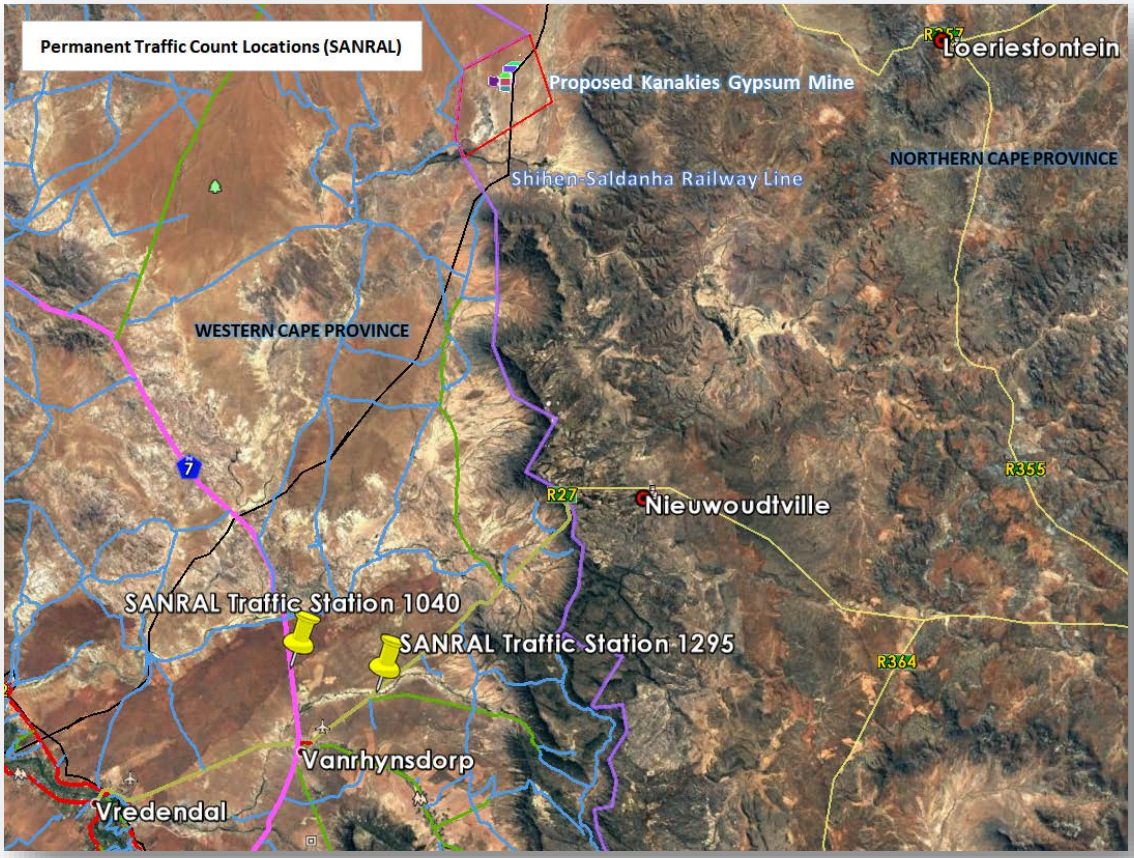
Future road upgrades within the study area present additional opportunities that could impact on the Kanakies gypsum mine operations. In terms of the analysis of the available road network, it can be broken down into two sections, local and regional traffic. Local traffic will be traffic generated by the daily activities of Loeriesfontein and Nieuwoudtville towns, immediately surrounding towns and settlements and the Kanakies gypsum mine.

Regional traffic will be generated outside the immediately surrounding road network and will be related to the operations of the Kanakies gypsum mine and the logistical needs required for the gypsum mine operations, and general business in Loeriesfontein and Nieuwoudtville.

The road network affected by the Kanakies gypsum mine is under the jurisdiction of various authorities, Namakwa District Municipality and Hantam Local Municipality. Any impact or proposed road upgrades on these roads will require consultation with the different authorities.

3.2 EXISTING TRAFFIC CONDITIONS

No traffic counts were conducted in the vicinity of the proposed site due to the low volume (<100vpd) of traffic on the directly affected roads in the area.



SANRAL provided traffic count information for several permanent and secondary counting stations along the N7 and R27. There are no stations in the vicinity of the site however, the stations closest to the proposed site is Station 1040 (on the N7) approximately 8km north of Vanrhynsdorp and Station 1295 (on R27) approximately 9km northeast of Vanrhynsdorp as indicated above.

In addition, the Western Cape Government's (WCG) Road Network Information System (RNIS) has a traffic count database for which traffic counts are conducted regularly. The Western Cape proclaimed road network is categorised into Trunk roads, Main roads, Divisional roads and Minor roads. A count station (Station 0488) is located at the R358 (MR736)/R355(MR737) intersection 41.7km from Transnet servitude on the R355.

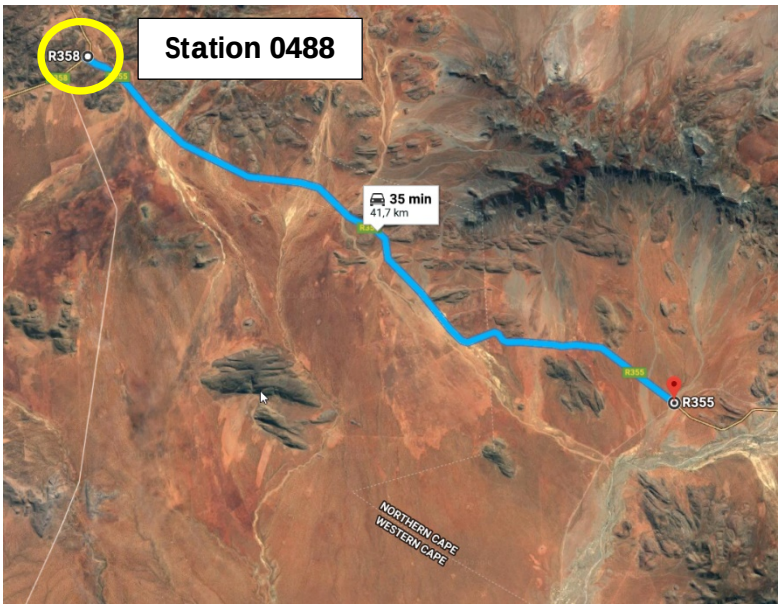


Figure 3 and **Figure 4** provides a detailed analysis of the traffic counts received from SANRAL (2018 and 2017).

Figure 5 provides the station data for the R355 (MR737) at the intersection with the R358 from RNIS (2017).

Figure 3: Traffic Highlights from SANRAL's Permanent Counting Station 1040 (2018) – N7

1040 **Vanrhynsdorp N New**

TRAFFIC HIGHLIGHTS OF SITE 1040				
1.1	Site Identifier			1040
1.2	Site Name			Vanrhynsdorp N New
1.3	Site Description			Between Vanrhynsdorp and Nuwerus
1.4	Road Description	Route : N007	Road : N007 Section : 05	Distance : 8.0km
1.5	GPS Position			18.721873E -31.537945S
1.6	Number of Lanes			2
1.7	Station Type			Permanent
1.8	Requested Period			2018/01/01 - 2018/12/31
1.9	Length of record requested (hours)			8760
1.10	Actual First & Last Dates			2018/01/01 - 2018/02/22
1.11	Actual available good data (hours)			1260
1.12	Percentage good data available for requested period			14.4
		To Springbok	To Vanrhynsdorp	Total
2.1a	Total number of vehicles (counted)	24174	24691	48865
2.1b	Total number of vehicles (projected for period)	168049	171643	339693
2.2	Average daily traffic (ADT)	460	470	931
2.3	Average daily truck traffic (ADTT)	123	125	249
2.4	Percentage of trucks	26.8	26.7	26.8
2.5	Truck split % (short:medium:long)	22 : 12 : 66	20 : 11 : 69	22 : 11 : 67
2.6	Percentage of night traffic (20:00 - 06:00)	21.1	15.9	18.5
3.1	Speed limit (km/hr)			120
3.2	Average speed (km/hr)	111.2	112.3	111.7
3.3	Average speed - light vehicles (km/hr)	120.5	121.6	121.1
3.4	Average speed - heavy vehicles (km/hr)	85.9	86.6	86.2
3.5	Average night speed (km/hr)	99.1	101.7	100.2
3.6	15th centile speed (km/hr)	83.6	83.7	83.7
3.7	85th centile speed (km/hr)	136.0	138.0	136.0
3.8	Percentage vehicles in excess of speed limit	39.3	41.3	40.4
4.1	Percentage vehicles in flows over 600 vehicles/hr	0.0	0.0	0.0
4.2	Highest volume on the road (vehicles/hr)		2018/01/02 15:00:00	143
4.3	Highest volume in the North (vehs/hr)		2018/01/03 12:00:00	77
4.4	Highest volume in the South (vehs/hr)		2018/01/02 15:00:00	84
4.5	Highest volume in a lane (vehicles/hr)		2018/01/02 15:00:00	84
4.6	15th highest volume on the road (vehicles/hr)		2018/01/03 09:00:00	104
4.7	15th highest volume in the North direction (vehs/hr)		2018/01/03 16:00:00	51
4.8	15th highest volume in the South direction (vehs/hr)		2018/02/09 13:00:00	57
4.9	30th highest volume on the road (vehicles/hr)		2018/01/14 15:00:00	92
4.10	30th highest volume in the North direction (vehs/hr)		2018/02/16 15:00:00	44
4.11	30th highest volume in the South direction (vehs/hr)		2018/01/02 11:00:00	53
5.1	Percentage of vehicles less than 2s behind vehicle ahead	3.2	4.8	4.0
6.1	Total number of heavy vehicles (projected for period)	45075	45804	90879
6.2	Estimated average number of axles per truck	5.6	5.8	5.7
6.3	Estimated truck mass (Ton/truck)	32.3	32.9	32.6
6.4	Estimated average E80/truck	1.9	1.9	1.9
6.5	Estimated daily E80 on the road			482
6.6	Estimated daily E80 in the North direction			238
6.7	Estimated daily E80 in the South direction			243
6.8	Estimated daily E80 in the worst North lane			238
6.9	Estimated daily E80 in the worst South lane			243
6.10	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
6.11	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
6.12	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.5 : 3.9 : 2.1)

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Figure 4: Traffic Highlights from SANRAL's Secondary Counting Station 1295 (2017) – R27

1295 **Nieuwoudtville**

	TRAFFIC HIGHLIGHTS OF SITE 1295			
1.1	Site Identifier			1295
1.2	Site Name			Nieuwoudtville
1.3	Site Description			Between Vanrhynsdorp & Nieuwoudtville
1.4	Road Description	Route : R027	Road : R027 Section : 07	Distance : 10.0km
1.5	GPS Position			18.819166E -31.556389S
1.6	Number of Lanes			2
1.7	Station Type			Secondary
1.8	Requested Period			2017/01/01 - 2017/12/31
1.9	Length of record requested (hours)			8760
1.10	Actual First & Last Dates			2017/02/10 - 2017/02/27
1.11	Actual available good data (hours)			421
1.12	Percentage good data available for requested period			4.8
		To Nieuwoudtville	To Vanryhnsdorp	Total
2.1a	Total number of vehicles (counted)	8002	8492	16494
2.1b	Total number of vehicles (projected for period)	166502	176698	343201
2.2	Average daily traffic (ADT)	456	484	940
2.3	Average daily truck traffic (ADTT)	117	127	244
2.4	Percentage of trucks	25.6	26.2	25.9
2.5	Truck split % (short:medium:long)	21 : 11 : 68	25 : 9 : 66	23 : 10 : 67
2.6	Percentage of night traffic (20:00 - 06:00)	17.1	15.0	16.0
3.1	Speed limit (km/hr)			100
3.2	Average speed (km/hr)	103.1	106.1	104.6
3.3	Average speed - light vehicles (km/hr)	110.8	113.7	112.3
3.4	Average speed - heavy vehicles (km/hr)	80.6	84.5	82.7
3.5	Average night speed (km/hr)	95.2	95.8	95.5
3.6	15th centile speed (km/hr)	79.7	81.5	81.6
3.7	85th centile speed (km/hr)	125.9	130.0	128.0
3.8	Percentage vehicles in excess of speed limit	57.2	60.2	58.7
4.1	Percentage vehicles in flows over 600 vehicles/hr	0.0	0.0	0.0
4.2	Highest volume on the road (vehicles/hr)		2017/02/24 17:00:00	117
4.3	Highest volume in the East (vehs/hr)		2017/02/24 17:00:00	57
4.4	Highest volume in the West (vehs/hr)		2017/02/24 15:00:00	66
4.5	Highest volume in a lane (vehicles/hr)		2017/02/24 15:00:00	66
4.6	15th highest volume on the road (vehicles/hr)		2017/02/24 09:00:00	82
4.7	15th highest volume in the East direction (vehs/hr)		2017/02/15 13:00:00	42
4.8	15th highest volume in the West direction (vehs/hr)		2017/02/17 10:00:00	49
4.9	30th highest volume on the road (vehicles/hr)		2017/02/17 18:00:00	75
4.10	30th highest volume in the East direction (vehs/hr)		2017/02/10 15:00:00	37
4.11	30th highest volume in the West direction (vehs/hr)		2017/02/16 18:00:00	43
5.1	Percentage of vehicles less than 2s behind vehicle ahead	1.8	2.6	2.2
6.1	Total number of heavy vehicles (projected for period)	42676	46214	88890
6.2	Estimated average number of axles per truck	5.7	5.6	5.7
6.3	Estimated truck mass (Ton/truck)	32.8	31.8	32.3
6.4	Estimated average E80/truck	1.9	1.8	1.9
6.5	Estimated daily E80 on the road			460
6.6	Estimated daily E80 in the East direction			227
6.7	Estimated daily E80 in the West direction			234
6.8	Estimated daily E80 in the worst East lane			227
6.9	Estimated daily E80 in the worst West lane			234
6.10	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
6.11	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
6.12	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.5 : 3.9 : 2.1)

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Figure 5: Traffic Highlights from RNIS's Traffic Counting Station 0488D (2017) – MR737 (R355)/MR736 (R358) intersection

Traffic Counts

Time	Light	Heavy	Taxis	Buses
00-01h00				
01-02h00				
02-03h00				
03-04h00				
04-05h00				
05-06h00				
06-07h00	0	0	0	0
07-08h00	1	0	0	0
08-09h00	1	0	0	0
09-10h00	3	1	0	0
10-11h00	0	0	0	0
11-12h00	3	2	0	0
12-13h00	0	0	0	0
13-14h00	1	0	0	0
14-15h00	0	0	0	0
15-16h00	1	0	0	0
16-17h00	1	0	0	0
17-18h00	0	0	0	0
Sub-Totals	11	3	0	0
18-19h00				
19-20h00				
20-21h00				
21-22h00				
22-23h00				
23-24h00				
Sub-Totals	0	0	0	0
Totals	11	3	0	0

Station AADT's

Light	Heavy	Taxis	Buses
16	4	0	0

Total 20

Station Data

Station No	0488D
Road No	MR00737
Km Distance	0.00
Count Date	25/07/2017
Hours Counted	12
Day Counted	Tuesday
Counted by	C
Expansion Factor	1.48
Night Factor	
Stratum	GA
Peak Hour Ratio	0.00
Total AADT	21

Sketch (Click on Leg to Display Data)

Print
Print
Intersection
Diagram
Growth Rate
Growth Rate Chart
Historical Data 1 of 9
< 2017/07/25 >
Exit
Station Data

Station Counts Chart
Light Heavy Taxis Buses Total
Stratum Pattern

It is clear from the above that the N7 near Vanrhynsdorp carries approximately 1 000 vehicles per day of which 250 (25%) are heavy vehicles.

The Annual Average Daily Traffic (AADT) of gravel road R355 (MR737) in the vicinity of the site is extremely low, approximately 20 vehicles per day (Source: RNIS) and the posted speed limit is 80km/h. Heavy vehicles present approximately 20% of the AADT. One would assume that the traffic on the R355 towards Loeriesfontein (closest town) would increase but with no more than 50 vehicles per day (vpd).

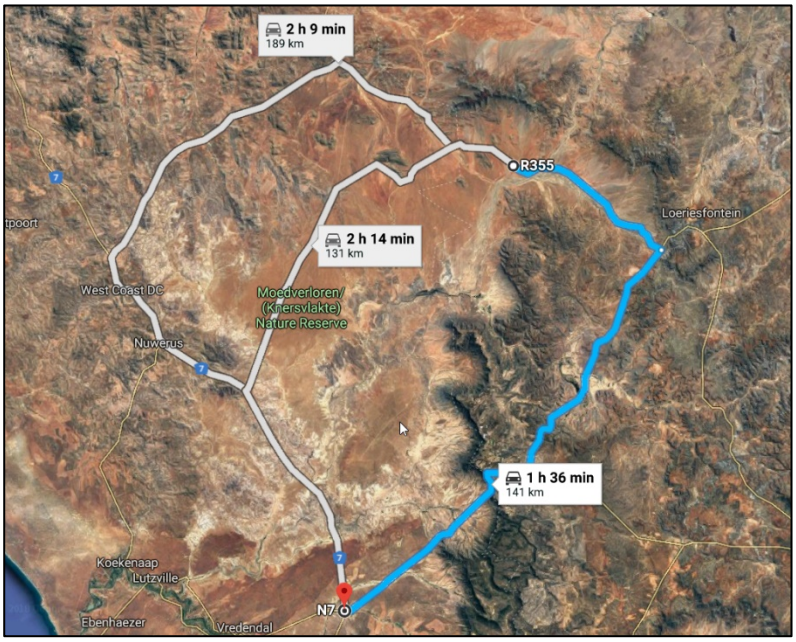
The traffic information for the counting station of the R27 near Vanrhynsdorp can be summarised as follows:

- The two-way ADT is 940 vpd.
- The ADTT is approximately 244 vpd.
- The heavy vehicles represent approximately 26% of the traffic, which is deemed fairly high.
- The highest two-way peak hour was approximately 117 vph (17:00-18:00).
- The highest peak hour volume (17:00-18:00) for vehicles travelling east (to Nieuwoudtville) is 57 vph.
- The highest peak hour volume (15:00-16:00) for vehicles travelling west is 66 vph.

- The 30th highest hour[1] is approximately 75 vph (two-way).

The posted speed limit for the R27 is 100km/h.

From a long-haul point of view, it is clear that trucks would rather travel east on the R355 and then onto the R357 and then onto the R27 to access the N7 via Vanrhynsdorp instead of travelling either of the gravel roads north of the site as shown below. However, a few trucks could use the gravel roads to the west to access the N7 going north.



4. PROPOSED GYPSUM MINE

4.1 PROJECT DESCRIPTION

This application relates to the surface mining of the industrial mineral, Gypsum. Gypsum is typically used in the agricultural and construction industries (plasterboard, Portland cement, plaster, etc.).

Of the overall mining right area (MRA), approximately 689 Ha will be earmarked for mining, whilst a further 9Ha will be affected by surface infrastructure.

The deposit will be harvested by means of simple roll-over trench mining and the depth of trenching will vary between 1.4 and 2.5m. The first step involves removing the overburden layer to a depth between 0.2 and0.7m, followed by the selective removal of the powder layer of approximately another 0.4m and subsequently by removal of the crystal-containing clay layer for a further depth between 0.9 and 1.3m. The powder will be screened to remove foreign materials and is expected to be recovered by a minimum margin of at least

[1] 30th highest hour it to reflect reasonable worst-case conditions. Used for design to account for seasonal variation.

40% by volume harvested, inclusive of waste generated during screening, which should be less than 2% combined from dust generated and foreign objects removed during screening. The clay layer will be roll-crushed and screened by means of high frequency technology alongside the trench to concentrate the average gypsum composition from between 40 and 50 percent to between 80 and 90 percent. The harvesting recovery margin is estimated at 65 percent by volume extracted whilst the efficiency of the high frequency screening process is expected to be no less than 37 percent, calculating to an overall 76% mean loss by volume of material harvested.

The overall theoretical recovery per hectare will thus be as follows:

- Powder layer @ +60% purity: 0.2m x 10 000m2 x 1ton/m3 x 40% = 800 t/ha
- Powder layer @ +80% purity: 0.2m x 10 000m2 x 1ton/m3 x 40% = 800 t/ha
- Crystal layer @ +80% purity: 1.1m x 10 000m2 x 1ton/m3 x 24% = 2 640 t/ha

The combined recovery per hectare therefore equals 800 ton of Agricultural material and 3 440 ton of Industrial material i.e. an overall saleable volume of 4 240 ton per mined hectare. Since the demand for higher purity gypsum in the more sophisticated agricultural industry is on a sharp incline, the volume between the two supply lines can be balanced on demand. Materials shall therefor be either sold from stockpile or blended to optimise quality as directed by the order book at any specific time.

The Kanakies Gypsum Mine (KGM) development will progress through various stages i.e.

I. Mine establishment and operational commissioning

II. Production build-up with concurrent rehabilitation

III. Production stabilisation with concurrent rehabilitation

IV. Production decline with concurrent rehabilitation

V. Decommissioning, final rehabilitation and mine closure

Stage I: Mine establishment and operational commissioning – 6 months

- During this phase, the very basic infrastructure will be constructed, and machinery required for mining and processing will be sourced either by means of outright purchase or through lease or rent-to-own agreements with OEM's. Contract mining may be considered as an option.
- During this phase, the Applicant's geologist will spend significant time to survey and mark out the designated blocks for optimal cost efficiency and quality.
- The laboratory will be established, and training will be provided.

- Mining will slowly commence, and operators and/or contractors will be trained.
- Production will be limited to 50% of the monthly stable target i.e. 0.5 x 5 000 ton per month i.e. 2 500 ton per month.

Stage II: Production build-up with concurrent rehabilitation – 6 months

- This phase will be characterised by increasing harvesting and processing rates by at least 600 ton per month over 6 months towards a stable output target of approximately 5 000 ton per month.
- The stockpiles of the two different grades will be accumulating to a stable target of minimum 6 000 ton each of Agricultural and Industrial grade.
- Sales are expected to show a rapid increase as the markets start absorbing the product, which is in extreme demand due to diminishing supply capacity in South Africa.

Stage III: Production stabilisation with concurrent rehabilitation – 20 years

- Stable production output is expected to be maintained for a period of 20 to 21 years at a forecast compounded growth in demand of 2% per annum.
- The resource is well defined, stable and predictable and continuous mine planning will ensure that quality is maintained as per the specifications outlined.
- The mine will reach a maximum annual output of approximately 73 000 ton at the end of year 21 of the stable production phase.

Stage IV: Production decline with concurrent rehabilitation – 8 years

- A slow decline in production output over a period of 8 years is planned as the availability of higher grade material within the resource slowly deteriorates.
- The rate of decline is projected to be exponential but indeed so from a low base of -2 000 ton per year in year 1 of this phase, -4 000 ton per year in year 2, -8 000 ton per year in year 3, -16 000 ton per year in year 4 and -20 000 ton per year in year 5.
- In year 6 of the downwind, production will be pegged at 17 000 per annum, followed by 12 000 ton per annum each in years 7 and 8.
- During this phase, the Mining Right Holder will start converting prospecting rights in the area to mining rights to enable supplemental streams into the established markets

- To this effect, the Mining Right Holder has already earmarked gypsum carrying land and is busy with negotiations with the land owners and an application for prospecting rights.

Stage V: Decommissioning, final rehabilitation and mine closure – 1 year

- No active mining will take place though sales from stockpiles will continue.
- The execution of the rehabilitation and closure plan will enjoy first priority and will be completed over a 12-month decommissioning period with inspections and audits continuing beyond this timeframe as directed by the updated closure plan at that stage.
- The personnel will be redeployed at a new gypsum facility as output at such facility demands and key personnel will remain on-site at Kanakies to wind down the operations, administration and facilitate the relocation to the new site (separate authorisation will be required).

The life of the mine will be approximately 30 years.

The expected split between road haulage and rail transportation will be approximately 60:40 i.e. 40% of output would potentially be moved by rail. Road haulage is the primary option for transporting the gypsum.

Figure 6 shows the general site plan layout. The proposed access location will be discussed in more detail in **Section 4.2**.

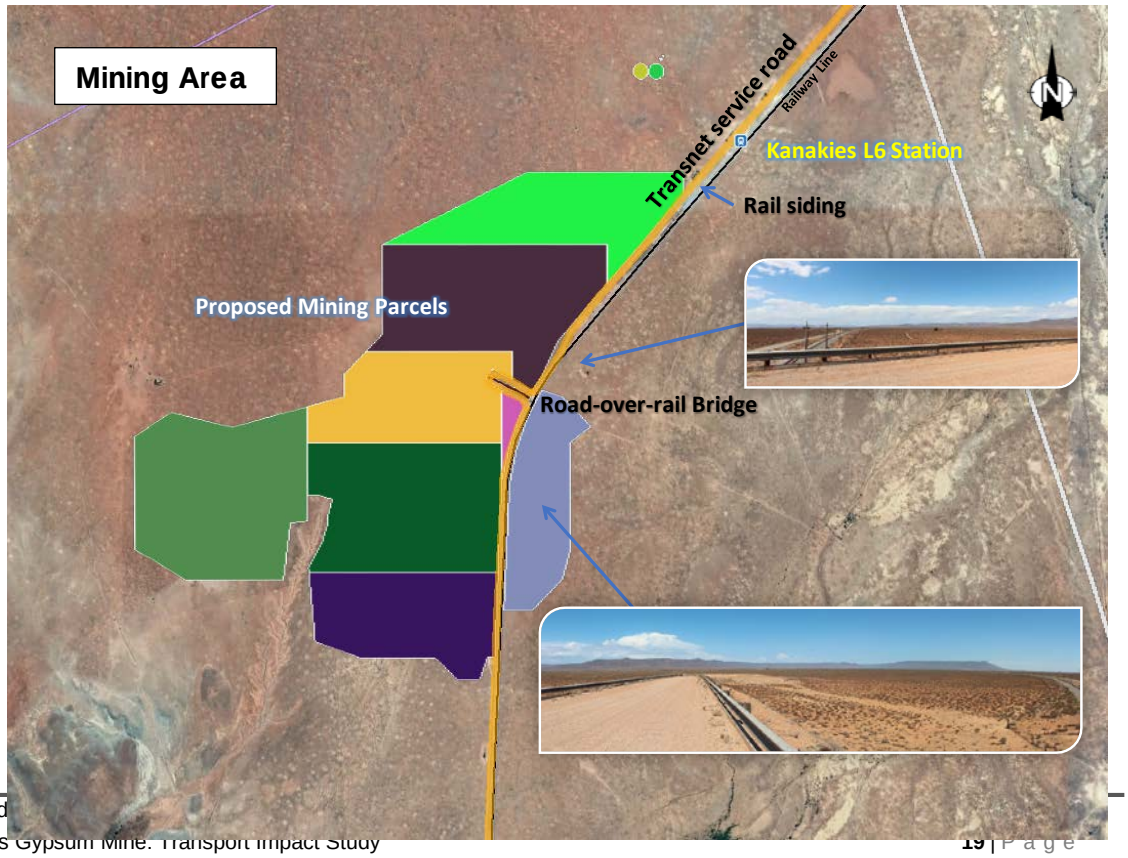
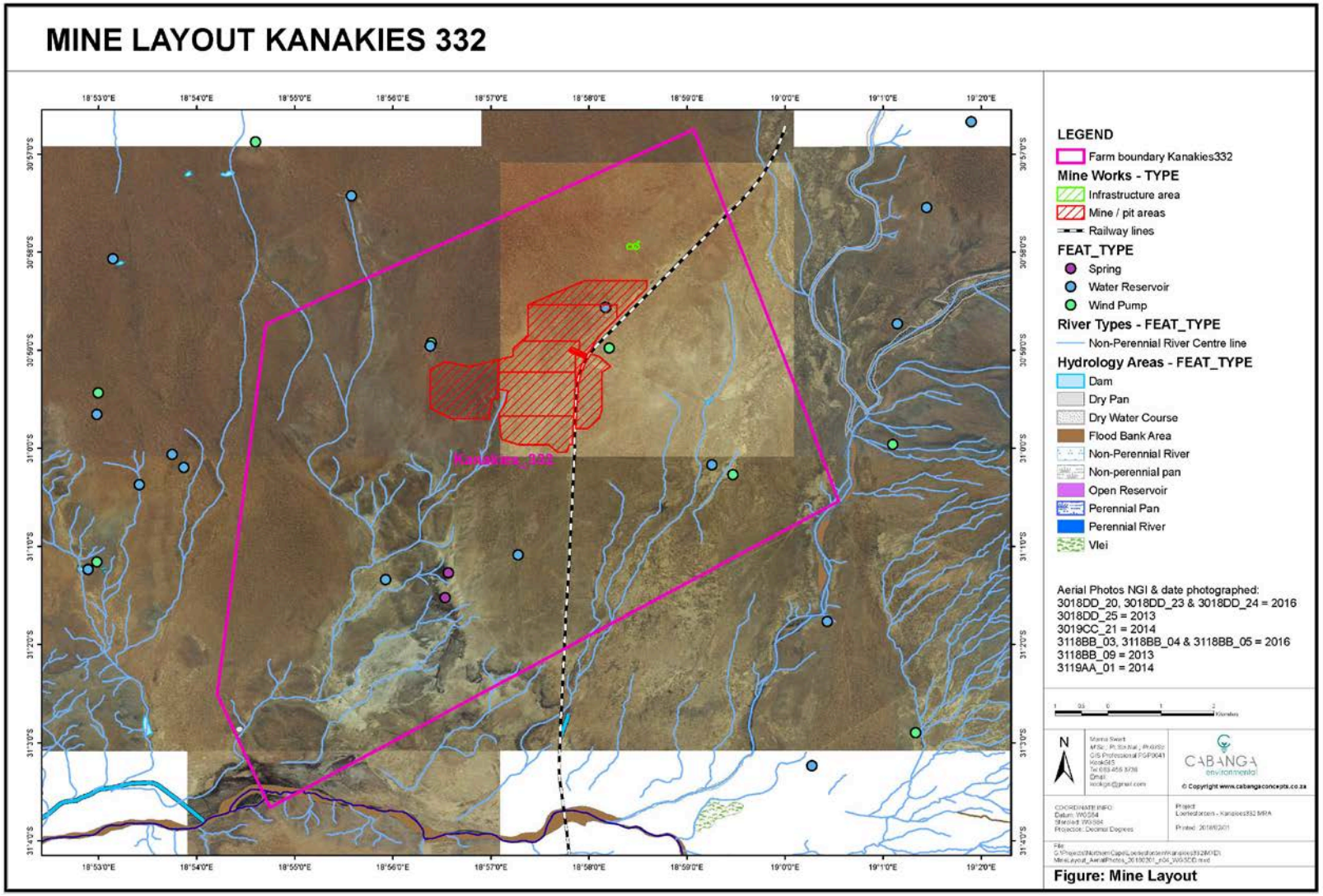
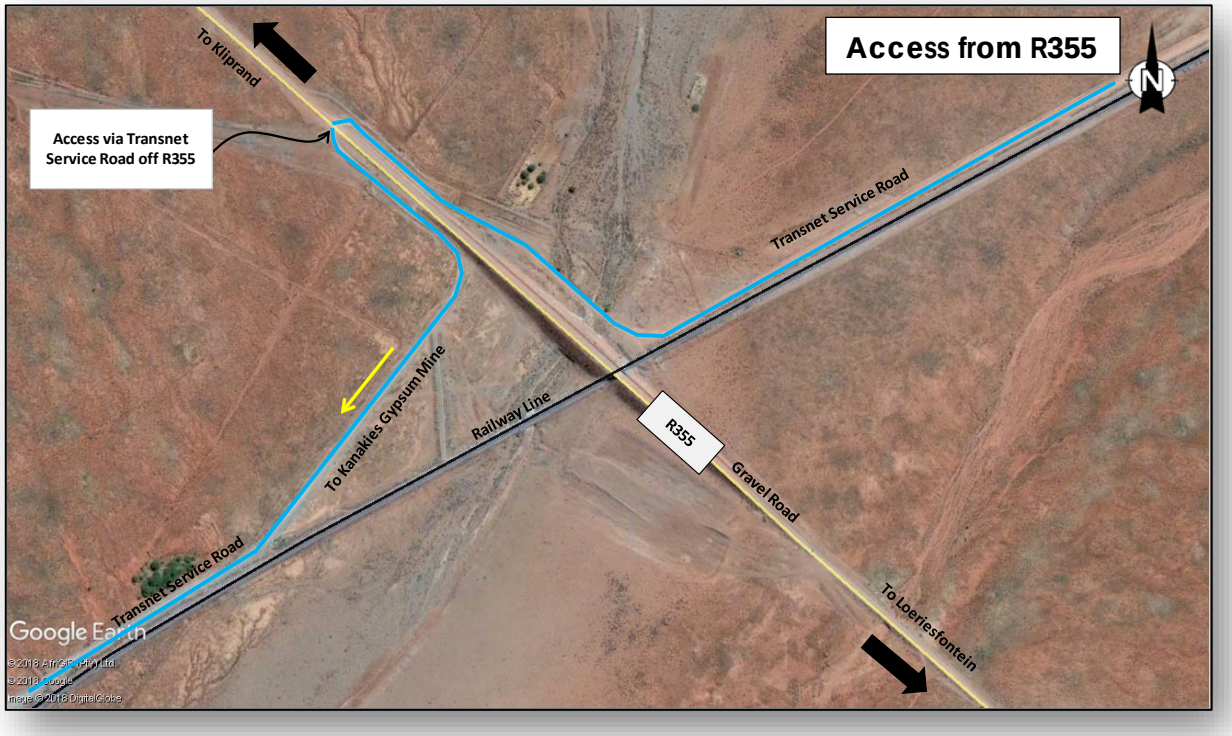


Figure 6: General Site Plan



4.3 ACCESS TO THE PROPOSED MINE

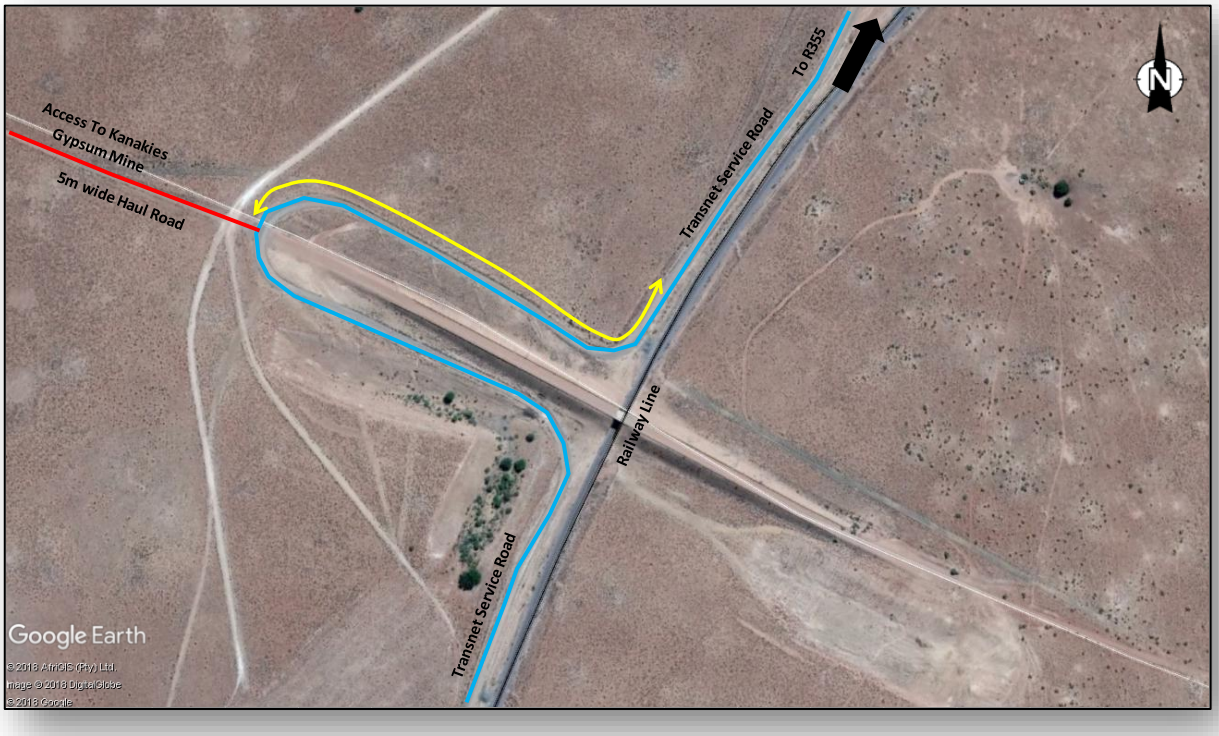
The site is serviced by a series of gravel farm roads, which provides access to the gypsum location as well as the Transnet rail siding situated on the site alongside the Sishen-Saldanha railway line (approximately 20km from the R355). There is only one option proposed for the access which is via the gravel road, Transnet service road, and the R355 (shown below). It is currently anticipated that this will be the only access to the Kanakies Mine and all construction and operational traffic (trucks and private/staff vehicles) will make use of the access via the Transnet servitude road off the R355.



It was proposed that the access to the mine's infrastructure area will be via the existing Transnet servitude road off the R355 (approximately 450m northwest of the railway line) onto the Transnet servitude road creating a two-way stop-controlled four-legged intersection.

A maximum of 10km of internal haul and access roads on site, with a width of 5m will be included over the life of the mine and will be created and rehabilitated concurrently as the need arises. A manned security boom and weighbridge are included in the infrastructure area. The proposed access location is shown in **Figure 7**.

Figure 7: Proposed Site Access from Transnet Service Road



5. TRAFFIC IMPACT OF THE PROPOSED MINE

The impact of the proposed development on the adjacent road network focuses on determining the vehicular trips generated per phase of the development and investigating traffic engineering issues and concerns such as road safety, public transportation and non-motorised transport within the study area.

The traffic impact will be in accordance with the phased development of the mine. Currently the planning is for a 5-stage development:

- Stage 1: Mine establishment and operational commissioning (Construction) – 6 months
- Stage 2: Production build-up with concurrent rehabilitation (Operational) – 6 months
- Stage 3: Production stabilization with concurrent rehabilitation (Operational) – 20 years
- Stage 4: Production decline with concurrent rehabilitation (Operational) – 8 years
- Stage 5: Decommissioning, final rehabilitation and mine closure – 1 year

Stage 1 will include the initial construction (±6 months) of all the facilities required while Stage 2 to Stage 4 will start once the mine starts operating and the operational phases will be 28 years and 6 months ending in Year 30. Each stage will generate its own traffic.

Generally speaking, traffic can be split between the following types:

- Staff/Commuter Trips:
  - Private vehicles
  - Public transport vehicles (buses and minibus taxis)
- Freight trips:
  - Small delivery vehicles (<3 ton)
  - Heavy vehicles (>3 ton)
  - Abnormal loads
  - Freight via rail

The number of construction vehicles has been reported under the Mine Work Programme (MWP). There will be occasional arrival of a 34-ton truck to deliver infrastructure. A maximum of 15 loads is expected to arrive over the 6-month period i.e. 2 to 3 loads per month. Other routine movement of smaller vehicles will be restricted to the infrastructure area and the initial earmarked mining area.

5.1 TRIP GENERATION

Trip Generation Rates do not exist for mining operations and associated activities based on the Department of Transport's (DoT) *South African Trip Generation Rates, 2nd Edition, 1995*. Therefore, the trip generation was

calculated based on employee figures received from Cabanga Concepts cc within the MWP and based on the typical traffic generation assumptions relating to similar mining operations. The trips generated as a result of employment activity are referred to as commuter trips, which are categorized as private vehicle trips and public transport trips. The transportation of commodities and products will generate freight movement on the transport network (road and rail).

Trip generation will differ during construction as well as during the operation of the mine. It is estimated that far more people will be employed during the construction of the mine, with many trips for delivering machinery, building materials and equipment to the site, expected. During the operational stage (Stage 2 to 4) the mine will generate less external trips as most employees will arrive by car or public transport at the mine depending on where they stay.

It is assumed that the mine will provide transportation through the provision of buses/taxis to ferry workers for the different shifts.

It has been estimated that the workforce will include **14 permanent employees** at full production of the mine. The mine will operate for a 10-hour per day period from 7am to 5pm daily, 5 days per week, 11 months per year with the full complement of staff on-site daily. No shifts will be implemented in the first 3 years of operation. It has been reported by the client that it is unlikely that the mine will need to revert to a shift-based system as production output can be easily enlarged by increasing the rate of harvesting during the daytime.

Most of the workforce will be recruited from the local community, in the nearby towns of Nieuwoudtville and Loeriesfontein.

There will be no rail trips during the construction stage.

5.1.1 Construction Workforce Traffic

It is assumed that as a worst case the workforce required during the construction stage will be double the workfoce required during the operational stage. Therefore, the construction workforce will be approximately 28 employees during the peak stage of the proposed construction.

It is assumed that approximately 20% (managerial, skilled and semi-skilled) of the construction workers, which equates to **6 workers,** are expected to use private vehicles to travel to and from work. Assuming a vehicle occupancy rate of 1.5 persons per vehicle, these categories of workers are expected to generate **4** private vehicles entering the facility during the AM peak hour and similarly **4** exiting the facility during the PM peak hour. This will generate an additional **8 trips per day (4 in, 4 out)**. The remaining 80% of the workforce is expected to travel to the site by existing bus and minibus taxi services or by construction company buses. The maximum traffic generation scenario assumes that all of these construction workers (**22 workers**) use taxis to travel to and from work. Therefore, using an occupancy rate of 15 persons per

minibus taxi, the 22 workers are expected to generate **4** additional minibus taxi trips during the AM and PM peak hours (2 vehicles arriving and 2 vehicles leaving). Therefore, during this stage approximately **6 vehicles (4 private + 2 public transport)** will move to/from the construction site during the AM and PM peak hours (12 vehicles per day).

The distribution of this construction traffic is expected to be approximately similar to the existing distribution of traffic using the surrounding road network.

Currently, the R355 in the vicinity of the site has an ADT of approximately no more than 100 vehicles therefore the additional construction workforce traffic is approximately 12% of the current daily traffic along the R355.

Given the estimated low volume of construction traffic daily and during the peak periods, it is not expected that this additional traffic will have a detrimental impact on the surrounding road network.

5.1.2 Construction Vehicles

The construction activities at the proposed mine will generate additional heavy vehicle traffic on the surrounding road network as a result of the construction vehicles travelling to and from the mine transporting equipment and construction materials. It is envisaged that the delivery vehicles will be deployed from their origins in the morning. The expected arrival times of these vehicles will fall outside of the traditional AM peak hour. Similarly, these vehicles will leave for their origins before the PM peak hour in order to be back in time. Therefore, the impact of the heavy construction vehicles on the external road network is expected to be negligible during the peak hours. In addition, heavy vehicles will be used to transport raw materials and equipment within the construction site, in which case, these construction vehicles will remain on site overnight for lengthy periods of time and will also have no impact on the surrounding road network.

During the construction phase there will be no routine movement of construction vehicles in and out of the mining or infrastructure areas using the access roads. Information supplied by Cabanga Concepts cc indicate that there will be a once-off arrival of the equipment listed in the MWP and that will be scheduled over an extended period of 6 to 12 months as capex is made available for procurement. Apart from that, there will be occasional arrival of a 34-ton truck to deliver infrastructure. A maximum of 15 loads is expected to arrive over a 6-month period i.e. 2 – 3 loads per month. Other routine movement of smaller construction vehicles will be restricted to within the infrastructure and initial earmarked mining areas. This additional construction traffic will not be significant in comparison to the current daily traffic on the R355 and the other surrounding roads as part of the road network.

5.1.3 Permanent Workforce (Operational Stage)

Additional permanent (steady state jobs) staff will be employed to operate the new activities at the proposed Kanakies gypsum mine during the

operational stage. This stage will see **14 employees** at full production, hence half the number of trips as the construction stage as described above.

The summary of the workforce at Kanakies gypsum mine reported from *'Social and Labour Plan, Witkop Flourspar Mining Company (Pty) Ltd: Kanakies Gypsum Mine Prospecting Right Number NC 30/5/1/1/2/12013 PR, January 2019 to December 2023'* that 85% of the workforce is managerial, skilled and semi-skilled employees and the remaining 15% is constituted by unskilled employees.

As with most industries in SA, it is safe to assume that most management, skilled and semi-skilled labour will travel to work in private cars while the rest and unskilled employees will use public transport or be transported by mine transport. A minibus taxi service will be deployed, preferable run by a local Previously Disadvantaged South African (PDSA) owned company as part of the local economic development initiatives driven by the mine. A 20-seater bus will therefore enter and exit the site offices once or twice daily, 5 days per week.

Based on vehicle occupancy rates of 1.5 for private vehicles and 20 for buses, the additional workforce that will be employed at the plant will generate 2 private vehicles and 1 bus to sustain the new operations per day. Therefore, a total of **3 trips** per day will be generated (approximately 1 veh/hr two-way).

As mentioned above in **Section 5.1**, no shifts will be implemented in the first 3 years of operation and it is unlikely that the mine will revert to a shift-based system as production output can be easily enlarged by increasing the rate of harvesting during the daytime.

The maximum current average daily traffic (ADT) on the R355 in the vicinity of the site is approximately 100 vehicles, therefore the additional vehicles a day is approximately 3% of the current ADT on the R355.

5.1.4 Heavy Delivery Vehicles

During the operational stage, the road infrastructure of the mine will be utilised to transport 34 ton loads to end-users or to the rail siding for loading onto train trucks.

In the first 3 years of operation, transport will most likely be limited to road haulage as the negotiations with Transnet is expected to take 2 to 3 years. Given the expected production output of approximately 50kt/annum as outlined in the Mining Work Programme (MWP) over an 11-month cycle, the expected number of trips will be 134 truckloads of 34 ton loads each per month or approximately 6 to 7 trips per day one-way over a 5-day week (134/20 days). Assuming that the transport operations occur in 10 hours a day, this then calculates to a maximum of 1 truck one-way per hour (2 veh/hr two-way).

Whilst the totals appearing to be high per month, from a traffic perspective, 2 veh/hr two-way is considered to be very low.

By virtue of this low additional volume of daily traffic required for delivery of the gypsum, the impact of these delivery vehicles will be negilble on the surrounding road network.

The operations stage will therefore generate a total of 3 veh/hr light and heavy vehicles (1 + 2) during the AM and PM peak hours, a total of 17 vehicles per day (3 + 14). This volume of traffic is considered to be relatively low in traffic analysis terms.

5.1.5 Rail Transport

It is expected that from Year 4 of full operation, the split between road haulage and rail transport will be approximately 60:40 i.e. 40% of output would potentially be moved by train. That implies that the road-based truck trips will be reduced from 7 to approximately 4 trips per day over a 5-day week, with the remainder to be loaded and moved by rail.

A single train car can carry up to 60 tons of gypsum material, it is envisaged that the annual output to be transported by train i.e. approximately 20 000 ton/annum, shall be loaded in 30 cars of 60 tons each per month for 11 months.

With the combined inclusion of rail transport, the impact on the surrounding road network could be even less.

5.2 ANALYSIS REQUIREMENTS FOR THE ADDITIONAL MINE GENERATED TRAFFIC VOLUMES

In accordance with the Department of Transport's Manual on Traffic Impact Studies (RR93/365), developments that generate over 150 vehicle trips per hour, in peak hours, require a full Traffic Impact Assessment (TIA), while those generating less than 150 vehicle trips per hour only require a Traffic Impact Statement (TIS). The difference between these two assessments is that a TIA must contain recent traffic counts and analysis of both existing and future traffic flows, whereas in a TIS, little or no analysis is required, instead the traffic Engineer's professional opinion is given more emphasis based on his or her observations and experience.

For both the construction and operational stages, the new proposed activities at the Kanakies Gypsum Mine will generate significantly less than 150 veh/hr in the peak hours, therefore a detailed analysis of these traffic volumes on the surrounding road network is not required for this study. The Traffic Engineer will instead provide his or her professional opinion based on a qualitative assessment of his or her experience and calculations.

Traffic data from SANRAL counting stations and the Western Cape Government's (WCG) Road Network Information System (RNIS) was utilised in order to obtain a baseline of the existing traffic conditions on the surrounding road network, which was used to base the impact assessment on.

5.3 TRIP DISTRIBUTION

Assuming that most employees will stay close to the nearby towns of Nieuwoudtville and Loeriesfontein the morning and afternoon trips will be via the R355/R357 (Loeriesfontein) and R357 (Nieuwoudtville) to/from the mine with peaks during the morning and afternoon.

Other trip purposes (deliveries, heavy vehicle loads and abnormal loads) will occur throughout the day and will mostly come from Loeriesfontein (in the east) on the R355/R357 or Nieuwoudtville (in the south) on the R357.

5.4 PEAK HOUR TRAFFIC GENERATION

The highest AM and PM peak hour traffic distribution are expected during the construction stage of the mine with far less trips expected during the operational stage.

6. ROAD IMPROVEMENTS REQUIRED

6.1 TRAFFIC IMPLICATIONS OF THE PROPOSED DEVELOPMENT

During the construction stage of the development many heavy and abnormal vehicles may bring machinery and equipment to the site. It is envisaged that these vehicles will travel along the R355 and the Transnet Servitude road and possibly the R27 and R357. This will add additional heavy vehicles that could have an impact on the existing pavement structure of these roads, especially with the gravel roads.

After construction, the number of heavy vehicles accessing the site will decrease significantly. During the operational stage trucks will then transport the product (powder and crystalline gypsum) from the site via the existing road and rail network to Western Cape, Limpopo, Gauteng and North West markets. It is expected that the split between road haulage and rail transport will be approximately 60:40. Rail-based transport will be discussed in **Section 6.7**.

Even though the predicted impact is expected to be negligible, the additional traffic generated by the mine activity at Kanakies needs to be monitored. It is recommended to monitor the traffic conditions on the roads which are used by the mine-generated-traffic by means of sample traffic counts which then in turn needs to be assessed by a traffic engineer on a 3-year cycle. Should congestion levels at key locations start deteriorating as a result of the natural growth in the background traffic volumes, then further appropriate mitigation measures should be identified and implemented.

6.2 IMPACT OF ROAD SAFETY CONDITIONS

The increase in traffic generated by the proposed Kanakies project activities is not expected to have a major impact on the prevailing road safety conditions on the surrounding road network. There will however be an increase in heavy vehicle traffic volumes on the surrounding road network (including the Transnet Servitude road) and heavy vehicles can be identified as one of the major causes of accidents and incidents including fatalities on the road network. Whilst the responsibility for road safety on public roads is not that of private mining companies, the Kanakies development can implement measures to reduce the frustration experienced by the motoring public on these roads. It is therefore recommended that drivers of all heavy vehicles be required to attend a specialized road safety and driving course that sensitises them to the impact that they have on driving conditions for other vehicles on these roads.

6.3 ROAD AND INTERSECTION UPGRADES FOR ACCESS ROADS

Based on the expected number of employee trips generated by the proposed development as mentioned above in Section 5.1, it is our opinion that the existing road network has sufficient capacity to accommodate the additional trips during construction and operational stages. A two-lane road such as the R355 and R357 in the vicinity of the site can accommodate approximately 32 000 vehicles per day (1 600 vph/lane x 10), depending on the type of vehicles. Once construction is completed, the day-to-day operation of the proposed mine will generate relatively low traffic volumes which can easily be accommodated by the current road surface. The current daily traffic on the R355 is expected to be not more than 100 vehicles which is approximately 10 vph (approximately 10% of capacity of the road). During the AM and PM peak hours, the proposed Kanakies mine will add an additional 6 vph during the construction stage and 3 vph during the operational stage which is still far less than the current capacity of the two-lane road (3 200 vph).

The operational stage of this project is not expected to generate significant traffic volumes (±3 vph). The number of staff on site is not expected to be more than 14 people and therefore no additional upgrades are required to accommodate the operational site traffic.

The mine will have to undertake regular maintenance of the service road and the R355 and will contribute towards the costs of the maintenance in agreement with Transnet and the Northern Cape Provincial Department of Transport. This will include the re-cutting and cleaning of side-drains and pipes and grading and shaping as well as dust suppression (where required).

6.4 IMPACT ON THE CONDITION OF THE ROAD NETWORK

The increase in traffic generated by the proposed Kanakies development activities will increase the percentage of heavy vehicles using this road network. Some sections of the road network have a high percentage of heavy vehicles and others have a very low percentage. The paved R357 is in a good condition but the R355 gravel road is in a poor condition.

The increase in heavy vehicles will accelerate the deterioration of these roads. With the exception of the Transnet Servitude road and the mine access road all other roads that the mine-generated-traffic is likely to use is under the jurisdiction of the Northern Cape and the Western Cape Department of Road and Public Works. The Hantam Municipality is responsible for the normal maintenance, re-gravel and reseal of roads. One of the major challenges experienced by the municipality is the ongoing maintenance of potholes due to insufficient funds. The District Municipality in combination with Public Works is responsible for maintenance, repairing, protecting and management of the proclaimed provincial roads in the area and not the mining companies. The Transnet Servitude road is under Transnet's jurisdiction and therefore Transnet takes responsibility for any maintenance requirements on this road. It is recommended that a standard operating procedure (SOP) be developed by the Kanakies management, which is responsible for all operations. This SOP will require all mine drivers to identify and report potholes and edge breaks on these national and provincial roads to the operations manager whom in turn

will then report it to Transnet and the relevant Department of Public Works, Roads and Transport. In this way, the proposed Kanakies project will have completed its obligations in bringing to the attention, the deterioration of the road to the relevant departments.

6.5 ABNORMAL LOADS

For the proposed quarry development, it may be necessary for large equipment/machinery, materials to be delivered to the site during the construction stage. It is also expected that many abnormal load vehicles will be travelling from major centers via the National roads, Provincial and District roads to access the site. Depending on the type, weight and length of the load an abnormal load permit may be required accompanied by a transport management plan indicating the route and possible limitations on travel.

6.6 CONDITION OF ROAD SURFACES

Generally, the provincial roads are in a fair condition. Resealing, re-gravelling and pothole repairs take place on an ongoing basis dependant on the funding available, and with a few exceptions regional mobility is not seriously impaired. Road freight transport, specifically mining activity transport, significantly contributes to the deterioration of provincial road surfaces and maintenance of these roads is not adequate.

Local roads in the urban areas are maintained by the municipality. The gravel roads are in a bad state of repair, especially during the winter rainy season. Heavy trucks transporting mining activities in the area are causing damage to the municipal, national and provincial roads. SANRAL maintains the national roads.

Ongoing visual assessments are suggested to be carried out to evaluate the road conditions for each route. Any overhaul of the road surface as a result of the proposed development must be repaired by the mine. The amount and frequency of heavy vehicles will have to be calculated to determine the type of pavement required as well as the frequency of maintenance procedures required over the time span of the construction stage of the project. This method classifies the condition of the current status of the affected roads and the required preventive measures to be implemented to prevent roads from being rebuilt before the project is completed.

6.7 RAIL INFRASTRUCTURE

The property is bisected by the Transnet Freight railway line which links Sishen Iron Ore to the Port of Saldanha.

As well as the series of gravel farm roads, which provides access to the Kanakies Gypsum mine, also provides access at the Transnet rail siding situated on the farm alongside the Sishen-Saldanha railway line.

The rail siding is not in use and is earmarked to serve as a loading base for gypsum on a permanent basis.

As mentioned previously, approximately 40% of output of the product will be transported via rail, the remainder of the gypsum product from Kanakies will be road-based.

There are no level crossings over the railway line in the vicinity of the proposed mine. The farm will be mined on both sides of the railway line and trucks will use the road-over-rail bridge to access the rail siding and Transnet service road.

6.8 LIAISON WITH ROAD AUTHORITIES

The following authorities will need to be consulted with regards to the transport impact:

- Transnet
- Northern Cape Department of Road and Public Works
- Western Cape Government Department of Transport and Public Works
- Hantam Local Municipality
- Namakwa District Municipality
- Local Communities
- Other Interested and Affected Parties (IAPs)

7. PUBLIC TRANSPORT ASSESSMENT

7.1 BACKGROUND

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

7.2 ROAD-BASED PUBLIC TRANSPORT

Public transport in the area is road-based and centers on bus and minibus taxi transport, focusing mainly on the urban centers. Rail services are exclusively dedicated to freight.

It is envisaged that all staff will live in the nearby towns of Nieuwoudtville and Loeriesfontein travelling between these towns and the mine. A minibus-taxi/bus service will be deployed, probably run by a local Previously Disadvantaged South African (PDSA) owned company as part of the local economic development initiatives driven by Kanakies.

7.3 NON-MOTORISED TRANSPORT ASSESSMENT

The only Non-Motorised Transport (NMT) that would be related to the proposed mine would be workers walking/cycling on site or between the site and the rail siding as well as those being dropped off by minibus taxis or a bus. Should any temporary housing be allowed on the site, these workers will also walk/cycle to the site and back.

7.4 COMMUTER RAIL

There are no commuter rail services in the vicinity of the site.

The existing Sishen-Saldanha railway line running through Kanakies does not carry daily commuters and would therefore not be able assist in getting workers to/from other towns once mining has started.

8. CONCLUSIONS AND RECOMMENDATIONS

Sturgeon Consulting prepared this transport impact study for the proposed Kanakies Gypsum Mine near Loeriesfontein and Nieuwoudtville in the Northern Cape. This report summarises the existing transportation conditions within the site vicinity and provides an assessment of the transportation impacts of the proposed development on the surrounding transport system.

From the traffic impact investigation and discussions in the report the following conclusions can be made: the proposed Kanakies mine and the expected increase in traffic due to the development can be accommodated on the road network.

Based on above analysis the following is recommended:

- The current demand on the existing road network in the vicinity of the site is very low and the road network and intersections operate at acceptable levels of service.
- The majority of the construction vehicles and abnormal loads (if any) will come from Loeriesfontein in the east on the R355/R357 and/or Nieuwoudtville on the R27 & R357 and/or Vanryhnsdorp on the R27 in the south.
- During the construction stage and as part of the contract, the contractor is required to monitor the condition of the roads used and repair the road where it becomes damaged due to construction traffic.
- It is expected that the construction stage of the proposed development will generate the most vehicular trips as opposed to the operational stage. The biggest impact will be during the construction stage which will be approximately 6 vehicles during the peak hours.
- Access to the site is off the gravel R355 road via the existing Transnet Servitude road approximately 45km from Loeriesfontein.
- During construction, the road surface of the gravel R355 and the Transnet Servitude roads may require maintenance at regular intervals. However, once construction is completed, the day to day operation of the proposed mine will generate very low traffic volumes which can be easily accommodated by the existing gravel roads and must be kept in the same condition it was before construction started.
- The operational stage of this project is not expected to generate significant traffic volumes. The number of permanent staff on site is not expected to be more than 14 people. Therefore, no additional upgrades are required to the R355 road nor the Transnet Servitude road, to accommodate the operational site staff.
- 10km of haulage roads to be constructed on site
- 60%/40% road/rail split

- Haulage between mine and rail siding – road maintenance agreement
- During the operational stage, the mine will generate approximately 3 34-ton truck trips during the peak hours. The current daily traffic along the R355 is not expected to be more than 100 vehicles (± 10 vph, two-way).
- Regular Road Maintenance agreement between Transnet and the Northern Cape Provincial Department of Transport for the service road and the R355. This will include the re-cutting and cleaning of side-drains and pipes and grading and shaping as well as dust suppression (where required).
- It is also recommended that the developer/client negotiate a chartered contract with existing minibus taxi or bus operators to transport the majority of the workers during the different stages of the development.

No other remedial or mitigation measures will be required to accommodate the additional traffic generated by the proposed gypsum mine facility.

Provided that the above recommendations are adhered to, the proposed development of the Kanakies gypsum mine facility can be supported from a traffic engineering perspective.

9. REFERENCES

1. Department of Transport, Guidelines for Traffic Impact Studies, Report No. PR 93/645, Pretoria, 1995.
2. Department of Transport, South African Trip Generation Rates, Report No. RR 92/228, Pretoria, 1995.
3. Department of Transport, Geometric Design of Rural Roads, TRH 17, Pretoria, 1988.
4. Committee of Transport Officials, South African Trip Data Manual, TMH 17, September 2013.
5. Committee of Transport Officials, South African Traffic Impact and Site Traffic Assessment Manual, TMH 16 Volume 1, August 2012.
6. Committee of Transport Officials, South African Traffic Impact and Site Traffic Assessment Manual Standards and Requirements Manual, TMH 16 Volume 2, August 2012.
7. Hantam Local Municipality, Integrated Development Plan (IDP) 2015 - 2020, Final, May 2015.
8. Hantam Local Municipality, Local Economic Development Strategy 2011 (Urban-Econ), Draft Final. 2011.
9. Namakwa District Municipality, Draft Integrated Development Plan 2015 - 2016.
10. Department of Mineral Resources, Mining Work Programme Submitted in Support of a Mining Right Application, 9th March 2018.
11. Department of Mineral Resources, Kanakies Mine: Scoping Report. March 2018
12. Social and Labour Plan (SLP), Kanakies Gypsum Mine Prospecting Right Number NC 30/5/1/1/2/1203 PR, January 2019 to December 2023. March 2017

ANNEXURE A: CVS

GENERAL INFORMATION:

Name	:	**BAREND DU PREEZ**
Date of Birth	:	8 May 1962
Marital Status	:	Married
Home Language	:	Afrikaans
Profession/Specialisation	:	Professional Civil Engineer (950110) Transport Planning and Traffic Engineering
Years Self Employed	:	9 years
Nationality	:	South African
Experience (years)	:	30+

KEY EXPERTISE:

As a Professional Civil Engineer (Prof. Reg. No. 950110), Barend du Preez has extensive experience in **transportation planning and traffic engineering**. He started his own Transport and Traffic Engineering Consultancy, called **Sturgeon Consulting** in October 2008. He has also been an office manager for more than 4 years in Cape Town while working for Arup. Over the last 30 years he has been involved in a wide range of projects in South Africa and worked on a Transport Master Plan in Mauritius, Stellenbosch Transport Model and Public Transport Operations Plan, as well as the Stellenbosch NMT Master Plan. He is currently working on the Update of the West Coast ITP as well as the Stellenbosch CITP. He has also recently done Transport Studies for several mining projects which included Farm Schurvekop Underground Coal Mine (Bethal), Central Pit opencast coal mine as part of the Ntendeka Colliery (Newcastle Phase 1), Kanakies Gypsum Mine (Loeriesfontein) and he is currently working on the Chelmsford Colliery near Newcastle. He has experience in the following wide range of transportation-related fields:

Transportation Planning:

- Transportation Policies and Institutional Issues
- Transportation Modelling (EMME/2 and Saturn)
- Non-Motorised Transport (NMT) Planning
- Integrated Transport Plans (ITPs) at all levels of government
- Integrated Development Plans (IDP's) transportation inputs
- Land Development Objectives (LDO's) transportation inputs
- Transportation Project Prioritisation (Planning and Implementation)
- Economic Evaluation of New Road Projects (CB-Roads and HDM3)
- Provincial Land Transport Framework (PLTF)
- Transport Corridor Feasibility Planning
- Road network classification

Public Transport:

- Public Transport Planning
- Public Transport Surveys (Operational as well as facilities management)
- Public Transport Data Collection and Surveys including Household Surveys
- Feasibility Studies for the Development of Public Transport Facilities
- Public Transport Facilities Management and Maintenance
- Supply and demand analysis for Public Transport Operations
- Public Transport Facilities Design

Traffic Engineering

- Transport Impact Assessments and Statements
- Land Use Application Evaluation – Traffic Impact
- Arterial Access Management Plans
- Travel Time Surveys
- Signal settings and signal design
- Various Transport and Traffic Surveys

EMPLOYMENT RECORD

Oct 2008 to date	Self Employed – Sturgeon Consulting (Pty) Ltd
Jun 2007 - Sept 2008	Africon, Associate
Oct 2002 - May 2007	Arup (Office Manager Cape Town), Associate
Aug 1999 - Sept 2002	UWP Engineers, Associate
Aug 1997 - July 1999	GIBB Africa (African Consulting Engineers merger), Associate
April 1997 - July 1997	African Consulting Engineers, Director
April 1996 - Mar 1997	African Consulting Engineers, Associate
Jan 1995 - Mar 1996	African Consulting Engineers, Senior Transportation Engineer
April 1994 - Dec 1994	Stewart Scott, Transportation Engineer
Dec1993 - Mar 1994	Eastern Gauteng Services Council (EGSC), Transport Planning Analyst
Jan 1989 - Nov 1993	Scott and De Waal/Stewart Scott, Junior Transportation Engineer
Jan 1988 - Dec 1988	Johannesburg Consolidated Investments, Engineer in training
Jan 1986 - Dec 1987	South African Air Force, Quartermaster General

KEY QUALIFICATIONS/EDUCATION

1980	:	Standard 10 (Grade 12), Westonaria, South Africa
1985	:	BEng (Civil), University of Pretoria, South Africa
1990	:	BEng (Hons) (Transport), University of Pretoria, South Africa

PROFESSIONAL AFFILIATIONS

Professional Engineer, Engineering Council of South Africa (ECSA) – 950110 – 16 March 1995

LANGUAGES

Language	Reading	Writing	Speaking
Afrikaans	Excellent	Excellent	Excellent
English	Excellent	Good	Good

PUBLICATIONS

- Du Preez B and Gaigher R. - How Can Traffic Engineering Save Fuel? - Annual Transportation Convention, Pretoria, June 1992.
- Du Preez B. and Ho D. - GJMC Audit of Transport Related Studies: An insight into the Document Management System - Transport Conference, Pretoria, July 2000.

EXPERIENCE RECORD – Since 2000

- *Various Traffic Impact Studies to date under Sturgeon Consulting – ±60 projects* (Cape Town): 10.2008 to date
- *Chelmsford Colliery Traffic Impact Assessment* (Cabanga Environmental): 05.2018 to date
- *Stellenbosch Comprehensive Integrated Transport Plan Update* (Kantey and Templer): 03.2018 to date
- *Paarl East IRDP Housing (650 units) Traffic Impact Assessment* (Aurecon): 03.2018 to date
- *West Coast ITP Update 2018* (WCG): 02.2018 to date
- *Blueberry Hill Housing Development* (Nadeson Consulting): 02.2018 to date
- *Kanakies Gypsum Mine Traffic Impact Assessment* (Cabanga Environmental): 01.2018 to date
- *Berg River-Voëlvlei Augmentation Scheme (BRVAS) alternative access road investigation* (Nemai Consulting): 02.2018 to date
- *Mahama Infill Housing Project* (ACE Consulting): 03.2018 to date
- *Voortrekker St Upgrade, Citrusdal – Transport Input* (Nadeson Consulting): 10.2017 to 02.2018
- *Central Pit opencast coal mine as part of the Ntendeka Colliery (New Castle Phase 1) Transport Assessment* (Ikwezi Mining): 08.2017 – 04.2017
- *Farm Schurvekop Underground Coal Mine – Transport Study (Cabanga Environmental)*:02.2017 to 05.2017
- *Kruskal Avenue - Master Planning, Feasibility Study on Informal Trading & Hard and Soft Landscaping: Kruskal Avenue, Bellville – TIA* (City of Cape Town): 07.2016 to 07.2017
- *Tygerberg Campus Development – Transport Input* (Stellenbosch University): 06.2016 to date
- *Cape Town Film Studio – Development Framework TIA and Service Station TIA* (Cape Town Film Studios): 12.2015 to 07.2016
- *Learner Transport* (Western Cape Education Department): 10.2015 to 12.2016
- *Eden District Municipality Integrated Transport Plan (ITP) Review* (WCG): 07.2016 to 10.2016
- *Traffic Flow Analysis and Impact* (St Cyprians School, Cape Town): 05.2015 to date
- *Travel Demand Management Policy for the City of Cape town* (City of Cape Town): 04.2015 to 08.2015
- *City of Cape Town "Awareness" Signage Plan for Cyclists* (City of Cape Town): 01.2015 to 07.2015
- *West Coast ITP Review* (WCG): 09.2014 to 01.2015
- *Rhodes Drive NMT Study* (City of Cape Town): 08.2014 to 04.2015
- *WCG Informal Sector Trading Spaces – Transport Input* (CK Rumboll & Partners): 06.2014 to 09.2014
- *Expansion of Stellenbosch NMT Network* (Stellenbosch Municipality): 05.2014 to 06.2015
- *Thembalethu School George* (WCG): 03.2014 to 02.2015
- *Plantation Road NMT Study* (City of Cape Town): 04.2014-05.2014
- *Birdwood Street one-way and NMT Study* (City of Cape Town): 02.2014-03.2014
- *Vygekraal River Pedestrian Bridge in Kewtown* (City of Cape Town): 09.2013-11.2013
- *Phola Park Proposed Pedestrian Bridge over Railway, Gugulethu* (City of Cape Town): 09.2013-11.2013
- *West Coast ITP Update (WGC) 2013*: 09.2013 to 02.2014
- *Oostewal Street Transport Study in Langebaan* (Saldanha Bay Municipality): 07.2013 to 03.214
- *Transport Impact Assessment Evaluations for Land Use Applications* (PGWC): 04.2009 to date
- *Somerset West Public Transport Interchange (City of Cape Town)*: 11.2012 to 06.2013
- *Kalkfontein Housing Project (City of Cape Town)*: 02.2013 to 03.2014
- *Upgrading of Ekanini Informal Settlement*: 02.2013 to 09.2014
- *West Coast ITP Update (WGC) 2012*: 08.2012 to 01.2013

- *Stellenbosch Roads Master Plan* (Stellenbosch Municipality): 05.2012 to 08.2012
- *George Airport Service Station and Hotel TIA:* (ACSA) 08.2011 to 03.2011
- *Erf 11910, Worcester, Road diversion impact on local business from a traffic point of view:* 07.2011 to 11.2011
- *Welbeloond Mix Use Development Traffic Impact Input:* 10.2008 on-going
- *Served on the following Project Management Teams (PMTs) on behalf of the PGWC Department of Transport and Public Transport: Barrydale Parking Study, Glentana MR348 AMP, R304 AMP, R44 AMP, Road Access Guideline Review, R44 Safety Assessment.*
- *Urban Renewal of the Paarl CBD* (Cape Winelands District Municipality, Stellenbosch): 11.2009 to 12.2009
- *CPTR Live Database Assessment* (Cape Winelands District Municipality, Stellenbosch): 04.2009 to 10.2009
- *Stellenbosch Transport Model and Public Transport Operations Plan* (Stellenbosch Municipality): 01.2009 to 06.2010
- *Stellenbosch NMT Network* (Stellenbosch Municipality): 10.2008 to 02.2010
- *Cape Winelands CPTR and OLS Review* (Cape Winelands District Municipality, Stellenbosch): 06.2008 – 10.2008
- *Medine Transport Master Plan* (Medine, Mauritius): 01.2008 – 12.2008
- *Various Traffic Impact Studies while with Africon – 15 Projects* (Cape Town): 06.2007 – 10.2008
- *R44 Arterial Access Management Plan* (PGWC): 05.2007 – 10.2008
- *Welbeloond TIA* (Private Client, Cape Town): 05.2007 – 10.2008
- *Transport Development Levy Review* (Nelson Mandela Bay/PE): 05.2007 – 10.2008
- *Drakenstein Transport Master Plan* (Drakenstein Municipality, Paarl): 05.2007 – 05.2008
- *Worcester Regional Hospital Independent Traffic Review* (PGWC): 01.2008 – 05.2008
- *Taxi Verification Project* (PGWC): 05.2006 – 04.2007
- *Klipfontein Corridor - Infrastructure Design Team: Traffic Impact* (PGWC): 06.2005 – 04.2007
- *Cape Winelands District Municipality Traffic Impact Support* (PGWC): 11.2004 – 03.2004
- *2004 CPTR Rail CD* (City of Cape Town): 08.2004 – 10.2004
- *Bergzicht Taxi Rank* (Stellenbosch Municipality): 07.2004 – 12.2004
- *Kayamandi Transport Plan* (Stellenbosch Municipality): 06.2004 – 08.2004
- *Mitchells Plain TMP* (City of Cape Town): 03.2004 – 07.2004
- *Provincial Non-Motorised Transport Strategy* (Western Cape): 03.2004 – 08.2004
- *2004 Household Surveys* (City of Cape Town): 02.2004 – 07.2004
- *2004 CPTR Facilities* (City of Cape Town): 02.2004 – 08.2004
- *Mamre Taxi Rank* (City of Cape Town): 01.2004 – 07.2004
- *SARS Container PPP Project* (SARS Pretoria): 10.2003 – 05.2004
- *Stellenbosch Transport Plan* (Stellenbosch Municipality): 02.2003 – 12.2003
- *Century City - Macro TIA Review* (Nedcor): 12.2002 – 08.2003Various Traffic Impact Studies while with Arup – 35 Projects (Cape Town): 10.2002 – 06.2006
- *Langeberg Transport Modelling* (Durbanville, Cape Town): 10.2002 – 03.2003
- *Stellenbosch Growth Management Strategy* (Stellenbosch Municipality): 10.2002 – 02.2003
- *Berg River Project -Traffic Management Plan* (DWAF, Franschhoek): 10.2002 – 11.2002
- *Water Sector Plans* (DWAF, KwaZulu Natal): 03.2002 – 08.2002
- *Eastern Cape Provincial Land Transport Framework (PLTF)* (PGEC, Eastern Cape): 02.2001 – 12.2001
- *Sandton Civic Taxi Rank* (City of Johannesburg): 01.2001 - 07.2001
- *Baragwanath Public Transport Node* (City of Johannesburg, Soweto): 08.2000 – 03.2001
- *Road Closures Orange Grove; Robindale; Darrenwood;* (Ratepayers, Randbrug): 06.2000 – 08.2002
- *Marabastad Road Network Assessment* (City of Pretoria): 06.2000 – 02.2001

- *Vom Hagen Road Network Assessment* (South Africa): 01.2000 – 12.2001
- *Main Road MR14* (Swaziland Government): 09.1999 – 01.2000
- *Inanda Club Office Development* (Private Client, Sandton)*:* 09.1999 – 09.2000
- *Transport Audit Document Management System* (City of Johannesburg): 09.1999 – 05.2000

GENERAL INFORMATION:

Name	:	**SARAH LARRATT**
Date of Birth	:	3 February 1975
Marital Status	:	Married
Home Language	:	English
Profession	:	Civil Engineer
Specialism	:	Transport Planning and Traffic Engineering
Joined Sturgeon	:	2012
Nationality	:	South African
Years' Experience	:	20+
Qualifications	:	BTech Eng (Civil)
Professional Associations	:	Professional Engineering Technologist (201070166) MSAICE (2011239) Member of Institute of Professional Engineering Technologists (IPET) Member of Institute of Civil Engineers (ICE) Member of Institute of Transportation Engineers (ITE)

KEY EXPERTISE:

Sarah is an Associate for **Sturgeon Consulting** and a Traffic Engineer with over 20 years of experience in South Africa and the UK. Much of her experience relates to public transport and planning and design of NMT facilities with responsibility for all aspects of traffic engineering. Sarah has experience gained in Project Management on a number of bus priority and traffic management projects in London including interim design, consultation and detailed design. Sarah has a technology degree in civil engineering and is a registered Professional Engineering Technologist with the Engineering Council of South Africa. She has a wide range of technical and professional skills, including corridor studies, public transport planning, non-motorised transport planning & design, traffic management studies, transport impact assessment for redevelopment and urban regeneration, determining development impact for major residential, commercial and industrial projects and providing conceptual design for mitigation improvements. Sarah also has experience in geometric design, intersection analysis (SIDRA), signal design and client management/ partnering and is familiar with the following software packages: SIDRA 8, AutoCAD, Microsoft Office Suite.

EMPLOYMENT RECORD:

August 2012 to date	Sturgeon Consulting, Associate
May 2007 – July 2012	Arup (Pty) Ltd, Senior Engineer
May 2000 - Dec 2006	Atkins Limited UK, Senior Consultant
Jan 1996 - March 2000	HHO Africa (Pty) Ltd, Graduate Engineering Technician
Jan 1994 – Dec 1994	Shell South Africa (Pty) Ltd, Student

KEY QUALIFICATIONS/EDUCATION:

1995	:	ND (Civil), Cape Peninsula University of Technology, Cape Town
1997	:	BTech Eng (Civil) (Urban Engineering), Cape Peninsula University of Technology, Cape Town

PROFESSIONAL AFFILIATIONS

Professional Engineering Technologist, Engineering Council of South Africa (ECSA) – 201070166 – 29 July 2010

PROJECT EXPERIENCE

Sturgeon Consulting, Cape Town, South Africa (2012 – Present)

Schurvekop Underground Coal Mine – Transport Impact Study, Bethal, Mpumalanga
To provide specialist input to the EIA application in terms of a Transport Impact Study for the proposed Schurvekop Underground Mine Project.

De Roodepoort Coal Mine – Transport Impact Study, Ermelo, Mpumalanga
To provide specialist input to the EIA application in terms of a Transport Impact Study for the proposed De Roodepoort Coal Project.

Kanakies Gypsum Quarry Mine – Transport Impact Study, Calvinia, Northern Cape
To provide specialist input to the EIA application in terms of a Transport Impact Study for the proposed Kanakies Gypsum Quarry Mine Project.

Kruskal Avenue - Master Planning, Feasibility Study on Informal Trading & Hard and Soft Landscaping: Kruskal Avenue, Bellville
Part of large project team doing the traffic studies required to support the proposed layouts.

Eden District Municipality Integrated Transport Plan, South Africa
Part of the project team involved in the full review of the ITP of the Eden District Municipality, preparation of the DITP, LITP, Operating License Strategy (OLS) and Current Public Transport Record (CPTR).

West Coast District Municipality Review of Integrated Transport Plan, South Africa
Part of the project team involved in the full review of the ITP of the West Coast Municipality, preparation of the DITP, LITP, Operating License Strategy (OLS) and Current Public Transport Record (CPTR).

Update of Integrated Transport Plan for the West Coast District Municipality, South Africa
Transport planner involved in the update of the transport budgets & programmes and linkages with the PSO3 Outcomes, revision of the categorisation of planning authorities and institutional capacity building through information sessions for the West Coast District.

West Coast District Integrated Transport Plan Update (Transport Needs Assessment & Transport Register), South Africa
Transport planner assisting with the update of the transport needs assessment, transport register and the implementation budget and programme chapters of the Integrated Transport Plan for the West Coast District Municipality.

Somerset West Public Transport Interchange, Cape Town
Traffic Impact Assessment, Public Transport Planning, Conceptual Design of new facility and Design Transport Planning Input.

Cape Town Film Studio Development Framework, Cape Town
Transport Engineer responsible for the preparation of the Transport Impact Assessment for the proposed draft Development Framework for the Cape Town Film Studios consisting of approximately 41 486m^2 Gross Leasable Area (GLA) for offices, light industrial, retail, storage, warehousing and residential land uses.

Steenberg Road/Main Road Signal Design, Cape Town
Traffic engineer responsible for the design and implementation for the installation of traffic signals at the intersection of Steenberg Road and Main Road in Retreat. Responsible for signal timing plan, tender documentation and contract administration and construction monitoring (level 1).

Michigan Street/Tower Road Signal Design (Cape Town International Airport), Cape Town
Traffic engineer responsible for the design and implementation for the installation of traffic signals at the intersection of Michigan Street and Tower Road in the CTIA. Responsible for signal timing plan, tender documentation and contract administration and construction monitoring (level 1).

Planning Services for the Upgrading of Enkanini Informal Settlement, Cape Town
Traffic engineer responsible to undertake the transport study component for the Provision of Professional Planning Services for the Upgrading of Enkanini Informal Settlement for the City of Cape Town for 3409 low-income residential units, community facilities and public open spaces, intended for the use of the immediate community as well as general business. This includes input into the scoping phase relating to transport impact scoping, input into designs, detailed traffic impact assessment and final transportation study report.

Kalkfontein Housing Project, Cape Town
Part of the Bergstan project team appointed by the City of Cape Town: Informal Settlements project to undertake a Transport Impact Assessment (TIA) for the upgrading of the Kalkfontein Informal Settlement in Kuilsrivier consisting of

782 units (combination of single and double storey).

Thembalethu Secondary School Transport Impact Assessment, George, South Africa

Traffic Engineer responsible for the preparation of the transport impact assessment for the proposed new Thembalethu Secondary School 2 in George for approximately 1480 learners and investigating the impact of the proposed development on the surrounding road network and proposed any necessary improvements.

University of Stellenbosch Tygerberg Campus Biomed Research Facility – Traffic Impact Statement, Cape Town

Preparation of Traffic Impact Statement for the redevelopment and extension of the existing Fisan building to a larger Biomed Research Facility (BMRF) as well as contributing to the development of an Urban Design Framework for the Tygerberg Campus.

City of Cape Town Route Assessment & "Awareness" Signage Plan for Cyclists, Cape Town

Project Engineer responsible for the evaluation of the process and outcome of a study to propose bicycle awareness signage on routes frequently used by cyclists in the greater Cape Town region, as identified in the City's Bicycle Master Plan.

Stellenbosch Municipality 2015 Non-Motorised Transport (NMT) Network Plan, Cape Town

The development of the NMT network in the satellite towns/nodes in the Stellenbosch Municipal Area as well as identifying additional NMT links for Phase 2 in Stellenbosch town for Stellenbosch Municipality. Proposals that provide infrastructure that supports walking and cycling, provides individuals with an alternative and sustainable choice of travel.

St Cyprian's School Traffic Study, Cape Town

Traffic Engineer responsible for preparing a Transport Impact Assessment (TIA) for the proposed redevelopment of St Cyprian's School in Gorge Road, Oranjezicht looking at current traffic and access issues and proposing mitigation measures.

Rhodes Drive Non-Motorised Transport Feasibility Study, Cape Town

Traffic study to investigate the current non-motorised transport (NMT) safety concerns along Rhodes Drive between Paradise Road and Constantia Nek and the feasibility of implementing NMT interventions to improve the safety for pedestrians (including runners) and cyclists for the City of Cape Town. Recommendation of appropriate improvements that will enable a safer NMT environment and achieve a balance in the competing needs of road user groups.

Various Non-Motorised Transport (NMT) Assessment Studies, Cape Town

Traffic engineer responsible for the investigation of the current NMT safety issues in various areas in the Southern Region and the feasibility of grade-separated NMT interventions (pedestrian footbridge) to enable a safer pedestrian environment. Projects are part of the City of Cape Town's Non-Motorised Transport projects for the Southern Region.

Oostewal Road Upgrade Transport Study – Langebaan, South Africa

Traffic engineer responsible for the preparation of the transport impact assessment for the upgrade of Oostewal Road in Langebaan for the Saldanha Bay Municipality. Development of road cross sections, conceptual design of the Non-Motorised Transport (NMT) facilities, critical road / intersection upgrades as a result of the traffic impact of all existing, planned and future developments in the greater Langebaan area for the next 20 years.

Forensic Pathology Laboratory Traffic Impact Assessment, Cape Town

Traffic engineer for proposed Forensic Pathology Laboratory on the existing Groote Schuur Hospital building in Observatory. Examined the traffic implications of the proposed development and its impact on the adjacent traffic regime.

Atlantic Hills Development, Cape Town

Traffic engineer involved in the development of the Public Transport and Non-motorised Transport plan for the Atlantic Hills Development in the Annandale area and assistance with the transport and traffic highlights report.

Motor City Development Traffic Impact Assessment, Cape Town

Traffic engineer for proposed Motor City development in Paarl for the mixed-use development consisting of 12 140m^2 of car showroom, 17 698m^2 of general office and 11 000m^2 shopping mall. Examined the traffic implications of the proposed development and its impact on the adjacent traffic regime.

Arup (Pty) Ltd, Cape Town, South Africa (2007 – 2012)

West Coast IRT Corridor: NMT Integration, South Africa

Project Leader responsible for the project planning and project management, co-ordinating activities of team members and ensuring project deliverables were met. Development of conceptual through to detailed design and tender preparation of the non-motorised transport components within a 500m radius from the proposed IRT stations.

Gaborone NMT Facilities, Botswana

Concept and detailed design of cycle and pedestrian facilities for the Gaborone City Council. Tasks included finalising detailed design drawings, contract documents and schedule of quantities.

Woodstock & Salt River Rail Stations Transport Study, South Africa

Traffic engineer involved in undertaking transport investigations as input to multi-disciplinary planning and design for potential developments at the Woodstock and Salt River rail station precincts. Critical analysis undertaken of the conditions of interchange and transport, to inform planning and design rationale.

Cape Town East City Design Initiative Transport Strategy, South Africa

Identifying and assessing transport strategies to support the vision of the East City Design Initiative by encouraging the establishment of a safe and attractive walking environment, while optimising the use of existing and planned infrastructure.

West Coast Mobility Strategy, South Africa

Part of the project team in the development of a mobility strategy as part of Integrated Public Transport Network (IPTN) plans for the purpose of implementing formal scheduled public transport services within the District Municipality of West Coast.

Klipfontein Public Transport Corridor, South Africa

Traffic Engineer for the traffic engineering aspects and conceptual to preliminary design with high priority on public transport and NMT facilities. Geometric design for new bus lanes and stations.

Atkins Limited, London, United Kingdom (2000 – 2006)

Sarah joined Atkins in London in 2000 as a Transport Engineer and was appointed to be part of the senior management in the position of Team Leader and Senior Consultant in the Network Planning Team. Some of the major projects she was involved in are listed below:

International Convention Centre Parking & Access, Qatar

Assisted in the full demand, access and circulation assessment and design, development of design criteria for car park and drop-off & pick-up facilities and traffic assessment for the development of a 4,500-space car park to service the proposed Convention Centre in Doha for Qatar Foundation and Qatar Petroleum.

London Borough of Islington Framework Contract, UK

Client and Contract manager for the Street Management Consultancy Panel Contract for Lot 1: Traffic and Safety Engineering Services including area-wide traffic management, junction improvements, local safety schemes, bus priority measures, cycle and pedestrian improvement schemes.

Lambeth North/Waterloo Pedestrian Interchange Route Improvement Project, UK

Project managed the design and implementation of this safety and security project. Key tasks included resourcing of project, client liaison, development of provisional cost estimates, development of designs and monitoring progress.

Route 12 Articulated Bus Study, UK

Project Manager for the interim and detailed design to assess the traffic management measures necessary to permit the possible conversion of Bus Route 12 to operation by articulated buses within the London Borough of Southwark.

LANGUAGES

English	:	Very Good
Afrikaans	:	Average