EXECUTIVE SUMMARY

This report contains a Traffic Impact Statement undertaken for the following development:

- The proposed Palmietkuilen Mining Project, on Portions 1, 2, 4, 9, 13 and 19 of the Farm Palmietkuilen 241-JR.
- The project (mining right) covers an area of approximately 3 422 ha, located entirely within the Sedibeng District Municipality.

The application is for a new opencast coal mine with the following key characteristics:

- Open pit mining.
- Processing Plant and Fuel Storage;
- Haul roads from pit to plant, and from plant to mine access point, and various conveyor belts;
- Conventional truck and shovel operations;
- Various overburden dumps and run of the mine (RoM) stockpile area;
- Pollution control dam, stormwater trenches and sewage management systems;
- Site office and security offices;
- Transport of product from mining area to the Welgedacht rail siding by 34 ton trucks; and

The total project footprint of the applicant area is 3 422 hectares (ha). The coal reserves to be mined consist of approximately 110.91 tons of coal, which will be mined over 51 years.

The expected annual production is 2 4000 000 tonnes, averaging 200 000 tonnes/month.

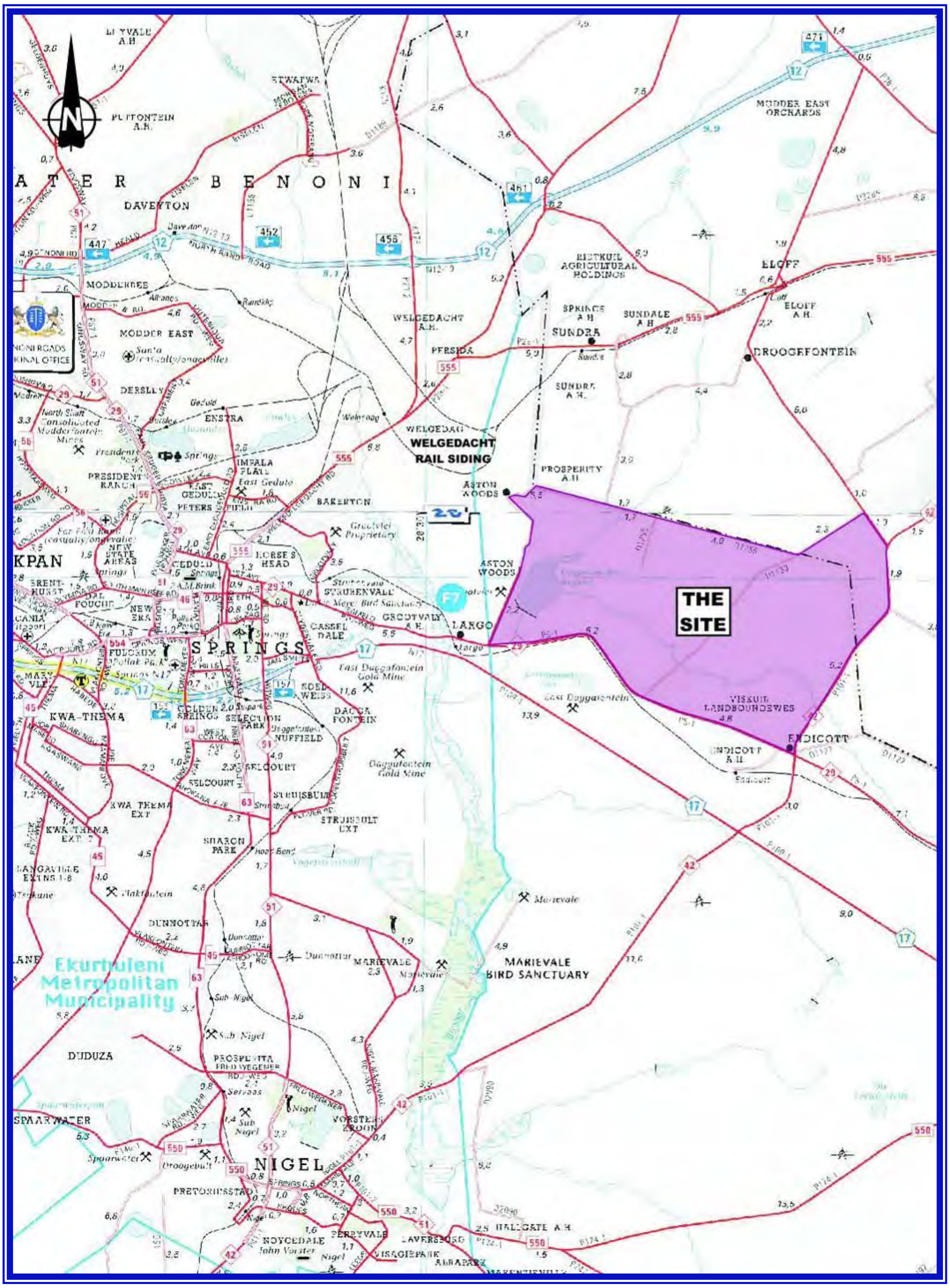
It is planned for the coal resource to be mined using open pit methods, using a combination of the strip and bench mining techniques. Bench mining involves the development of the open pit through a series of benches at varying depths. Strip mining involves the movement of overburden laterally to an adjacent empty pit where the mineral has already been extracted.

The construction phase of the project will take approximately 1 year to complete and will include site establishment and the construction of all infrastructure. The operations phase of the project will be approximately 47 years. The decommissioning and closure phase will follow afterwards.

The proposed development will generate negligible additional trips, during the weekday morning and weekday afternoon peak hour respectively.

The site access is proposed from Road D1255.

Plan showing area of investigation



MARITENG INFORMATION PAGE

TITLE OF REPORT:

Traffic Impact Statement: Proposed Palmietkuilen Coal Mine Project, on Portions 1, 2, 4, 9, 13 and 19 of the Farm Palmietkuilen 241-JR

DATE: March 2017	**STATUS OF REPORT:** Rev 1
MARITENG PROJECT NUMBER: 184/70	**MARITENG REPORT NUMBER**: 184-70-04 Rev 1 March 2017 Palmietkuilen mine.doc

PREPARED BY:

Mariteng Consulting Engineers (Pty) Ltd
P.O. Box 8864
VERWOERD PARK
1453
Tel : (082) 854 7358
Fax : (086) 547 8882
E-mail: louis@mariteng.co.za

	Name	Signature	Date
AUTHOR/S OF REPORT	: L J du Toit	....	17-03-2017
TECHNICAL SUPPORT	: Me. E Muller		
	: Me. L du Toit		
	: Me. M.E. Nkonde		

Revision No.	**Date**	**Comments**
1	17/3/2017	a) Reassess application with access from Road D1255. b) Remove Intersection R29/D1133 and include Weltevreden/Main & Milner. c) Relook at impact of provincial road reserve requirements on applicant site.

TRAFFIC IMPACT STATEMENT:

PALMIETKUILEN MINE PROJECT, ON

PORTIONS 1, 2, 4, 9, 13 AND 19 OF THE

FARM PALMIETKUILEN 241-JR

(REVISION 1)

TABLE OF CONTENTS

PAGE

1. INTRODUCTION 1

1.1 PROJECT DESCRIPTION 1

1.2 CLIENT DETAILS 1

1.3 BACKGROUND OF RESPONSIBLE TRAFFIC ENGINEER 2

2. STUDY METHODOLOGY 2

3. PROPOSED DEVELOPMENT 6

3.1 DESCRIPTION OF PROPOSED DEVELOPMENT 6

3.2 EXISTING ZONING AND LAND USE RIGHTS 6

3.3 APPLICATION 6

3.4 TIME FRAME OF DEVELOPMENT 6

4. STUDY AREA 7

4.1 EXTENT OF STUDY AREA 7

4.2 LATENT LAND-USES AND DEVELOPMENTS IN STUDY AREA 7

4.3 EXISTING ROAD AND STREET NETWORK 7

4.4 INTERSECTIONS EVALUATED 8

5. SCENARIOS 8

6. GAUTENG TRANSPORT INFRASTRUCTURE ACT EVALUATION 8

7. DESIGN PEAK HOURS AND PEAK-HOUR FACTORS 10

7.1 DESIGN PEAK HOURS 10

7.2 PEAK HOUR FACTORS 11

8. BACKGROUND TRAFFIC DEMAND 11

8.1 BASE YEAR BACKGROUND TRAFFIC DEMAND 11

8.2 IMPACT OF CHANGES TO ROAD NETWORK PLANNED BY THE ROAD AUTHORITIES 11

8.3 FUTURE YEAR BACKGROUND TRAFFIC DUE TO TRAFFIC GROWTH 11

8.4 FUTURE TRAFFIC VOLUMES DEMAND DUE TO LATENT LAND USES 11

9. PROPOSED DEVELOPMENT TRAFFIC 12

9.1 INTRODUCTION 12

9.2 OPERATIONAL CHARACTERISTICS OF THE MINE 12

9.3 TRIP GENERATION BY PROPOSED DEVELOPMENT 12

9.4 SUMMARY OF TRIP GENERATION BY PROPOSED DEVELOPMENT 15

10. TRIP DISTRIBUTION AND ASSIGNMENT – PROPOSED DEVELOPMENT 16

10.1 TRIP DISTRIBUTION 16

10.2 TRIP ASSIGNMENT 16

11. TOTAL TRAFFIC DEMAND 16

12. CAPACITY ANALYSIS OF INTERSECTIONS 16

12.1 INTRODUCTION 16

12.2 MEASURE OF EFFECTIVENESS 17

12.3 EXISTING INTERSECTION CONFIGURATIONS 18

12.4 DISPLAY OF CAPACITY ANALYSIS 19

13. ACCESS REQUIREMENTS 21

14. PUBLIC TRANSPORT REQUIREMENTS 21

14.1 INTRODUCTION 21

14.2 EXISTING PUBLIC TRANSPORT INFRASTRUCTURE 21

14.3 ESTIMATED NUMBER OF PUBLIC TRANSPORT USERS 21

14.4 PROPOSED PUBLIC TRANSPORT INFRASTRUCTURE 22

15. OTHER TECHNICAL RELATED MATTERS 22

15.1 STRUCTURAL STRENGTH OF ROAD NETWORK 22

15.2 ROUTE DESCRIPTION FROM SITE TO WELGEDACHT RAIL SIDING 22

16. CONCLUSIONS AND RECOMMENDATIONS 23

16.1 CONCLUSIONS 23

16.2 RECOMMENDATIONS 24

ANNEXURE

ANNEXURE A: EXTRACT FROM EIA APPLICATION
ANNEXURE B: MINING OPERATIONS - LIFE OF MINE PLAN
ANNEXURE C: DIGBY WELLS PLAN NO.: 2 - PROPOSED INFRASTRUCTURE
ANNEXURE D: PROPOSED ROAD RESERVE WIDENING REQUIREMENTS FOR PROVINCIAL ROADS - MARITENG PLAN NO.: 184-70-01
ANNEXURE E DETAILED INTERSECTION TRAFFIC SURVEY RESULTS
ANNEXURE F: SIDRA CAPACITY RESULTS

LIST OF TABLES

Table 1: Trip Generation Threshold Value for a Traffic Impact Study (DoT) ..... -3-
Table 2: Defining the Study Area for the Traffic Impact Study (DoT) ..... -4-
Table 3: Assessment Years for a Traffic Impact Study (DoT) ..... -4-
Table 4: Mining Employment Opportunities ..... -13-
Table 5: Trip Generation for Road Hauling Trucks ..... -15-
Table 6: Total Number of Development Trips ..... -15-
Table 7: Level of Service Results: Intersection 1 – Weltevreden/Main Road & Milner Street ..... -20-
Table 8: Level of Service Results: Intersection 2 – Road D1255 & Proposed Site Access ..... -20-

LIST OF PHOTOS

Photo 1: Road D1255 - Eastbound direction - Unsurfaced road section (Source: Google) .... -22-

Photo 2: Road D1255 - Eastbound direction - Narrow surfaced road section (Source: Google) .... -23-

LIST OF FIGURES

Figure 1: Locality Plan

Figure 2: Gauteng Strategic Road Network

Figure 3: Aerial View of Study Area

Figure 4: Existing Weekday Peak Hour Traffic Volumes - Background Traffic

Figure 5: Trip Generation Characteristics - Proposed Development

Figure 6: Estimated (2016) Weekday Peak Hour Traffic Volumes - With Development Traffic

Figure 7: Estimated (2016) Weekday Peak Hour Traffic Volumes - Intersection 2 - Road D1255/Site Access

1. INTRODUCTION

1.1 PROJECT DESCRIPTION

This report contains a Traffic Impact Statement undertaken for the following development:

Canyon is proposing to develop and operate a new open pit coal mine and associated infrastructure - Palmietkuilen Coal Mine Project. The project is situated approximately 9.0 km east of Springs and falls within the jurisdiction of the Sedibeng District Municipality. The project's mining activity will be located on Portions 1, 2, 4, 9, 13 and 19 of the Farm Palmietkuilen 241-JR.

The total project footprint of the applicant area is 3 422 hectares (ha). The coal reserves to be mined consist of approximately 110.91 tons of coal, which will be mined over 51 years. The expected annual production is 2 4000 000 tonnes, averaging 200 000 tonnes/month.

It is planned for the coal resource to be mined using open pit methods, using a combination of the strip and bench mining techniques. Bench mining involves the development of the open pit through a series of benches at varying depths. Strip mining involves the movement of overburden laterally to an adjacent empty pit where the mineral has already been extracted.

The construction phase of the project will take approximately 1 year to complete and will include site establishment and the construction of all infrastructure. The operations phase of the project will be approximately 47 years. The decommissioning and closure phase will follow afterwards.

1.2 CLIENT DETAILS

The details of the developer involved with the projects/development are:

- Canyon Coal (Pty) Ltd

  13 Fredman Drive

  Sandown

  Contact Person: Me. Melissa Pillay

  Tel No.: 011 783-7996

  Fax No.: 011 783-0816

1.3 BACKGROUND OF RESPONSIBLE TRAFFIC ENGINEER

This study was undertaken by traffic engineer:

Mr. Louis du Toit, P.O. Box 8864, Verwoerd Park, 1453

The traffic engineer has the following qualifications for undertaking Traffic Impact Studies:

- Registered as a professional engineering technologist (Registration No. 200270072);
- Baccalaureus Technologiae – Engineering Civil (Transportation) (1997); and
- Experienced in the field of evaluating the traffic impact of developments.

"I Louis du Toit, author if this traffic impact study, hereby certify that I am a professional traffic engineer (ECSA Registration No.: 200270072) and that I have the required experience and training in the field of traffic and transportation engineering, as required by the Engineering Council of South Africa (ECSA), to compile this traffic impact study/statement and I take full responsibility for the content, including all calculations, conclusions and recommendations made therein".

Signature:............................

2. STUDY METHODOLOGY

The South African Department of Transport (DoT) Manual for Traffic Impact Studies (RR 93/635, of 1995) is a guideline document used for undertaking traffic impact assessments and the THM 17 Volume 1, South African Trip Data Manual (Version 1, September 2014) was used to calculate the additional development traffic.
According to the DoT 1995 Manual definition for a TIA, "A traffic impact study may be considered as a procedure to determine the effect that a change in land use or transportation infrastructure may have on existing and future traffic conditions".

The Manual sests out various principles and guidelines for implelementation in a Traffic Impact Assessment and the following criteria (in **Tables 1, 2 and 3**) are recommended for defining the thresholds (i.e. the minimum size of development).

Table 1: Trip Generation Threshold Value for a Traffic Impact Study (DoT)

Recommended Threshold	
i)	More than 150 peak hour trips [a] – prepare a Traffic Impact Study (TIS)
ii)	Less than 150 and more than 50 peak hour trips - prepare a Traffic Impact Statement (TISm)
iii)	Less than 50 peak hour trips - no study required except if the surrounding road network is operating at or above capacity
iv)	Discretion of the responsible authority [b]

(a) Refers to "trip-ends" which includes primary and pass-by trips.

(b) *Based on the discretion of the responsible road authority, a Traffic Impact Study or Statement can be required e.g. if the development is located in a sensitive area, even though less than 50 peak trips are generated. Alternatively, only a Traffic Impact Statement can be required although the development generates more than 150 trips, but is for example located in an insensitive area.*

The Manual recommends that a Traffic Impact Assessment include the following:

- *Description of the proposed development and trips generated.*
- *An evaluation of the existing operational conditions of the road network in the immediate vicinity of the proposed development.*
- *Analysis of the operation of the proposed access (es) to the development.*
- *Conceptual geometric arrangement of the proposed access (es).*
- *Analysis of the operation of the first intersection on either side of the access (es) to the development.*
- *Analysis of forecasted operational conditions of the road network taking into consideration development and background traffic at the expected critical peak hour*
- *Assessment of mitigation measures to maintain a reasonable level of service (LOS).*
- *Assessment of parking sufficiency.*

The impact of traffic generated by a development usually decreases with distance away from the development due to the dilution of traffic over a greater road network and therefore the limit of assessment seldom exceeds 1.5km from the site.

Table 2: Defining the Study Area for the Traffic Impact Study (DoT)

Recommended Study Area	
i)	All elements of the road infrastructure in the TISm.
ii)	All further elements of the road infrastructure where 75 additional[a] development trips are added to the sum of the critical lane volumes.
iii)	In the case of denser urban road networks a cut-off distance of 1 to 1.5km from the site along the road network (not as crow flies) can be considered to limit the extent of the study.
iv)	Discretion of the responsible authority [b].

(a) *In case of a development where a percentage of the trips attracted are bypass trips (e.g. retail, this refers to primary trips, i.e. total trips generated by the development minus bypass trips where applicable.*

(b) *The responsible authority can require that intersections beyond 1 to 1.5km from the site be included, based on site-specific issues or to include intersections where less than 75 additional trips are added to the sum of the critical lane volumes.*

The Manual further recommends that a relevent forecast period should be considered and the following assessment years are recommended.

Table 3: Assessment Years for a Traffic Impact Study (DoT)

TIS m - (50-150 trips in the peak hour)	1. Base year (assuming full development and base and opening year is the same year); 2. Any other year on discretion of the responsible road authority.
Single phase development – (150-2000 trips in the peak hour)	1. Base year (assuming full development); and 2. Five years after the base year; 3. Any other year on discretion of the responsible road authority.
Single phase development – > 2000 trips in the peak hour	1. Base year (assuming full development); and 2. Ten years a after the base year; 3. Any other year on discretion of the responsible road authority.
Multi-phase developments	1. Opening year; and 2. Five years after the base year or completion of important phases if development generates < 2000 peak hour trips; 3. Ten years after base year assuming full development if development generates> 2000 peak hour trips; 4. Any other year on discretion of the responsible road authority.

Based on the aforementioned discussion it is not required to prepare a traffic study. However, for the purpose of this study a traffic impact statement was undertaken to determine the impact the additional development traffic will have on the road network. In light of this, the study was executed in accordance with the following guideline documents:

- Committee of Transportation Officials (COTO), August 2012, **South African Traffic Impact and Site Traffic Assessment Manual (TMH 16 - Volume 1) (Version 1.0)**.
- Committee of Transportation Officials (COTO), TMH 17, September 2012, **South African Trip Data Manual (Draft)**.
- Department of Transport, 1995, **Manual for Traffic Impact Studies**.

The following processes were followed in the assessment of this application:

- Prepared a desktop study;
- Undertook field investigations; and
- Prepared a traffic study which includes traffic modeling.

The traffic study was executed in the following procedures:

- The extent of the study was determined by identifying the intersection/s near the development on which the traffic generated by the development may have a significant impact.
- The existing traffic flow patterns were surveyed, where after the functioning of the intersection/s was analyzed. Recommendations were made on the need for road upgrades, without the development.
- In addition to the proposed development, the study also took into consideration the impact of other developments (latent rights) already approved or submitted to the local road authority for approval. For ease of reference, these developments will jointly be referred to as the **other development or latent rights scenario**.
- The study also assessed the applicant site in terms of the Gauteng Transport Infrastructure Act.
- Given the extent of the development and using the applicable trip generation rates, the expected number of trips that will be generated was determined.
- The trip distribution of the traffic that will be generated by the proposed development was derived from the existing traffic flow patterns, the location as well as the potential market area of the development in relation to the road network. For ease of reference the proposed development will be referred to as **with or proposed development scenario**.
- Given the trip distribution, the generated traffic was assigned to the road network together with the existing traffic demand. The functioning of the intersections was again analyzed and recommendations were made on the need for additional road upgrading necessary, due to the proposed development.
- As part of the study, the existing public transport infrastructure was also evaluated and where required

upgrading to the existing infrastructure was recommended.

The following documentations were also used as part of this study:

- Institute of Transportation, 2nd Edition, **Transportation and Traffic Engineering Handbook**.
- Akcelik and Associates (Pty) Ltd, 2011, **Sidra Version 7.0**.
- Dr J Sampson, November 2015, **AutoJ**.
- Transport Research Board, 1994, **Highway Capacity Manual**.
- Committee of Transportation Officials (COTO), February 2014, **South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual (TMH 16 - Volume 2) (Version 1.01)**.
- Committee of Transportation Officials (COTO), August 2012, **South African Road Classification and Access Management Manual (TRH 26) (Version 1.0)**.
- Department of Transport, South African Development Community, **Road Traffic Signs Manual (SARTSM) Volume 1, Chapter 4 (3rd Edition)**.

3. PROPOSED DEVELOPMENT

3.1 DESCRIPTION OF PROPOSED DEVELOPMENT

The proposed Palmietkuilen Coal Mine Project, on Portions 1, 2, 4, 9, 13 and 19 of the Farm Palmietkuilen 241-JR.

The location of the proposed development is shown in **Figure 1**.

3.2 EXISTING ZONING AND LAND USE RIGHTS

The current land use of the affected land parcels is predominantly agricultural land. There are no major industrial developments found within the project boundary. The Blesbokspruit is located approximately west of the project area.

3.3 APPLICATION

The application is for a new open pit coal mine which forms part of an environmental process submitted for the mining operations. Details related to the EIA application are appended in **Annexure A**.

3.4 TIME FRAME OF DEVELOPMENT

The time frame for the project as follows:

- Planning and construction is two (2) years (assume start of mining operation at beginning 2019);
- Production is 51 years - (Refer to **Annexure B** for "Life of Mine Plan" details); and
- Decommissioning and after care.

4. STUDY AREA

4.1 EXTENT OF STUDY AREA

The study area for this application is shown in **Figure 1**, and is surrounded by the following streets:

- To the north of the site is Road D1255.
- To the east of the site is Road P101-1 (Road R42).
- To the south of the applicant site is Road R29 (also referred to Ermelo Road).
- To the west, the site abuts an unnamed road, serving "Aston Lake".

4.2 LATENT LAND-USES AND DEVELOPMENTS IN STUDY AREA

No latent right developments were identified in the study area that could affect the findings of this report.

4.3 EXISTING ROAD AND STREET NETWORK

The existing surrounding road network is briefly discussed hereafter, and indicated on **Figures 1 and 2**:

- Road R29 is a single lane road running in an east-west direction. The road links Springs and surrounding area with areas such as Delmas. Road R29 falls under the jurisdiction of the Gauteng Provincial Administration.
- Road D1133 is a single lane surfaced road for a distance of approximately 950m (measured from the R29/D1133 intersection. The remaining section of the road has a gravel surface. Road D1133 falls under the jurisdiction of the Gauteng Provincial Administration.
- The road serving Aston Lake is a surfaced road and falls under the jurisdiction of Ekurhuleni Municipality.
- Road D1255 is a gravel road serving only the farming community abutting the road. Road D1255 falls under the jurisdiction of the Gauteng Provincial Administration.
- Milner Street is a single lane road running in a north-southern direction. The road services the Welgedacht residential area, as well as the rail siding located to the north-west of the applicant site. The road falls under the jurisdiction of the Ekurhuleni Municipality.

- Welgedacht Road/Main Road runs in a west to northern direction. The road links the study area with Springs to the south and the N12 in the north. The road is a single lane road with road widening at the intersection with Milner Street. The Welgedacht Road/Main Road & Milner Street is signalised. Welgedacht Road/Main Road falls under the jurisdiction of the Gauteng Provincial Administration.

4.4 INTERSECTIONS EVALUATED

The proposed development will generate less than 50 peak hour trips, and in terms of the **guideline document,** it is not necessary to evaluate any adjacent intersections. However, for the purposes of this study, the following intersections were analysed (also refer to **Figure 1**):

- Intersection 1: Welgedacht Road/Main Road & Milner Street - Signalised intersection
- Intersection 2: Road D1255 & Proposed Site Access - Stop control with priority on Road D1255.

The above intersections were selected, as it provides the main access to the study area and the additional development traffic will have the highest impact on this intersection.

5. SCENARIOS

It is expected, that the development will generate less than 50 peak hour trips. However, as part of this study the following traffic assessment scenarios were analysed:

- Scenario 1: Target Year 2019 AM Peak background traffic.
- Scenario 2: Target Year 2024 AM Peak background traffic. 5 Years into mining operations.
- Scenario 3: Target Year 2019 AM Peak with development traffic.
- Scenario 4: Target Year 2024 AM Peak with development traffic. 5 Years into mining operations.
- Scenario 5: Target Year 2019 PM Peak background traffic.
- Scenario 6: Target Year 2024 PM Peak background traffic. 5 Years into mining operations.
- Scenario 7: Target Year 2019 PM Peak with development traffic.
- Scenario 8: Target Year 2024 PM Peak with development traffic. 5 Years into mining operations.

6. GAUTENG TRANSPORT INFRASTRUCTURE ACT EVALUATION

The application was also evaluated in terms of the Gauteng Transport Infrastructure Act of 2001. Based on the Gauteng Strategic Road Network (refer to **Figure 3**), the applicant site is affected by the following provincial roads:

- Road K134 is located partially along the southern boundary of the property and is mainly planned along the existing alignment of Road R29.

- Road D1133 traverses the applicant site. In terms of the ***"Life of Mine Plan"*** (refer to **Annexure B**) and the ***"Infrastructure Plan"*** (refer to **Annexure C**) the road is located partially within the mining belt.

- Road D1255 is located along the northern boundary of the applicant site and ties in with the future alignment of Road K118 (also located along part of the northern property boundary). In terms of the road master planning for the area, the future Palmietkuilen Access Interchange is planned where Road D1255 and Road K118 intersects with the PWV19.

- The future PWV19 will traverse the study area along the western side of the applicant site. In terms of the ***"Life of Mine Plan"*** (refer to **Annexure B**) and the ***"Infrastructure Plan"*** (refer to **Annexure C**) the mining operation does not affect the future alignment of the road.

The impact of the future road reserve requirements are shown in **Mariteng Plan No.: 184-70-01**, appended in **Annexure D**.

The following technical aspects relates to the impact of the future provincial roads on the applicant site:

a) Road R29 (future Road K134)

- No direct access is required from Road R29 or the future Road K134.

- A line of no access is imposed along Road R29 or the future Road K134.

- A building line restriction of 95m is imposed along the future centre line of Road R29 (future K134) and not the normal 16m measured from the road reserve. It will be possible to apply of a 16m building line subject to the submission of a Section 7 report.

- No mining activities or any form of construction may take place within the existing or future road reserve of the road.

b) Road D1133

- The open pit mining activities span across a section of the road. Thus access is required to allow the crossing of hauling traffic. The final access position will have to be agreed with Gautrans.

- A building line restriction of 95m is imposed along the future centre line of Road D1133 and not the normal 16m measured from the road reserve. It will be possible to apply of a 16m building line subject to the submission of a Section 7 report.

- No mining activities or any form of construction may take place within the road reserve of the road.

c) Road D1225

- Access is required from the road to accommodate the site access. The final access position is subject to approval by Gautrans.
- A building line restriction of 95m is imposed along the future centre line of Road D1225 and not the normal 16m measured from the road reserve. It will be possible to apply of a 16m building line subject to the submission of a Section 7 report.
- No mining activities or any form of construction may take place within the road reserve of the road.

d) Future Road K118

- No direct access is required from the alignment.
- A line of no access is imposed along the future K118, and access is only permitted as per the basic planning prepared for the road.
- A building line restriction of 95m is imposed along the future centre line of Road K118 and not the normal 16m measured from the road reserve. It will be possible to apply of a 16m building line subject to the submission of a Section 7 report.
- No mining activities or any form of construction may take place within the existing or future road reserve of the road.

e) Future PWV19

- No access permitted from this road.
- A building line restriction of 20m for single storeys and 30m for multi storey development.
- No mining activities or any form of construction may take place within the future road reserve required for the road.

7. DESIGN PEAK HOURS AND PEAK-HOUR FACTORS

7.1 DESIGN PEAK HOURS

Given the trip generation characteristics of the proposed development, the peak demand is during the weekday morning peak and weekday afternoon hour of the adjacent road network. The peak hours selected for this application is as follows:

- Weekday morning peak hour (06:30 – 07:30)
- Weekday afternoon peak hour (16:00 – 17:00)

7.2 PEAK HOUR FACTORS

The following peak hour factors (PHF) were used in the capacity analysis and level-of-service (LOS) calculations:

- Base year – peak hour factors obtained from the existing traffic counts.
- For the future horizon target years, a PHF of 0.95 or LOS E was considered for a signalized controlled intersection. For unsignalized intersections, a PHF of 0.85 was used.

8. BACKGROUND TRAFFIC DEMAND

8.1 BASE YEAR BACKGROUND TRAFFIC DEMAND

Detailed traffic counts were carried out at the intersection, on Wednesday, 2 November 2016. The peak hour background traffic volumes are shown in **Figure 4**.

The detailed survey results are appended in **Annexure E**.

8.2 IMPACT OF CHANGES TO ROAD NETWORK PLANNED BY THE ROAD AUTHORITIES

No roads are currently under construction that could affect the findings of this report.

8.3 FUTURE YEAR BACKGROUND TRAFFIC DUE TO TRAFFIC GROWTH

For the purpose of this study, an annual growth rate of 3.0% was considered reasonable for the study area. The growth rate was used to determine the expected future target year through traffic volumes from the base year volumes. Therefore, the annual growth rate compounded for the target years are as follows:

- Target year January 2019, was taken as the opening year of mine (24 month from data collection date) yield an expected increase of 6.09% in the traffic volumes between base year and target year.
- Target Year 2024, five years (5) into mining operations yield an expected increase of 23.0% in the traffic volumes between base year and target year.

The above growth factors are applied to the projected future background demand on the road network.

8.4 FUTURE TRAFFIC VOLUMES DEMAND DUE TO LATENT LAND USES

As previously indicated no latent developments were indentified in the study area that could affect the outcome of this report.

9. PROPOSED DEVELOPMENT TRAFFIC

9.1 INTRODUCTION

The site is earmarked for a new open pit coal mine.

9.2 OPERATIONAL CHARACTERISTICS OF THE MINE

Based on the previous experience with the typical characteristics of an open pit coal mine, the operational characteristics of the new mine is summarised as follows:

- Three (3) eight (8) hour shifts per day, seven (7) days per week.
- Mining staff and contractors to access site from the east, along Road D1133.
- Mining and hauling operational hours - Mining (24/7) and hauling between 06:00 and 22:00.
- 34 ton interlink trucks (57 tons when loaded) will be used to transport coal from the site to Welgedacht Rail Siding (route located to the north-west of the site). The route selected is indicated in **Figure 2**. The proposed route will not take the hauling trucks through any residential area or using the main mine.
- Run of Mine (RoM) production approximately 200 000 tons/month.
- Product to be stockpiled at the Welgedacht Rail Siding, from where it will be transported by rail.
- Project timing - Construction period is 2 year and the mining operations is approximately 47, with several years allocated for decommissioning and after care.

9.3 TRIP GENERATION BY PROPOSED DEVELOPMENT

The South African Trip Data Manual does not regard mining as a weekday morning and afternoon peak hour trip generator. In light of this, an alternative approach was adopted to calculate the expected traffic demand for the new development.

Shift change times at mines normally occur outside the normal weekday morning and afternoon peak hours. The exception is the administrative section, which operates between around 07:30 and 16:00, with the morning peak hour that coincides with that on the adjacent road network and the afternoon outside the normal weekday afternoon peak traffic hour.

In view of the fact that there are no official trip generation rates for mines, the use of potential employment figures and acceptable shift change times can be used to determine a potential peak trip hour trip generation. The proposed mine will have three shifts, and the shift change times at a similar mine are as follows:

- Shift 1: 06:00 - 14:00
- Shift 2: 14:00 - 20:00
- Shift 3: 20:00 - 06:00
- Admin: 07:30 - 16:00

The admin component will have a potential peak hour trip generation during the morning peak hour.

a) Mining Employment Opportunities

Based on the details provided by the client, the anticipated employment opportunities for the mine is summarised in **Table 4**.

Table 4: Mining Employment Opportunities

CATEGORY	OPERATIONAL YEAR									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
PERSONNEL ON THE MINE'S PAYROLL										
Top Manager	1	1	1	1	1	1	1	1	1	1
Senior Manager	4	4	4	4	4	4	4	4	4	4
Professional qualified & experienced specialist& mid-management	3	3	3	3	3	3	3	3	3	3
Skilled technical and academically qualified workers, junior management, supervisors, foreman & superintendents	12	12	12	12	12	12	12	12	12	12
Semi-skilled and discretionary decision making	20	20	20	20	20	20	20	20	20	20
Non permanent employees	0	0	0	0	0	0	0	0	0	0
Sub Total 1 - Mine Payroll Personnel	40	40	40	40	40	40	40	40	40	40
SUB CONTRACTOR'S PERSONNEL										
Top Manager	2	2	2	2	2	2	2	2	2	2
Senior Manager	6	6	6	6	6	6	6	6	6	6
Professional qualified & experienced specialist& mid-management	0	0	0	0	0	0	0	0	0	0
Skilled technical and academically qualified workers, junior management, supervisors, foreman & superintendents	20	20	20	20	20	20	20	20	20	20
Semi-skilled and discretionary decision making	40	40	40	40	40	40	40	40	40	40
Sub Total 2 - Sub contractor's Personnel	68	68	68	68	68	68	68	68	68	68
Total (Sub Total 1 & Sub Total 2)	108	108	108	108	108	108	108	108	108	108
Summary - Semi-skilled and discretionary decision making only	60	60	60	60	60	60	60	60	60	60

Based on the above, the total expected employment opportunities equates to 108 people. As part of the study, it was assumed:

- Semi-skilled personnel from both the mine and contractors will make use of public transport facilities for daily commuting.
- The remaining mine personnel and subcontractor's employees will use private vehicles for their daily commuting.
- The mine will operate at 3 eight hour shifts per day, 7 days per week. Assuming the mangers, professional and skilled workers are divided by three to cover the three daily shifts. This equates to approximately 16 workers per shift, which equates to 16 vehicles or 32 trips. In the absence of trip generation details for mines, it was assumed that the trip generation repeats itself, with one shift arriving and one shift leaving in the same hour. In light of this, a directional split of 50:50 was assumed.
- Similar for the semi-skilled workers, it is estimated that the 60 workers will be divided by three which equates to 20 workers per shift. Assuming 12 passengers per taxi, a total of 1.7 taxis (say 2 taxis) are required to transport the staff between the mine and the adjacent towns. The same taxis arriving with the new shift will wait for the workers from the shift leaving the site. The public transport trip generation is thus 4 trips within a one hour period. In light of this, a directional split of 50:50 was assumed.

NOTE: As part of the report the peak hour trip generation was based on shift change times to coincide with the peak traffic hour on the adjacent road network. The employment figures, mine personnel and sub-contractors, were split into three shifts and the trip generation based on the number of staff per shift making use of their own transport and minibus transport. The methodology followed, although it is an overestimate of the expected weekday morning and afternoon peak hour trip generation was followed.

b) Anticipated Road Hauling Traffic

Based on the details provided by the client, the possibility of transporting coal by road is also investigated. The proposed hauling route the trucks will follow is shown in **Figure 2**.

The expected trip generation for the hauling of coal between the site and the rail siding in Welgedacht were calculated based on the details provided in **Table 5**.

Table 5: Trip Generation for Road Hauling Trucks

ITEM DESCRIPTION	UNIT
Monthly stockpile at Welgedacht Rail Siding (by road hauling)	200 000 tons/month
Haul vehicle capacity	34 ton interlink trucks (57 tons loaded)
Total number of truck loads/month	5 883 truck loads (200 000/ 34)
Number of monthly trips	11 766 trips/month
Trips per day (assume average of 30 days/month)	393 trips/day
Hauling operation (06:00 to 22:00)	16 hours/day
Trips per hour	25 trips (assume directional split: In : Out -50%:50%

Based on the above, the expected peak hour demand is 25 trips.

9.4 SUMMARY OF TRIP GENERATION BY PROPOSED DEVELOPMENT

Based on the above, the total trip generation for the development is summarised in **Table 6.**

Table 6: Expected Weekday Morning and Afternoon Peak Hour Trips

DESCRIPTION	MORNING PEAK HOUR			AFTERNOON PEAK HOUR		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Private Vehicles	16	16	32	16	16	32
Public Transport	2	2	4	2	2	4
Sub Total 1 : Mine Personnel	18	18	36	18	18	36
Sub Total 2: Hauling Traffic	12	13	25	12	13	25
Total	30	31	61	30	31	61

From **Table 6**, it can be concluded that:

- 36 peak hour trips will be generated by the mine personnel and contractors, during the weekday morning and weekday afternoon peak hours. These trips will access the mine from Road D1133, via Road R29 (located to the south-west of the mine).
- 25 peak hour trips will be generated by the hauling operations, during the weekday morning and weekday afternoon peak hours. These trips will operate between the main access proposed on Road D1125 and the Welgedacht rail siding, located to the north-west of the site.
- The impact of the proposed development on the adjacent road network, from a traffic engineering viewpoint is expected to be negligible.

10. TRIP DISTRIBUTION AND ASSIGNMENT – PROPOSED DEVELOPMENT

10.1 TRIP DISTRIBUTION

The most likely direction from which the generated traffic will approach and leave the study area was determined by taking the following in consideration:

- The location of the development in relation to Springs and surrounding residential areas; and
- The existing road network serving the new mine.

For the purpose of the application the following distribution was accepted, (refer to **Figure 5** for details):

- Weltevreden/Main Road - East = 85%
- Weltevreden/Main Road - West = 15%

10.2 TRIP ASSIGNMENT

Given the trip distributions, the expected traffic volumes the development generates were assigned to the road network. The details are shown in **Figure 5**.

11. TOTAL TRAFFIC DEMAND

The total traffic volumes were determined by adding the development traffic to the background traffic. The details are shown in **Figure 6**.

NOTE: The traffic on Road D1255 at the proposed site access is negligible and for the purpose of the study 10 trips were assigned to the through movements on Road D1255. The total traffic demand was determined by adding the "General worker" traffic and "Hauling truck" traffic to the road network. The expected 2016 base year traffic demand is shown in **Figure 7**.

12. CAPACITY ANALYSIS OF INTERSECTIONS

12.1 INTRODUCTION

The following methodology was adopted in evaluating the intersections included as part of this study:

- Analyze the existing background traffic demand, using the existing intersection layout.
- Determine the road upgrades required to accommodate the background traffic scenario.
- Analyze the expected base year scenario, taking the traffic that will be generated by the proposed development into consideration.

- In order to determine the required road upgrading, a level-of-service E or worse on any approach at an intersection was accepted at the stage when road upgrading will be implemented.

12.2 MEASURE OF EFFECTIVENESS

The capacity analysis was done according the method as contained in the ***Highway Capacity Manual*** (4-way stop scenario) and ***SIDRA*** intersection software program. The operation of an intersection is defined in terms of levels-of-service (LOS).

The LOS for a traffic light controlled intersection is defined in terms of average total vehicle delay (not average stop delay), where delay is a measure of driver discomfort, frustration, fuel consumption and lost travel time. However, for an unsignalized intersection the average delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation.

The LOS for an approach values are based on the worst delay for any vehicle movements. The average intersection delay is not a good LOS measure for two-way control intersection, as the major through movements normally have a zero delay. The average LOS is therefore recorded as “NOT APPLICABLE”.

The thresholds for signalized intersection and stop-controlled intersection can be summarised as follows:

Signalized intersections

LOS A describes operations with very low delays, up to 10 sec/vehicle. The LOS occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all.

LOS B describes operations with delays greater than 10 sec and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths or both. More vehicles stop than with LOS A, causing higher levels of average delay.

LOS C describes operations with delays greater than 20 sec and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many vehicles still pass through the intersection without stopping.

LOS D describes operations with delays greater than 35 sec and up to 55 sec per vehicle. This level, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume over capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping decline considerable. Individual cycle failures are noticeable.

LOS E describes operations with delays greater than 55 sec and up to 80 sec per vehicle. This level is considered by many road agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, or high volume over capacity ratios. Individual cycle failures are frequent occurrences.

LOS F describes operations with delays in excess of 80 sec per vehicle. This level, considered unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection.

Unsignalized intersections

LOS A describes operations with very low delays, up to 10 sec per vehicle.

LOS B describes operations with delays greater than 10 sec and up to 15 sec per vehicle.

LOS C describes operations with delays greater than 15 sec and up to 25 sec per vehicle.

LOS D describes operations with delays greater than 25 sec and up to 35 sec per vehicle.

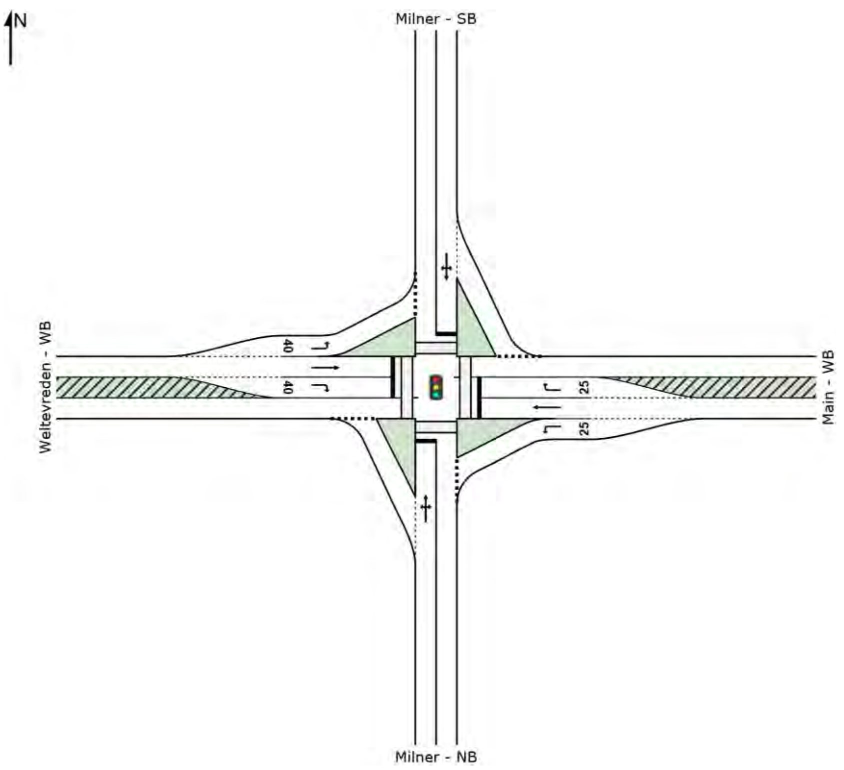
LOS E describes operations with delays greater than 35 sec and up to 50 sec per vehicle.

LOS F describes operations with delays in excess of 50 sec per vehicle.

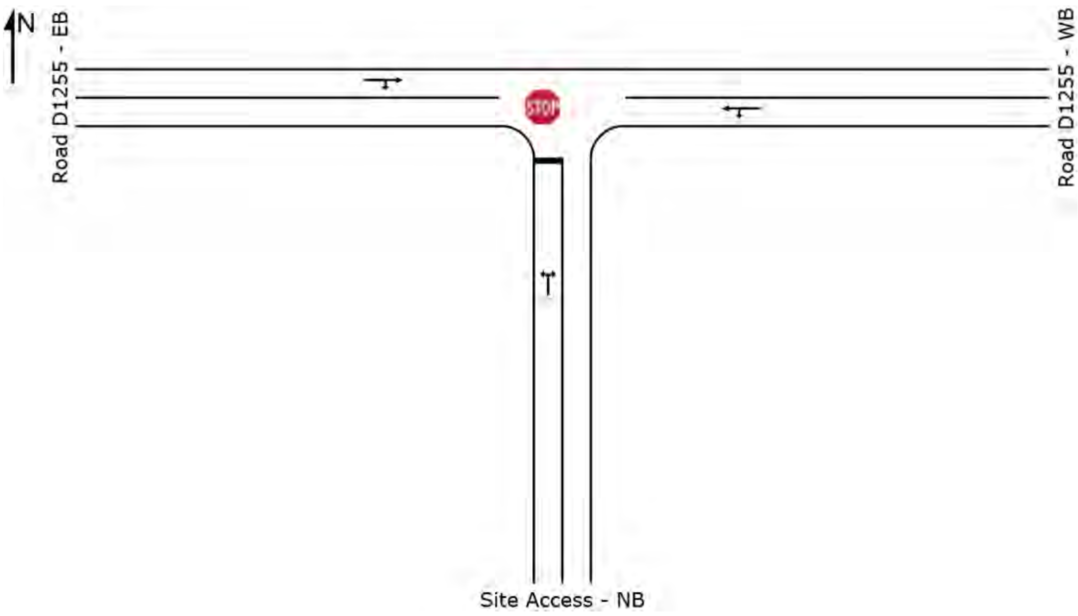
12.3 EXISTING INTERSECTION CONFIGURATIONS

Sidra 7.0 was used to assess the capacity for each intersection. The conceptual intersection layout for the intersection evaluated as part of this application is illustrated below:

a) Intersection 1 – Weltevreden/Main Road & Milner Street



b) Intersection 2 – Road D1255 & Proposed Site Access



12.4 DISPLAY OF CAPACITY ANALYSIS

The following figures should be read in conjunction with the capacity analysis:

- Figure 4: Existing Weekday Peak Hour Traffic Volumes - Background Traffic
- Figure 6: Estimated (2016) Weekday Peak Hour Traffic Volumes - With Development Traffic
- Figure 7: Estimated (2016) Weekday Peak Hour Traffic Volumes - Intersection 2 - Road D1255/Site Access

The SIDRA results are summarised hereafter, with detailed results appended in **Annexure F**. The future traffic flow scenarios are based on the growth factors of 6.09% and 23.0% as discussed **in Section 8.3** of this report.

a) Intersection 1 – Weltevreden/Main Road & Milner Street

Table 7: Level of Service Results: Intersection 1 – Weltevreden/Main Road & Milner Street

PEAK	SCENARIO	TOTAL AVERAGE VEHICLE DELAY & LEVEL OF SERVICE (LOS)														
		NORTHBOUND APPROACH			WESTBOUND APPROACH			SOUTHBOUND APPROACH			EASTBOUND APPROACH			INTERSECTION		
		S	D	L	S	D	L	S	D	L	S	D	L	S	D	L
AM	SC1	0.07	10.4	B	0.53	8.1	A	0.45	20.9	C	0.39	7.87	A	0.53	9.7	A
	SC2	0.09	10.3	B	0.61	8.7	A	0.52	23.2	C	0.47	8.2	A	0.61	10.4	B
	SC3	0.10	9.6	A	0.53	8.1	A	0.45	20.9	C	0.39	8.1	A	0.53	9.8	A
	SC4	0.12	9.9	A	0.61	8.6	A	0.52	23.2	C	0.48	8.6	A	0.61	10.5	B
PM	SC5	0.19	16.4	B	0.54	5.8	A	0.45	27.1	C	0.29	4.9	A	0.54	7.8	A
	SC6	0.21	15.1	B	0.63	6.2	A	0.52	30.4	C	0.34	5.2	A	0.63	8.3	A
	SC7	0.22	15.6	B	0.54	5.4	A	0.48	27.5	C	0.28	4.9	A	0.54	7.6	A
	SC8	0.26	14.3	B	0.62	5.8	A	0.56	30.9	C	0.33	5.2	A	0.62	8.1	A

Note: S = Degree of Saturation (v/c); D = Delay (sec/veh); L = Level of service (LOS)

Based on the results the intersection operates at acceptable LOS for the respective traffic scenarios.

b) Intersection 2 – Road D1255 & Proposed Site Access

Table 8: Level of Service Results: Intersection 2 – Road D1255 & Proposed Site Access

PEAK	SCENARIO	TOTAL AVERAGE VEHICLE DELAY & LEVEL OF SERVICE (LOS)														
		NORTHBOUND APPROACH			WESTBOUND APPROACH			SOUTHBOUND APPROACH			EASTBOUND APPROACH			INTERSECTION		
		S	D	L	S	D	L	S	D	L	S	D	L	S	D	L
AM	SC3	0.04	8.0	A	0.01	2.8	A	-	-	-	0.03	4.2	A	0.04	5.5	A
	SC4	0.05	8.0	A	0.02	2.8	A	-	-	-	0.03	4.2	A	0.05	5.5	A
PM	SC7	0.04	8.0	A	0.01	2.8	A	-	-	-	0.03	4.2	A	0.04	5.5	A
	SC8	0.05	8.0	A	0.02	2.8	A	-	-	-	0.03	4.2	A	0.05	5.5	A

Note: S = Degree of Saturation (v/c); D = Delay (sec/veh); L = Level of service (LOS)

Based on the results the intersection operates at acceptable LOS for the respective traffic scenarios.

13. ACCESS REQUIREMENTS

Based on the concept site layout prepared by Digby Wells Environmental (refer to **Plan No.: 6**, appended in **Annexure C**), access is from Road D1255. Thus as part of the study the following minimum access arrangements are required for the development:

- The site access is proposed approximately 1 100m east of the future Palmietkuilen Access Interchange. The final position is subject the approval of the Gauteng Provincial Administration (Gautrans).
- Two inbound lanes and two outbound lanes. One lane is for hauling trucks and the second lane for general public and worker traffic.
- Minimum lane width of 3.7m, with a clearance of 4.2m.
- Any access control system to be setback a minimum distance of 60m from the road reserve of Road D1125 and the centre of the access control boom/gate.
- Minimum vertical clearance of 5.2m.
- Bellmouth radii at the intersection on Road D1255 to be a minimum of 12.5m. The final radii to be used are subject to a detail design of the road network.

14. PUBLIC TRANSPORT REQUIREMENTS

14.1 INTRODUCTION

In terms of the National Land Transport Transition Act, Act 5 of 2009 (Section 38), it is also necessary to carry out a public transport assessment for all new developments. The assessment need to address aspects such as the additional transport trips that will be generated, the expected traveling pattern of these users, as well as the impact it may have on the existing public transport network.

14.2 EXISTING PUBLIC TRANSPORT INFRASTRUCTURE

Taxis services are provided along Weltevreden/Main Road & Milner Street, approximately 9.0km from the entrance to the applicant site.

14.3 ESTIMATED NUMBER OF PUBLIC TRANSPORT USERS

As previously indicated, the total expected work force that will make use of the public transport serves is 20 commuters per 8 hour shift. This equates to 1.7 taxis. It is expected that with the new destination created, the local taxi industry may introduce a new route to accommodate the expected demand.

14.4 PROPOSED PUBLIC TRANSPORT INFRASTRUCTURE

No public transport infrastructure is required. The mine should investigate as part of the internal safety requirements, the provision of sheltered parking area for the commuters. Such a facility can be accommodated at the office, by allocating one parking bay for taxi use.

15. OTHER TECHNICAL RELATED MATTERS

15.1 STRUCTURAL STRENGTH OF ROAD NETWORK

Based on the findings of the traffic impact assessment, the additional development traffic is negligible on the external road network. However, from a road safety viewpoint and structural strength, a civil engineer should confirm whether the pavement design of the existing gravel and surfaced roads can accommodate the additional the mine traffic, more specifically the hauling truck traffic on Road D1225.

Based on the EIA application, no roads are expected to be surfaced on the mine site. However, the pavement design requirements for internal haul roads will have to be provided by the civil engineer.

15.2 ROUTE DESCRIPTION FROM SITE TO WELGEDACHT RAIL SIDING

The coal product will be transported from the site to the rail siding in Weltevreden as depicted in the aerial photo appended in **Figure 2**. The condition of the haul road was evaluated from a traffic engineering view point and is summarised hereafter:

- Sections of Road D1225 are unsurfaced - - see **Photo 1** below.
- Sections of Road D1225 are narrow and surfaced - - see **Photo 2** below.

The route will be used by 393 x 34-ton interlink truck trip per day. From a traffic flow the traffic demand is negligible. However, a registered professional engineer will have to determine whether the structural strength of the pavement layers is sufficient to accommodate the truck traffic.

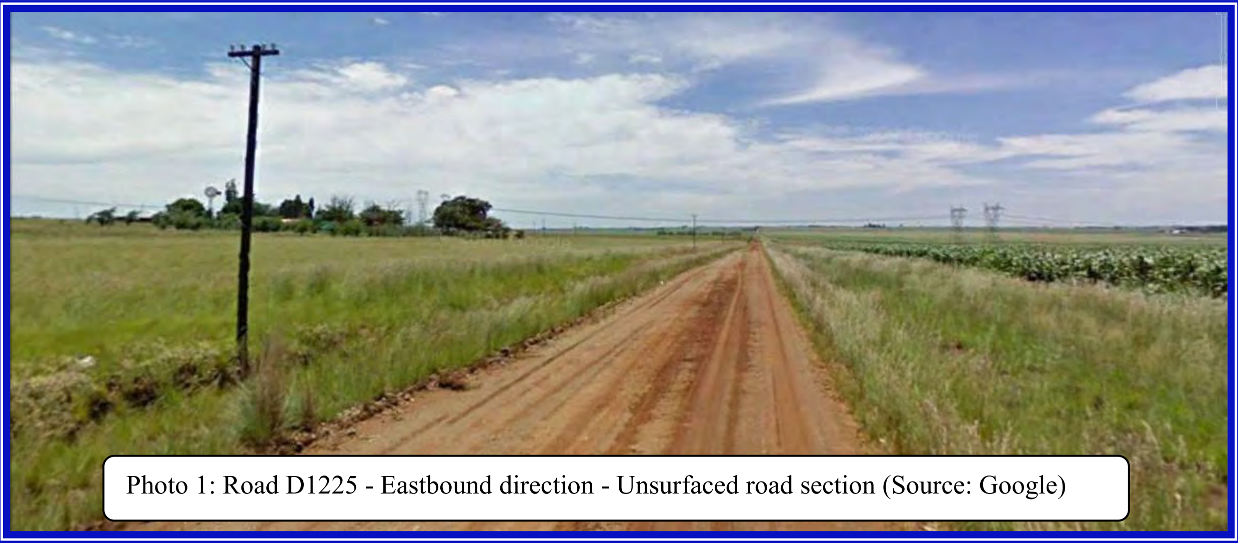


Photo 1: Road D1225 - Eastbound direction - Unsurfaced road section (Source: Google)

Photo 2: Road D1225 - Eastbound direction - Narrow surfaced road section (Source: Google)

16. CONCLUSIONS AND RECOMMENDATIONS

16.1 CONCLUSIONS

The study addresses the impact of the proposed Palmietkuilen Open Pit Coal Mine, on Portions 1, 2, 4, 9, 13 and 19 of the farm Palmietkuilen 241-JR, on the surrounding road network. The following conclusion can be reached from the study:

i. The site is earmarked for the mining of coal.

ii. **Gauteng Infrastructure Act:** The applicant site is affected by the following roads:

- Existing Road R29 (future Road K34)
- Existing Road D1133
- Existing Road D1225
- Future Road K118
- Future PWV19

iii. The base year was taken as 2016 (November) with expected mining operation starting January 2019. For the purpose of the study, the following two target years were analysed:

- Target Year 2019: Assuming start of mining operations in January 2019 with a growth in background traffic of 6.09%; and
- Target Year 2024: 5 Years after start of mining operations with a growth in background traffic of 23.0%.

iv. The proposed development will generate the following trips:

- Mine personnel via the Weltevreden/Main Road & Milner Street intersection along Road D1255 and is approximately 36 additional trips, during the weekday morning and weekday afternoon peak hour respectively; and
- Hauling truck traffic via the "Haul Road Access" along Road D1225 and is approximately 31 additional trips, during the weekday morning and weekday afternoon peak hour respectively. The hauling truck traffic will only travel between the site and the Welgedacht Rail Siding. The truck traffic will therefore not travel through the Weltevreden/Main Road & Milner Street intersection.

v. **Proposed road network upgrade – Proposed Development**: No external road upgrades are required at Weltevreden/Main Road & Milner Street intersection or Road D1255/Proposed Access Road intersections, to accommodate the additional development traffic.

vi. **Access Arrangements:** The site access is from Road D1255.

vii. **Surfacing of Road D1255:** From a traffic engineering viewpoint, the road has sufficient capacity to accommodate the hauling truck traffic.

However, the gravel road and existing surfaced sections may not have the pavement strength to carry the interlink trucks, transporting the coal. The civil engineer need to determine the pavement design required to accommodate the trucks and whether the road needs to be surfaced.

viii. **Road surface condition:** From a traffic engineering view point the road network could accommodate the additional traffic. However, the civil engineer need to determine the pavement design required to accommodate the impact of the additional E80's the 393 daily truck trips will generate.

ix. **Public Transport Assessments:** Additional public transport facilities are required - refer to ***"Recommendations"*** for details.

16.2 RECOMMENDATIONS

Based on the traffic impact study, it is recommended that the proposed Palmietkuilen Open Pit Coal Mine, on Portions 1, 2, 4, 9, 13 and 19 of the farm Palmietkuilen 241-JR, be approved for:

- Zoning : Open pit coal mine

The approval is subject to the following:

i. The applicant site is affected by several existing and future provincial roads. The final access arrangements are subject to Gautrans approval and general conditions.

ii. Reserve one parking bay at the office as a taxi bay.

iii. A registered professional civil engineer to confirm the final pavement design for Road D1225.

iv. The open cast mining activities will be affected by the alignment of Road D1133. The provision of crossing points along the road will have to be discussed with Gautrans.

v. The road reserve required for the provincial roads (K134, PWV 19, Road D1133 & Road D1255) to be excluded from the approval of this application. No mining activities may take place in the future road reserves.

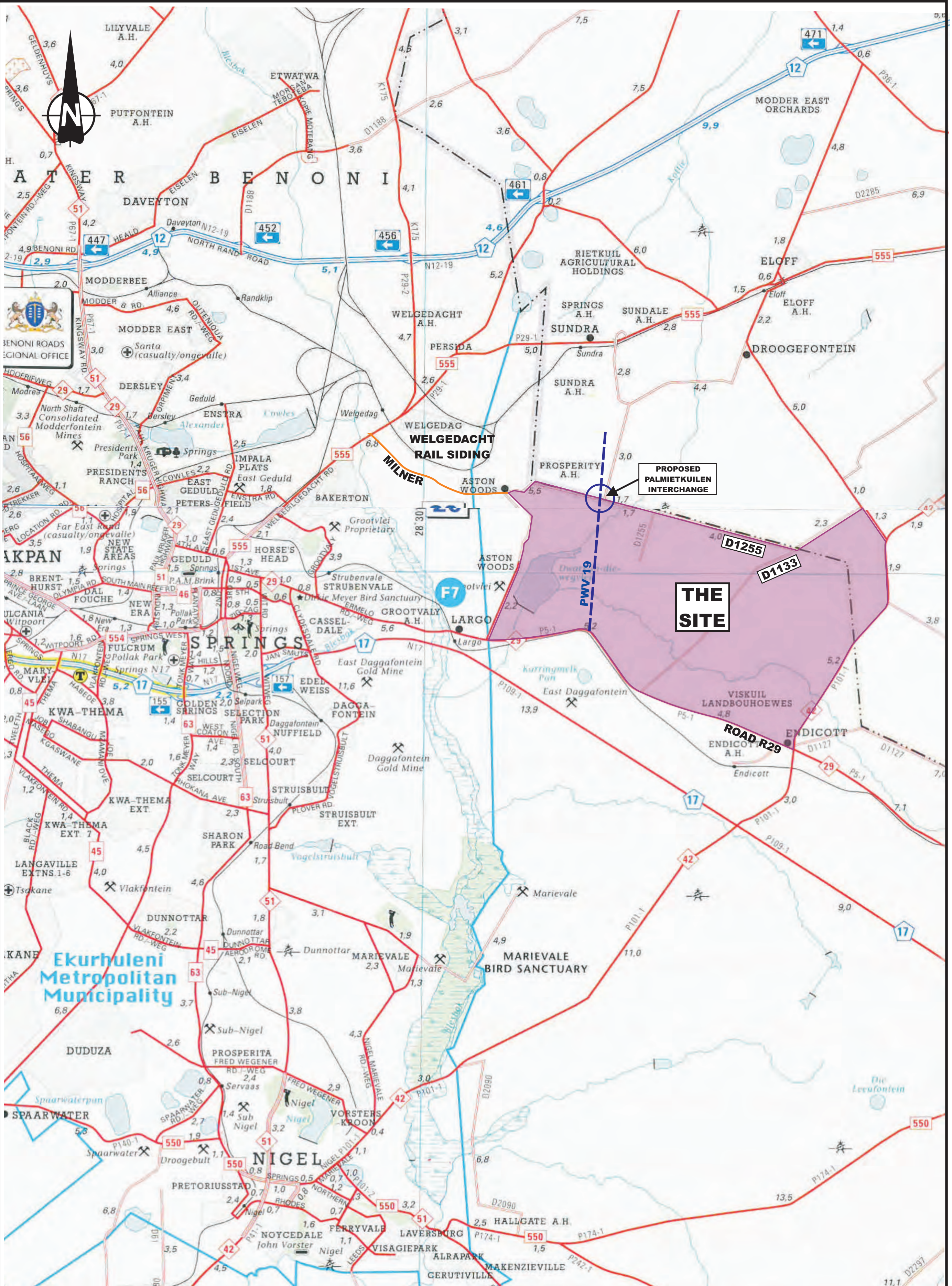
vi. crossing of The following access arrangements are proposed for the applicant site and will have to be finalised at site development phase:

- The site access is proposed approximately 1 100m east of the future Palmietkuilen Access Interchange. The final position is subject the approval of the Gauteng Provincial Administration (Gautrans).
- Two inbound lanes and two outbound lanes. One lane is for hauling trucks and the second lane for general public and worker traffic.
- Minimum lane width of 3.7m, with a clearance of 4.2m.
- Any access control system to be setback a minimum distance of 60m from the road reserve of Road D1125 and the centre of the access control boom/gate.
- Minimum vertical clearance of 5.2m.
- Bellmouth radii at the intersection on Road D1255 to be a minimum of 12.5m. The final radii to be used are subject to a detail design of the road network.

vii. **Surfacing of Road D1255:** A professional civil engineer need to determine the pavement design requirements for the road.

FIGURES

Figure 1: Locality Plan
Figure 2: Gauteng Strategic Road Network
Figure 3: Aerial View of Study Area
Figure 4: Existing Weekday Peak Hour Traffic Volumes - Background Traffic
Figure 5: Trip Generation Characteristics - Proposed Development
Figure 6: Estimated (2016) Weekday Peak Hour Traffic Volumes - With Development Traffic
Figure 7: Estimated (2016) Weekday Peak Hour Traffic Volumes - Intersection 2 - Road D1255/Site Access



MARITENG CONSULTING ENGINEERS

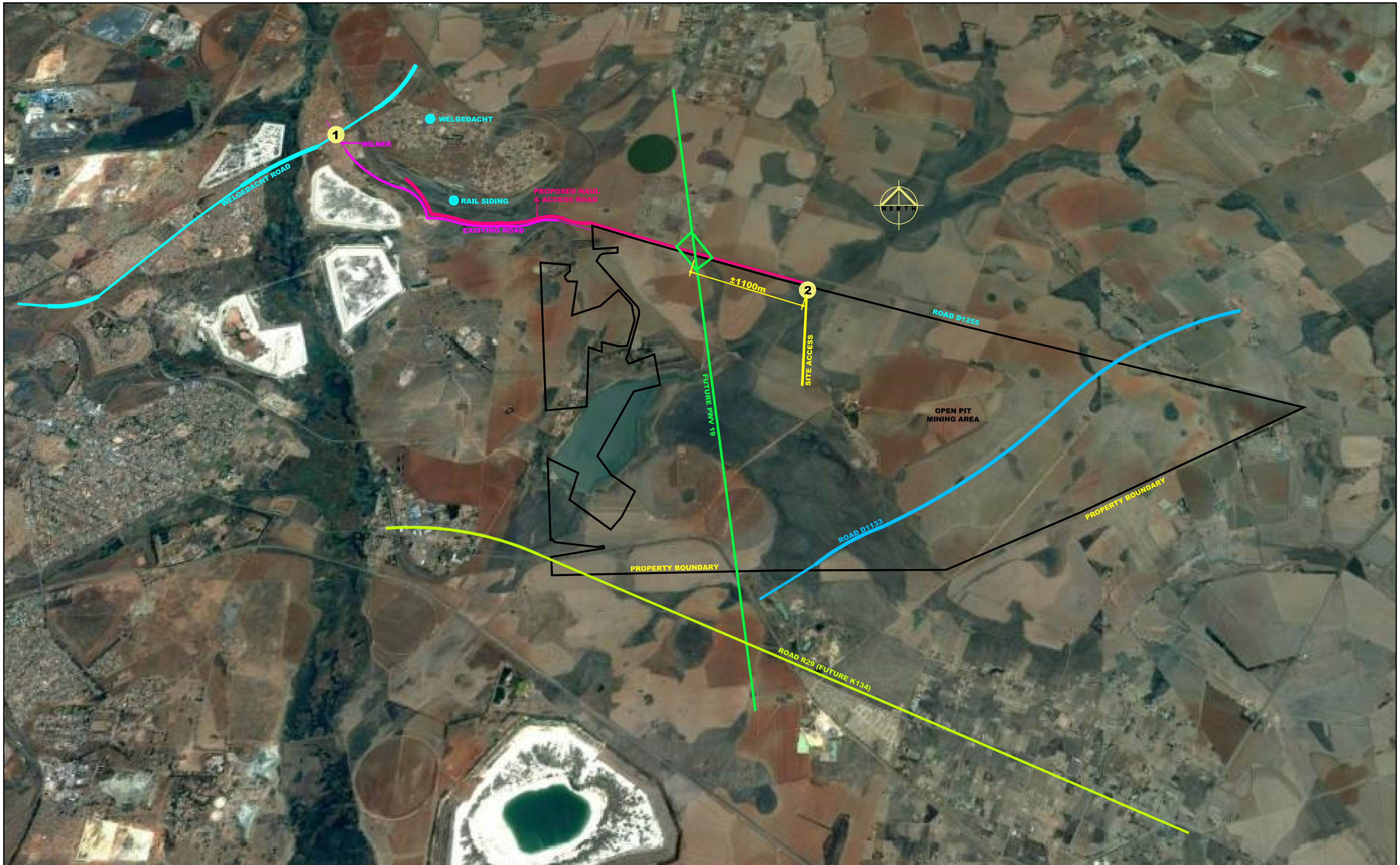
P.O. Box 8864
Verwoerd Park
1453

Tel: 011 902 4075
Fax: 086 547 8882
Cell: 082 854 7358

PALMIETKUILEN OPEN CAST MINE

LOCALITY PLAN

FIGURE 1

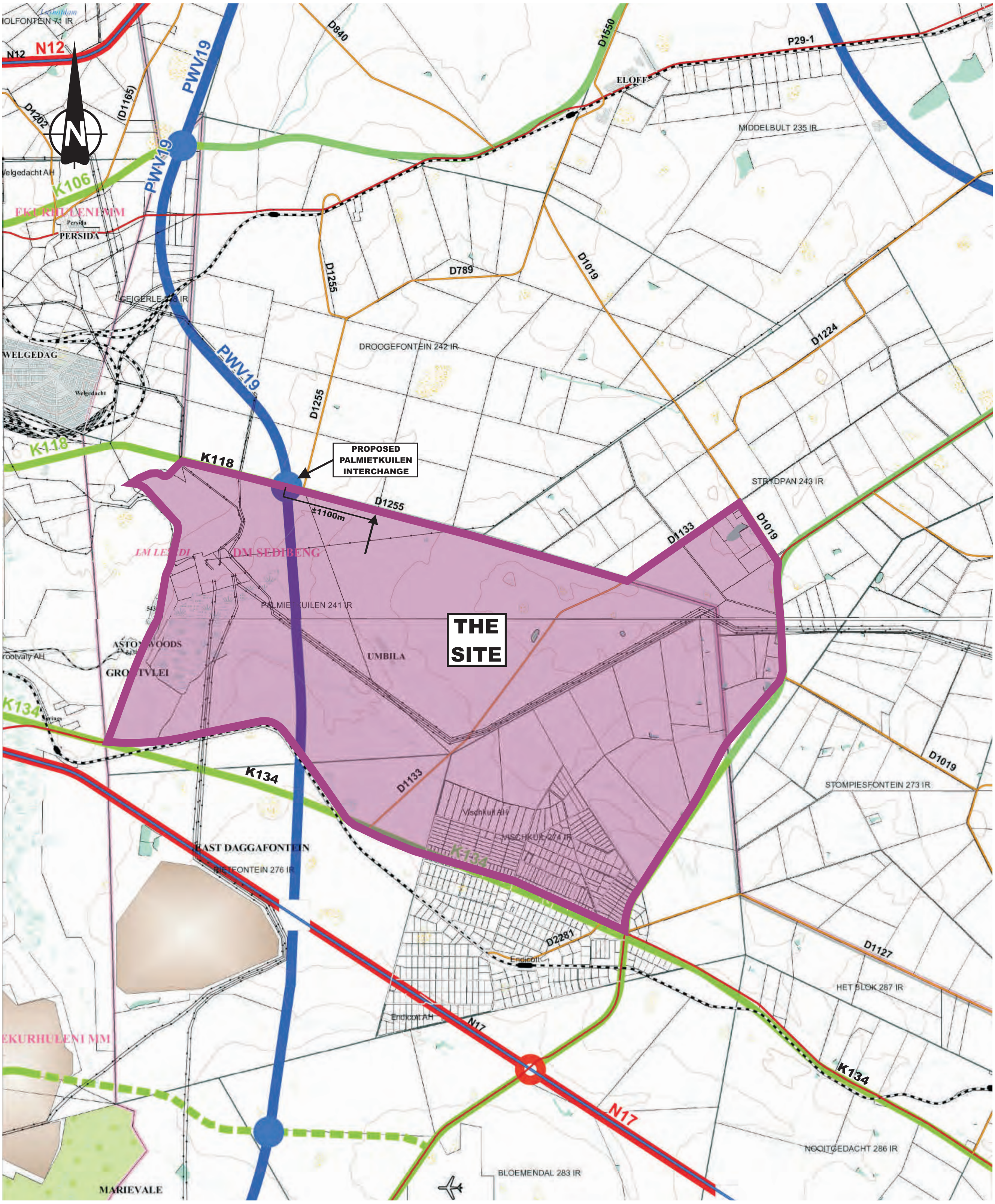


MARITENG CONSULTING ENGINEERS
P.O. Box 8864 Verwoerd Park 1453
Tel: 011 902 4075
Fax: 086 547 8882
Cell: 082 854 7358

PALMIETKUILEN OPEN CAST MINE

AERIAL VIEW OF STUDY AREA

FIGURE 2



MARITENG CONSULTING ENGINEERS

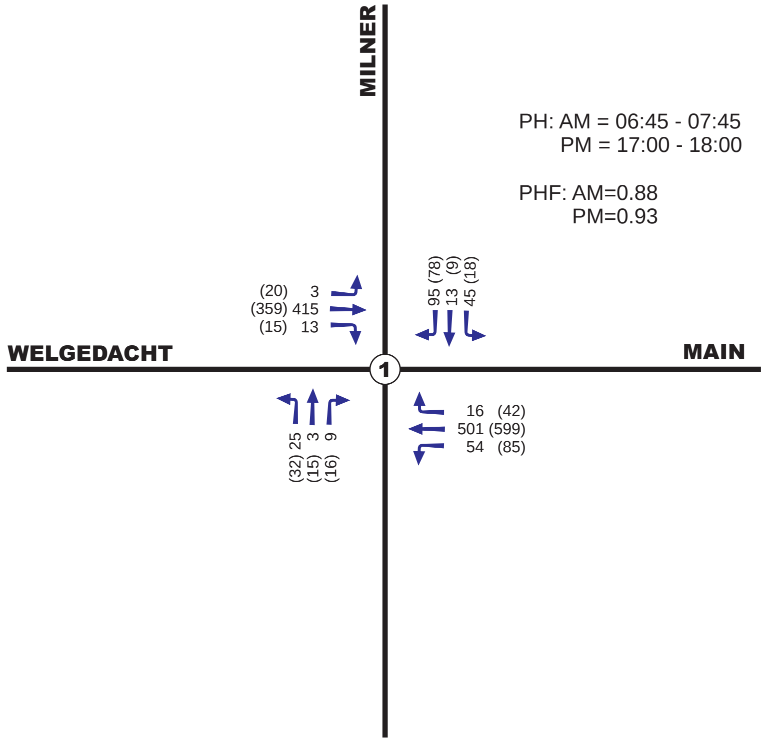
P.O. Box 8864
Verwoerd Park
1453

Tel: 011 902 4075
Fax: 086 547 8882
Cell: 082 854 7358

PALMIETKUILEN OPEN CAST MINE

GAUTENG STRATEGIC ROAD NETWORK

FIGURE 3



LEGEND:

5 - AM PEAK
(8) - PM PEAK

PH: AM = 06:45 - 07:45
PM = 17:00 - 18:00

PHF: AM=0.88
PM=0.93

Mariteng Consulting Engineers
P.O. Box 8864
Verwoerd Park
1453
Tel: 011 902 4075
Fax: 086 547 8882
Cell: 082 854 7358

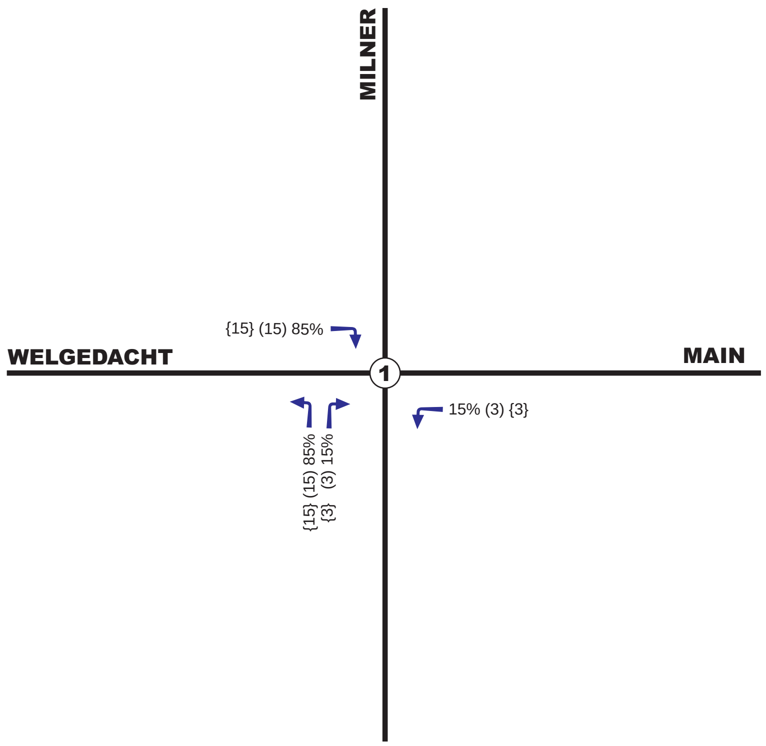
PALMIETKUILEN OPEN CAST MINE

EXISTING WEEKDAY PEAK HOUR TRAFFIC VOLUMES - BACKGROUND TRAFFIC

FIGURE 4

LEGEND:

15% - TRIP DISTRIBUTION (%)
(15) - AM PEAK TRIP ASSIGNMENT (VEHICLES/HR)
{15} - PM PEAK TRIP ASSIGNMENT (VEHICLES/HR)



	IN	OUT	TOTAL
AM	18	18	36
PM	18	18	36

NOTE:

HAULING TRUCK TRAFFIC DOES NOT USE THIS INTERSECTION.

MARITENG CONSULTING ENGINEERS
P.O. Box 8864
Verwoerd Park
1453
Tel: 011 902 4075
Fax: 086 547 8882
Cell: 082 854 7358

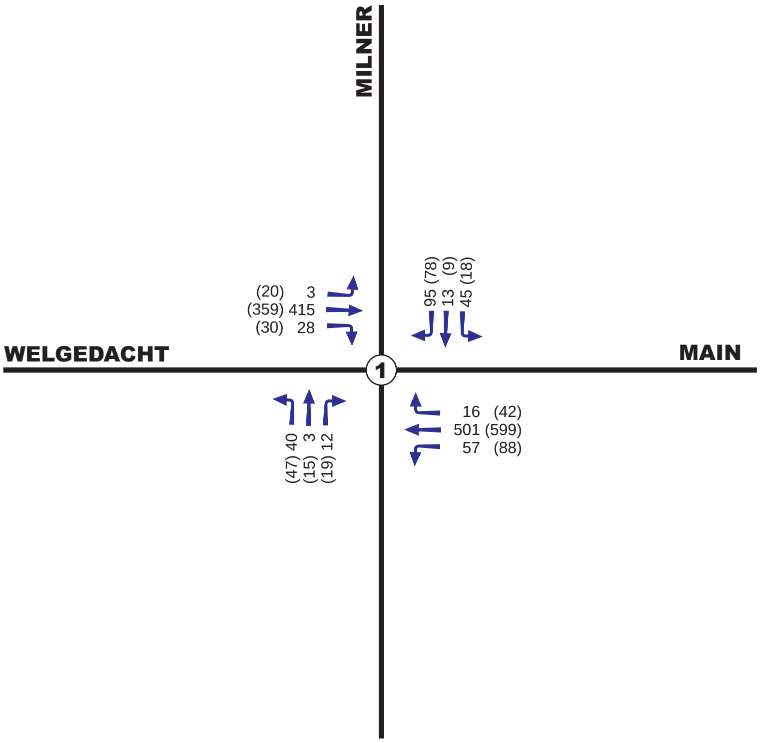
PALMIETKUILEN OPEN CAST MINE

TRIP GENERATION CHARACTERISTICS - PROPOSED DEVELOPMENT

FIGURE 5

LEGEND:

16 - AM PEAK
(42) - PM PEAK



MARITENG CONSULTING ENGINEERS
P.O. Box 8864
Verwoerd Park
1453
Tel: 011 902 4075
Fax: 086 547 8882
Cell: 082 854 7358

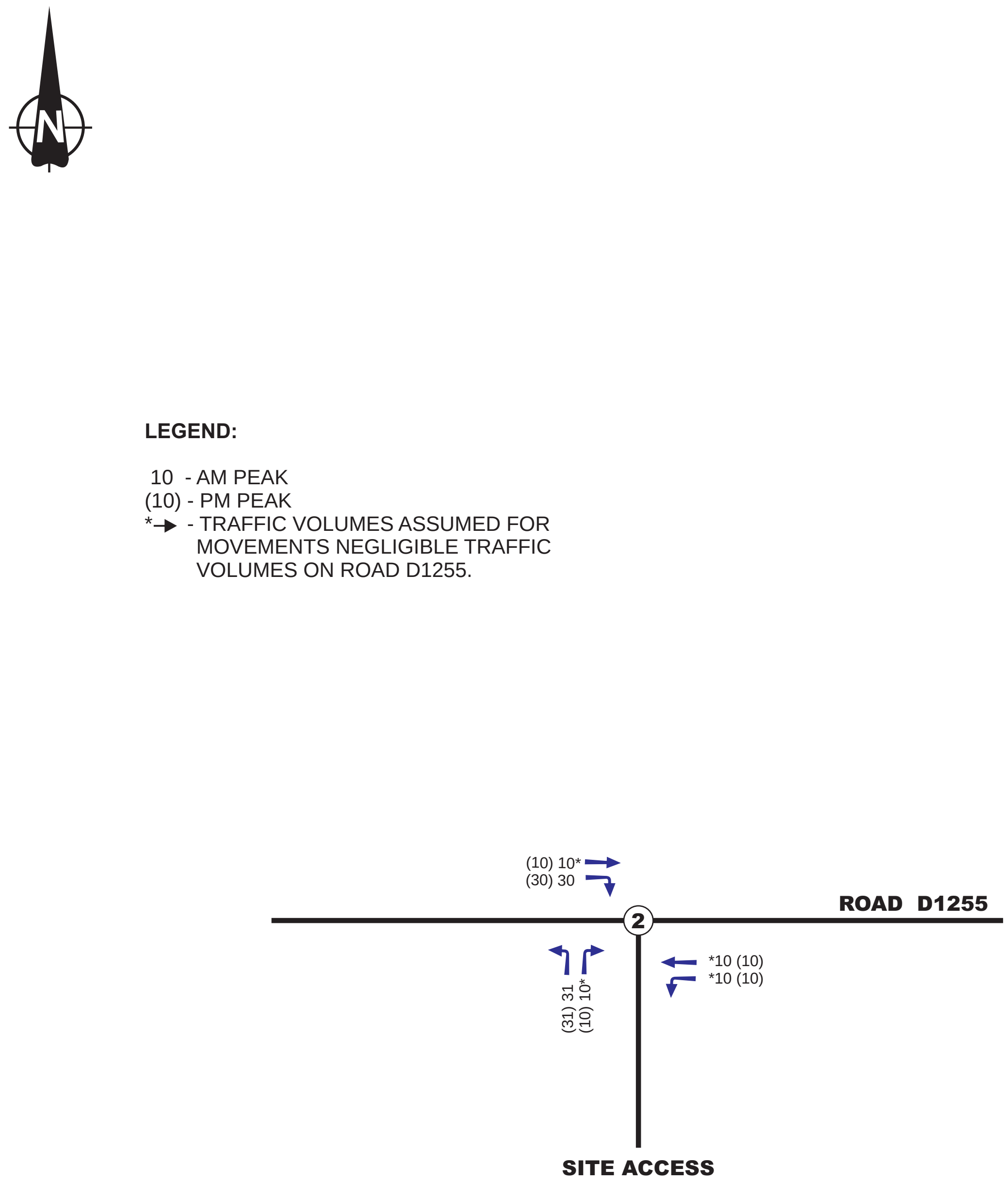
PALMIETKUILEN OPEN CAST MINE

ESTIMATED (2016) WEEKDAY PEAK HOUR TRAFFIC VOLUMES - WITH DEVELOPMENT TRAFFIC

FIGURE 6

LEGEND:

10 - AM PEAK
(10) - PM PEAK
*→ - TRAFFIC VOLUMES ASSUMED FOR MOVEMENTS NEGLIGIBLE TRAFFIC VOLUMES ON ROAD D1255.



	IN	OUT	TOTAL
AM	30	31	61
PM	30	31	61

NOTE:

VOLUMES INCLUDE "GENERAL" AND "HAULING TRUCK" TRIPS FOR NEW MINE.

MARITENG CONSULTING ENGINEERS
P.O. Box 8864
Verwoerd Park
1453
Tel: 011 902 4075
Fax: 086 547 8882
Cell: 082 854 7358

PALMIETKUILEN OPEN CAST MINE

ESTIMATED (2016) WEEKDAY PEAK HOUR TRAFFIC VOLUMES - INTERSECTION 2: ROAD D1255/SITE ACCESS

FIGURE 7

ANNEXURE A:

EXTRACT FROM EIA APPLICATION

EXECUTIVE SUMMARY

Introduction

Pandospan (Pty) Ltd(a subsidiary of the Canyon Group), on behalf of Anglo Operations Pty Limited (AOL), is applying for a Mining Right to mine coal on Portions 1, 2, 4, 9, 13 and 19 of the Farm Palmietkuilen 241 IR, near Springs in the Gauteng Province of South Africa. The proposed Project area falls within the Sedibeng District Municipality and borders the Province of Mpumalanga.

Project applicant

The details of the Project Applicant are included in the table below.

Company name:	Anglo Operations Pty Limited
Contact person:	Carol- Ann Mocke
Physical address:	55 Marshall Street, Johannesburg, 2001
Telephone:	011 638 3658
Cell phone:	073 179 5179
Email:	carol-ann.mocke@angloamerican.com

Project overview

The proposed Palmietkuilen Coal Mining Project is a "greenfields" Project, meaning there is currently no mining activity on the proposed site. AOL proposes to extract the coal through open pit mining and the Project is anticipated to have a Life of Mine of approximately 47 years. It is anticipated that the mine will produce 2 400 000 tonnes of coal per annum to supply to local and international markets.

The proposed infrastructure required on site includes the following:

- Access and haul roads;
- Office blocks;
- Workshops;
- A coal processing plant including a filter press;
- Stockpile areas;
- Pollution control dams;
- Slurry dams;
- A return water dam;
- Stormwater trenches and berms; and
- A future development area (to be confirmed).

The establishment of the open pit will lead to the establishment of topsoil-, subsoil-, and overburden stockpiles. Once coal is extracted it will initially be stored on a Run of Mine (ROM) stockpile before being fed to a processing plant on site which will crush and screen the coal. From there, slurry will be sent to the dense media separator and the remaining solid discard will be placed back into the void. Coal product will be stockpiled on the product stockpile and thereafter transported by truck to the Welgedacht Siding located approximately 2 kilometres (km) from the proposed Project area. The Welgedacht siding is linked to the major rail networks in the area and coal will be transported from there to the relevant markets. Surface water management infrastructure will also be required, thus a pollution control dam will be constructed for all mine-affected water. A slurry dam is also proposed and the slurry will be fed to a Filter Press Plant to extract coal fines to convert into coal "cakes", which will also be sold as product.

Purpose of this report

The Environmental Impact Assessment (EIA) process is considered a tool to identify and manage potential impacts on the environment as a result of a particular project. Environmental risks associated with such a project are also identified and mitigation measures proposed. The completion of an EIA is a regulatory requirement in terms of the provisions of the National Environmental Management Act, 1997 (Act 107 of 1998) (NEMA) and the EIA process which is regulated in accordance with the EIA Regulations, 2014[1] (the EIA 2014 Regulations). The overarching purpose of the EIA process is to determine, assess and evaluate the consequences (positive and negative) of a proposed development, activity or project.

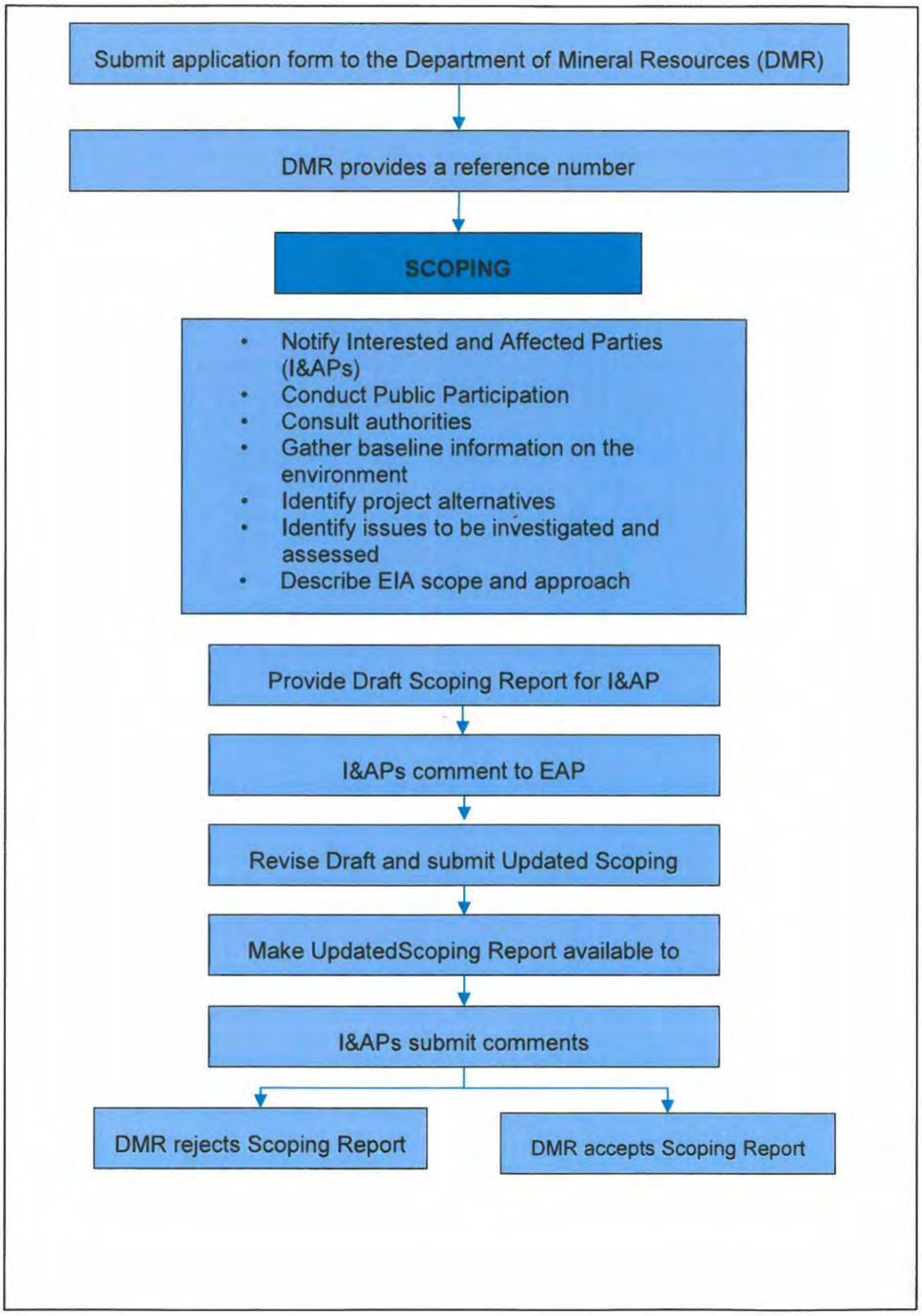
This Scoping Report forms part of the EIA process and aims to identify those biophysical and socio-economic issues or concerns that require investigation as well as determine feasible alternatives. This information is then used to determine the scope of work for the impact assessment phase of the EIA process. During the scoping phase, people interested or affected by the project are informed of the project as well as provided the opportunity to raise issues and concerns they may have. The process diagram for the scoping phase is provided in the diagram below.

The objectives of the scoping report are, therefore, to:

- Describe the Project and the associated activities;
- Provide a summary of the Baseline Environment;
- Predict potential positive and negative impacts as a result of the Project and its activities;
- Provide Plan of Study for the EIA Phase; and

[1] GN R982 published in Government Gazette 38282 of 4 December 2014

- Share the Project information with I&APs and to record the issues and comments raised by all stakeholders.



Environmental Consultants

Digby Wells Environmental (Pty) Ltd. has been appointed by Pandospan (a subsidiary of the Canyon Group) to undertake the enviro-legal applications relevant to this Project. The details of the Environmental Assessment Practitioner are contained in the table below.

Company name:	Digby Wells Environmental (Pty) Ltd
Contact person:	Stephanie Aken
Physical address:	48 Grosvenor Road, Bryanston,
Telephone:	+27 11 789 9495
Cell phone:	-
Email:	Stephanie.Aken@digbywells.com

Summary of the Baseline Environment

The proposed mine boundary encompasses several tributaries of the Blesbokspruit, most notably the stream on which Aston Lake is located. The Blesbokspruit, 3 km west of the site is regarded as a highly important wetland system in Gauteng and South Africa, and is classified as a Ramsar site (further explained in Section 10.1.10 of this report). The open pit will be located to the east of the Aston Lake; however, several pans and wetlands will be removed to establish the open pit. Based on the South African Aquifer Classification System (Parsons, 1995), the intergranular and fractured aquifer underlying the Palmietkuilen Coal Mining project area is classified as a Minor Aquifer System, with distinct zones that can be classified as Major Aquifer Systems towards northeast and southeast of the project boundary.

The project site falls within the grassland biome of South Africa and the regional vegetation types include the Andesite Mountain Bushveld, Soweto Highveld Grassland and Eastern Highveld Grassland. Seventy-eight plant species have been recorded, three of which have been allocated Red Data Status (one listed as Near-Threatened and one as Vulnerable). The Project site is also located 10 km north of the Marievale Bird Sanctuary (part of the Blesbokspruit) therefore wetland avifauna are expected to occur.

The Project site is currently characterised by agricultural land use, with limited land capability. There are two graveyards within the proposed location of the open pit and several other sites of historical importance surrounding the Project boundary. Residential areas border the Project boundary, namely Largo, Vischkuil, Welgedacht, Endicott and Strubenvale.

Approach and methodology for the Public Participation Process

A Public Participation Process has been initiated, which is central to the investigation of environmental and social impacts, as it is important that stakeholders who are affected by the Project are given an opportunity to identify concerns to ensure that local knowledge, needs and values are understood and taken into consideration as part of the EIA process.

This Draft Scoping Report was available for public comment for a period of 30 days and all comments or concerns raised during this period have been recorded and responded to in the Comments and Responses Report (CRR). The following activities were undertaken as part of the Scoping Phase:

- A Background Information Document (BID) was distributed;
- A newspaper advertisement was placed in the Springs Advertiser on 12 August 2016;
- An announcement letter including a registration form was distributed;
- Site notices were also placed around the site;
- A Scoping Phase Public Meeting was held on 24 August 2016; and
- Hard copies of the Draft Scoping Reports were made available at the Springs, Bakerton and Heidelberg public libraries, and an electronic copy was available for download from the Digby Wells website.

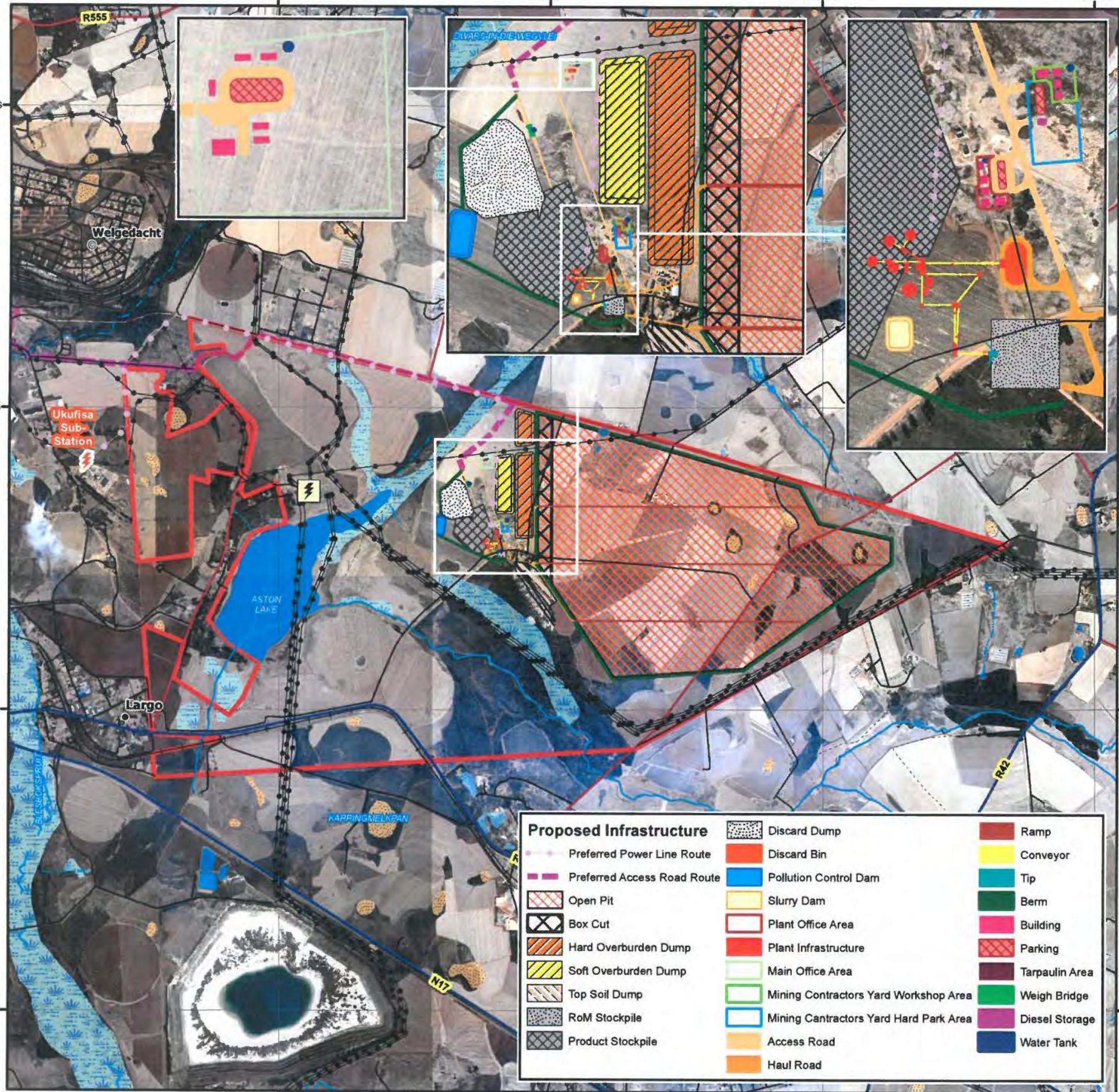
Project alternatives

The Project alternatives considered for this project include the following:

- Design and layout of the mine and mine-related infrastructure: the preliminary layout has been considered for the Scoping Report; however, this will be refined during the EIA Phase;
- Mining method: Open pit and underground mining alternatives have been considered in this document;
- Transportation of coal product: The options to transport coal via road or rail have been considered; and
- The "No-go" alternative: This alternative refers to the status quo remaining and the project not going ahead.

Conclusions and recommendations

The actual extent of the environmental impact is yet to be assessed; however, the project site has been identified as ecologically sensitive and for this Project to be approved, stringent mitigation measures will need to be developed. The preliminary mine plan (attached hereto as Appendix 4) has been designed in such a way to place the pit and mine infrastructure away from the residential areas surrounding the site, as well as avoiding the Blesbokspruit and tributaries. The final layout will be assessed and the relevant Specialist recommendations made for the placement of infrastructure during the EIA Phase.



Plan 2

Palmietkuilen Project EIA

Proposed Infrastructure

Legend

- Mining Right Boundary
- Other Town
- Settlement
- Sub-Station
- Ukufisa Sub-Station
- Power Line
- Arterial / National Route
- Main Road
- Minor Road
- Track
- Railway Line
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam / Lake
- Wetland
- Perennial Pan
- Non-Perennial Pan / Stream

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 29°E

Ref #: meg.CNC4065.201607.107
Revision Number: 5
Date: 24/03/2017

N

0 0.5 1 2 3
Kilometres
1:50 000

www.digbywells.com

ANNEXURE B:

MINING OPERATIONS - LIFE OF MINE PLAN

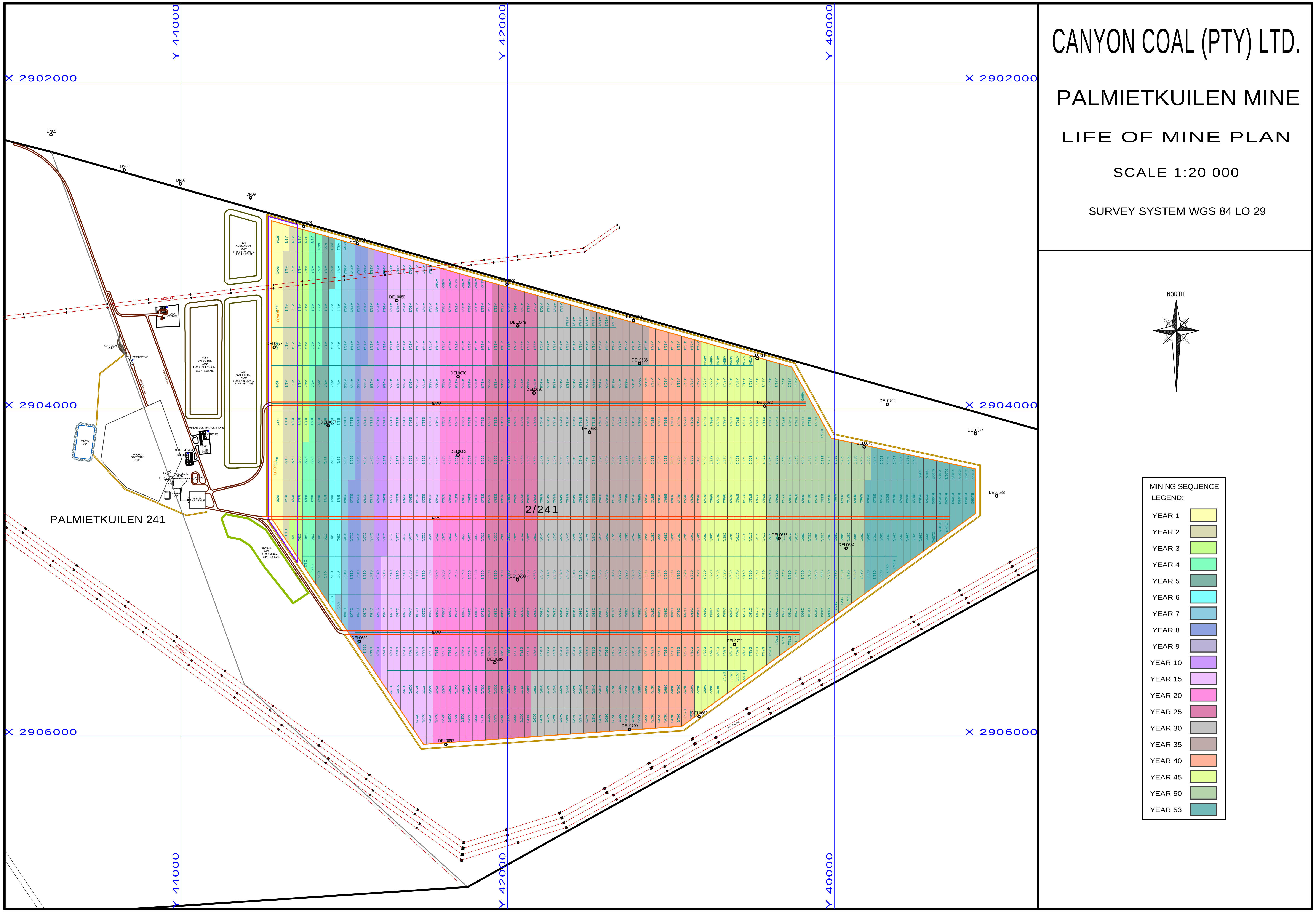
CANYON COAL (PTY) LTD.

PALMIETKUILEN MINE

LIFE OF MINE PLAN

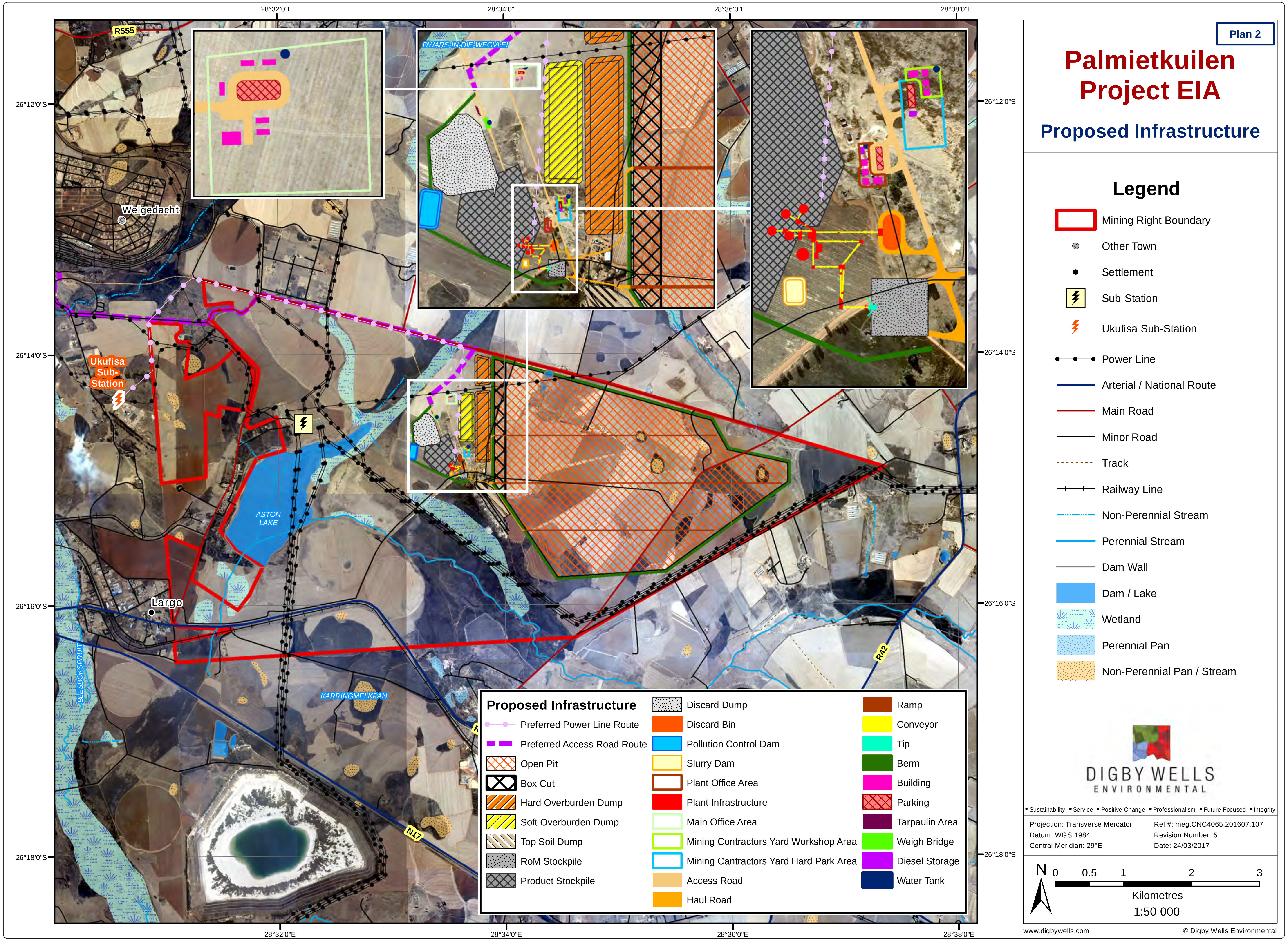
SCALE 1:20 000

SURVEY SYSTEM WGS 84 LO 29



ANNEXURE C:

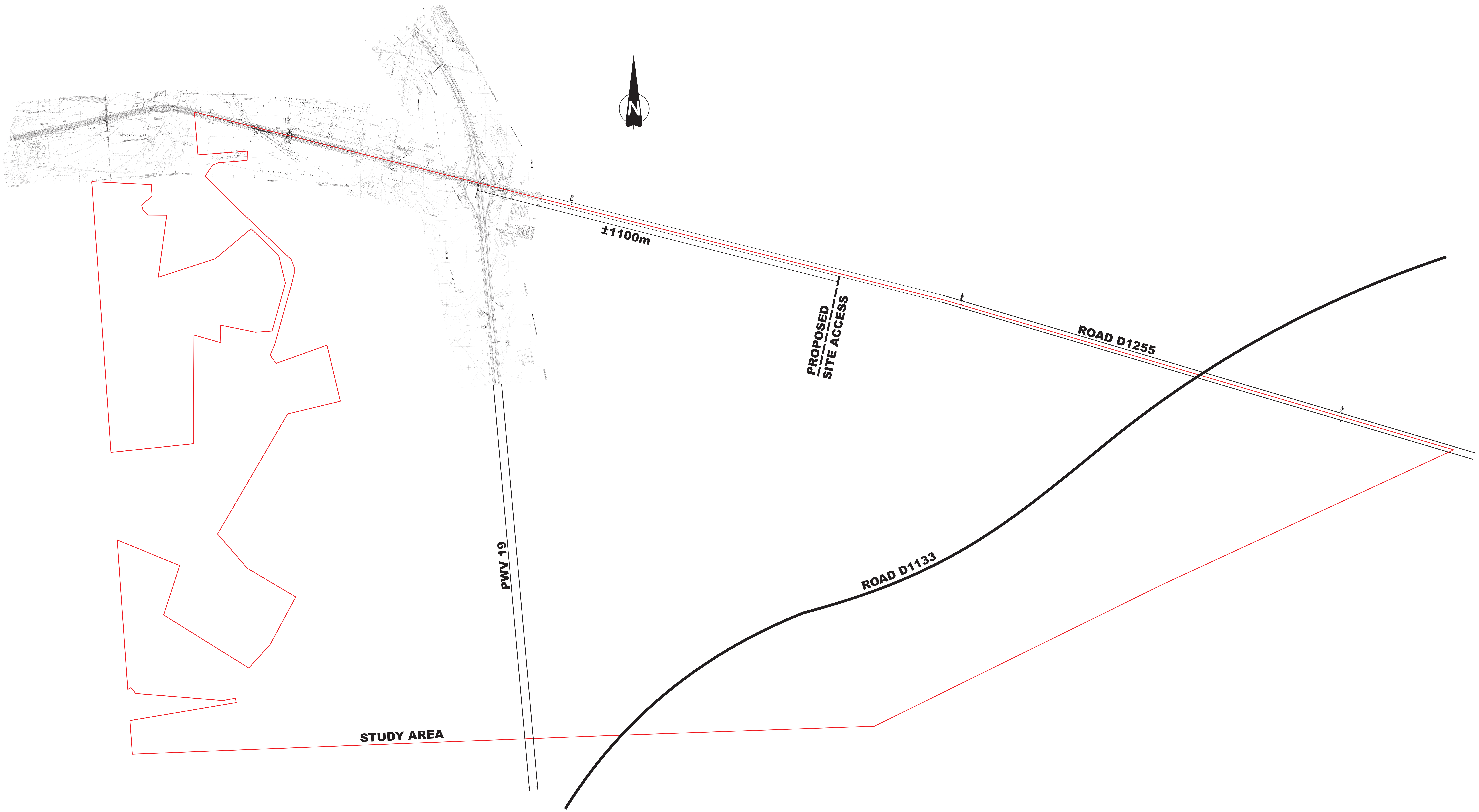
DIGBY WELLS PLAN NO.: 2 - PROPOSED INFRASTRUCTURE



Plan 2
Palmietkuilen Project EIA
Proposed Infrastructure
Legend
Mining Right Boundary
Other Town
Settlement
Sub-Station
Ukufisa Sub-Station
Power Line
Arterial / National Route
Main Road
Minor Road
Track
Railway Line
Non-Perennial Stream
Perennial Stream
Dam Wall
Dam / Lake
Wetland
Perennial Pan
Non-Perennial Pan / Stream
Proposed Infrastructure
Preferred Power Line Route
Preferred Access Road Route
Open Pit
Box Cut
Hard Overburden Dump
Soft Overburden Dump
Top Soil Dump
RoM Stockpile
Product Stockpile
Discard Dump
Discard Bin
Pollution Control Dam
Slurry Dam
Plant Office Area
Plant Infrastructure
Main Office Area
Mining Contractors Yard Workshop Area
Mining Cantractors Yard Hard Park Area
Access Road
Haul Road
Ramp
Conveyor
Tip
Berm
Building
Parking
Tarpaulin Area
Weigh Bridge
Diesel Storage
Water Tank
DIGBY WELLS ENVIRONMENTAL
• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity
Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 29°E
Ref #: meg.CNC4065.201607.107
Revision Number: 5
Date: 24/03/2017
N
0 0.5 1 2 3
Kilometres
1:50 000
www.digbywells.com
© Digby Wells Environmental
28°32'0"E
28°34'0"E
28°36'0"E
28°38'0"E
26°12'0"S
26°14'0"S
26°16'0"S
26°18'0"S
R555
Welgedacht
Ukufisa Sub-Station
ASTON LAKE
Largo
DWARS-IN-DIE-WEGVLEI
BLESBOKSPRUIT
KARRINGMELKPAN
N17
R42

ANNEXURE D:

PROPOSED ROAD RESERVE WIDENING REQUIREMENTS FOR PROVINCIAL ROADS - MARITENG PLAN NO.: 184-70-01



MARITENG CONSULTING ENGINEERS
P.O. Box 8864 Verwoerd Park 1453
Tel: 011 902 4075
Fax: 086 547 8882
Cell: 082 854 7358

NR	DATE	AMENDMENTS	ENGINEER	DATE

PROJECT:

PALMIETKUILEN OPEN CAST MINE

PROPOSED ROAD RESERVE WIDENING REQUIREMENTS FOR PROVINCIAL ROADS

SCALE: N.T.S.

DATE: 28/03/17

REVISION: 0

PLAN NO. 184-70-01

ANNEXURE E:

DETAILED INTERSECTION TRAFFIC SURVEY RESULTS

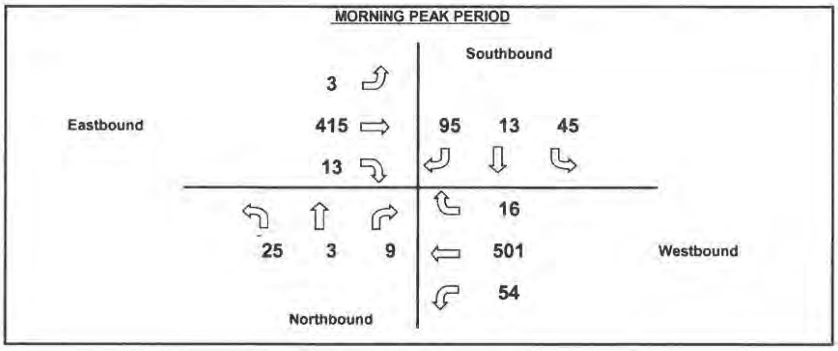
MARITENG CONSULTING ENGINEERS
INTERSECTION COUNTS

Project: PALMIETKUILEN OPEN MINE
Project No.: 184/70
Intersection: WELTEVREDEN/MAIN & MILNER
Day & Date WEDNESDAY, 2 NOVEMBER 2016
Time Period MORNING PEAK PERIOD

Starting Time	Milner Northbound				Weltevreden Eastbound				Milner Southbound				Main Westbound				Intersection	
	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Total	Hour
06:00	6	1	5	12	3	56	6	65	4	3	15	22	4	65	2	71	170	
06:15	7	1	4	12	4	105	2	111	9	3	30	42	7	116	7	130	295	
06:30	5	0	3	8	1	89	1	91	11	1	27	39	16	111	4	131	269	
06:45	8	0	3	11	1	119	2	122	14	6	26	46	17	138	4	159	338	1072
07:00	5	1	2	8	1	108	5	114	9	3	26	38	10	119	4	133	293	1195
07:15	7	2	1	10	0	99	5	104	11	3	16	30	11	133	4	148	292	1192
07:30	7	0	0	7	1	120	5	126	10	2	12	24	12	112	8	132	289	1212
07:45	0	0	2	2	2	46	6	54	2	3	20	25	7	75	2	84	165	1039
08:00	0	1	0	1	0	33	2	35	4	1	10	15	9	50	3	62	113	859
08:15	1	0	3	4	0	36	1	37	2	2	8	12	12	32	4	48	101	668
Total	46	6	23	75	13	811	35	859	76	27	190	293	105	951	42	1098	2325	
Peak Hour	25	3	9	37	3	415	13	431	45	13	95	153	54	501	16	571	1192	
Peak 15 min	8	2	3	11	1	119	5	122	14	6	27	46	17	138	4	159	338	
PHF				0.84				0.88				0.83				0.90	0.88	

Intersection Summary

Peak Hour: **06:45 - 07:45**
Peak Hour Volume: **1192**
Peak 15 minute Volume: **338**
PHF **0.88**

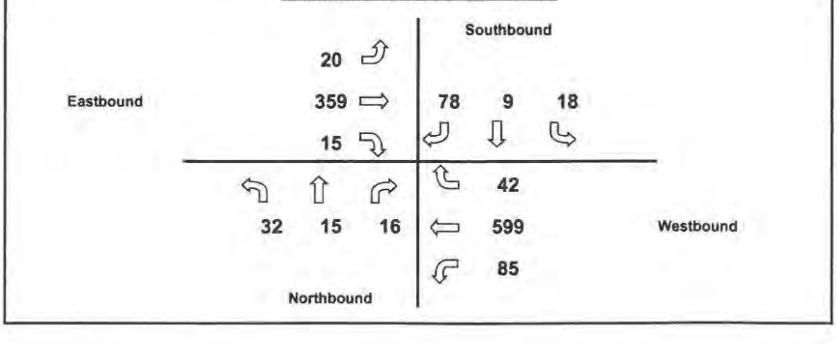


Time Period WEEKDAY AFTERNOON PEAK PERIOD

Starting Time	Milner Northbound				Weltevreden Eastbound				Milner Southbound				Main Westbound				Intersection	
	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Total	Hour
15:30	2	3	0	5	0	35	1	36	2	2	5	9	9	64	1	74	124	
15:45	3	1	0	4	1	69	1	71	7	3	15	25	14	116	6	136	236	
16:00	6	2	3	11	4	139	6	149	9	4	6	19	22	136	8	166	345	
16:15	3	0	0	3	2	49	1	52	1	0	12	13	14	89	8	111	179	884
16:30	6	1	0	7	1	52	0	53	7	3	8	18	12	48	11	71	149	909
16:45	2	0	0	2	10	78	0	88	9	3	11	23	17	156	13	186	299	972
17:00	6	10	5	21	2	90	5	97	3	1	19	23	21	153	13	187	328	955
17:15	4	0	4	8	5	91	2	98	1	2	16	19	15	146	11	172	297	1073
17:30	7	2	4	13	5	93	2	100	10	1	20	31	32	163	8	203	347	1271
17:45	15	3	3	21	8	85	6	99	4	5	23	32	17	137	10	164	316	1288
18:00	10	0	2	12	5	91	2	98	8	6	16	30	29	131	27	187	327	1287
18:15	5	0	2	7	2	40	0	42	7	4	13	24	32	165	21	218	291	1281
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	934
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	618
Total	69	22	23	114	45	912	26	983	68	34	164	266	234	1504	137	1875	3238	
Peak Hour	32	15	16	63	20	359	15	394	18	9	78	105	85	599	42	726	1288	
Peak 15 min	15	10	5	21	8	93	6	100	10	5	23	32	32	163	13	203	347	
PHF				0.75				0.99				0.82				0.89	0.93	

Intersection Summary

Peak Hour: **17:00 - 18:00**
Peak Hour Volume: **1288**
Peak 15 minute Volume: **347**
PHF **0.93**



ANNEXURE F:

SIDRA CAPACITY ANALYSIS

Intersection 1: Weltevreden/Main Road & Milner Street

MOVEMENT SUMMARY

Site: 101 [SC1 2019 AM Background]

Palmietkuilen Open Coal Mine
Weltevreden/Main & Milner
SC1 - 2019 AM Peak - Background traffic
Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)
Design Life Analysis (Practical Capacity): Results for 2 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Milner - NB											
1	L2	30	0.0	0.071	10.8	LOS B	0.5	3.2	0.52	0.64	50.7
2	T1	4	0.0	0.071	5.2	LOS A	0.5	3.2	0.52	0.64	51.3
3	R2	11	0.0	0.071	10.8	LOS B	0.5	3.2	0.52	0.64	50.4
Approach		45	0.0	0.071	10.4	LOS B	0.5	3.2	0.52	0.64	50.7
East: Main - WB											
4	L2	65	0.0	0.046	6.1	LOS A	0.2	1.4	0.16	0.59	53.7
5	T1	604	0.0	0.526	8.1	LOS A	12.2	85.1	0.56	0.50	53.0
6	R2	19	0.0	0.040	15.5	LOS B	0.4	2.6	0.51	0.67	46.5
Approach		688	0.0	0.526	8.1	LOS A	12.2	85.1	0.52	0.51	52.8
North: Milner - SB											
7	L2	54	0.0	0.450	21.4	LOS C	4.2	29.4	0.89	0.79	44.3
8	T1	16	0.0	0.450	15.8	LOS B	4.2	29.4	0.89	0.79	44.7
9	R2	115	0.0	0.450	21.4	LOS C	4.2	29.4	0.89	0.79	44.0
Approach		184	0.0	0.450	20.9	LOS C	4.2	29.4	0.89	0.79	44.1
West: Weltevreden - WB											
10	L2	4	0.0	0.003	6.4	LOS A	0.0	0.1	0.19	0.57	53.6
11	T1	500	0.0	0.394	7.5	LOS A	9.4	65.5	0.52	0.46	53.4
12	R2	16	0.0	0.039	17.1	LOS B	0.3	2.3	0.54	0.67	45.5
Approach		520	0.0	0.394	7.8	LOS A	9.4	65.5	0.52	0.47	53.1
All Vehicles		1437	0.0	0.526	9.7	LOS A	12.2	85.1	0.57	0.54	51.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	55	6.8	LOS A	0.1	0.1	0.41	0.41
P2	East Full Crossing	55	30.7	LOS D	0.1	0.1	0.88	0.88
P3	North Full Crossing	55	6.8	LOS A	0.1	0.1	0.41	0.41
P4	West Full Crossing	55	30.7	LOS D	0.1	0.1	0.88	0.88
All Pedestrians		219	18.8	LOS B			0.65	0.65

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

MOVEMENT SUMMARY

Site: 101 [SC2 2024 AM Background]

Palmietkuilen Open Coal Mine
Weltevreden/Main & Milner
SC2 - 2024 AM Peak - Background traffic
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (User-Given Cycle Time)
Design Life Analysis (Practical Capacity): Results for 7 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Milner - NB											
1	L2	35	0.0	0.087	10.8	LOS B	0.6	4.2	0.51	0.65	50.8
2	T1	4	0.0	0.087	5.1	LOS A	0.6	4.2	0.51	0.65	51.4
3	R2	13	0.0	0.087	10.7	LOS B	0.6	4.2	0.51	0.65	50.4
Approach		52	0.0	0.087	10.3	LOS B	0.6	4.2	0.51	0.65	50.7
East: Main - WB											
4	L2	75	0.0	0.053	6.2	LOS A	0.3	1.9	0.18	0.59	53.7
5	T1	700	0.0	0.610	8.7	LOS A	15.2	106.1	0.60	0.54	52.5
6	R2	22	0.0	0.053	16.7	LOS B	0.5	3.2	0.54	0.68	45.8
Approach		798	0.0	0.610	8.7	LOS A	15.2	106.1	0.56	0.55	52.4
North: Milner - SB											
7	L2	63	0.0	0.522	23.7	LOS C	5.1	35.6	0.91	0.82	43.1
8	T1	18	0.0	0.522	18.1	LOS B	5.1	35.6	0.91	0.82	43.5
9	R2	133	0.0	0.522	23.7	LOS C	5.1	35.6	0.91	0.82	42.8
Approach		214	0.0	0.522	23.2	LOS C	5.1	35.6	0.91	0.82	42.9
West: Weltevreden - WB											
10	L2	4	0.0	0.003	6.5	LOS A	0.0	0.1	0.21	0.57	53.5
11	T1	580	0.0	0.465	7.9	LOS A	11.5	80.3	0.55	0.49	53.1
12	R2	18	0.0	0.054	19.1	LOS B	0.4	2.9	0.59	0.69	44.4
Approach		602	0.0	0.465	8.2	LOS A	11.5	80.3	0.55	0.50	52.8
All Vehicles		1666	0.0	0.610	10.4	LOS B	15.2	106.1	0.60	0.57	51.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	60	6.8	LOS A	0.1	0.1	0.41	0.41
P2	East Full Crossing	60	30.7	LOS D	0.1	0.1	0.88	0.88
P3	North Full Crossing	60	6.8	LOS A	0.1	0.1	0.41	0.41
P4	West Full Crossing	60	30.7	LOS D	0.1	0.1	0.88	0.88
All Pedestrians		242	18.8	LOS B			0.65	0.65

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

MOVEMENT SUMMARY

Site: 101 [SC3 2019 AM With dev]

Palmietkuilen Open Coal Mine
Weltevreden/Main & Milner
SC3 - 2019 AM Peak - With dev traffic
Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)
Design Life Analysis (Practical Capacity): Results for 2 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Milner - NB											
1	L2	48	0.0	0.099	9.9	LOS A	0.6	4.5	0.47	0.65	51.3
2	T1	4	0.0	0.099	4.3	LOS A	0.6	4.5	0.47	0.65	51.9
3	R2	14	0.0	0.099	9.8	LOS A	0.6	4.5	0.47	0.65	50.9
Approach		66	0.0	0.099	9.6	LOS A	0.6	4.5	0.47	0.65	51.2
East: Main - WB											
4	L2	69	0.0	0.049	6.2	LOS A	0.2	1.7	0.18	0.59	53.7
5	T1	604	0.0	0.529	8.1	LOS A	12.2	85.1	0.56	0.50	53.0
6	R2	19	0.0	0.040	15.5	LOS B	0.4	2.6	0.51	0.67	46.5
Approach		692	0.0	0.529	8.1	LOS A	12.2	85.1	0.52	0.51	52.8
North: Milner - SB											
7	L2	54	0.0	0.450	21.4	LOS C	4.2	29.4	0.89	0.79	44.3
8	T1	16	0.0	0.450	15.8	LOS B	4.2	29.4	0.89	0.79	44.7
9	R2	115	0.0	0.450	21.4	LOS C	4.2	29.4	0.89	0.79	44.0
Approach		184	0.0	0.450	20.9	LOS C	4.2	29.4	0.89	0.79	44.1
West: Weltevreden - WB											
10	L2	4	0.0	0.003	6.4	LOS A	0.0	0.1	0.19	0.57	53.6
11	T1	500	0.0	0.394	7.5	LOS A	9.4	65.5	0.52	0.46	53.4
12	R2	34	0.0	0.084	17.5	LOS B	0.7	5.0	0.56	0.70	45.3
Approach		538	0.0	0.394	8.1	LOS A	9.4	65.5	0.52	0.48	52.8
All Vehicles		1480	0.0	0.529	9.8	LOS A	12.2	85.1	0.56	0.54	51.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	55	6.8	LOS A	0.1	0.1	0.41	0.41
P2	East Full Crossing	55	30.7	LOS D	0.1	0.1	0.88	0.88
P3	North Full Crossing	55	6.8	LOS A	0.1	0.1	0.41	0.41
P4	West Full Crossing	55	30.7	LOS D	0.1	0.1	0.88	0.88
All Pedestrians		219	18.8	LOS B			0.65	0.65

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

MOVEMENT SUMMARY

Site: 101 [SC4 2024 AM With dev]

Palmietkuilen Open Coal Mine
Weltevreden/Main & Milner
SC4 - 2024 AM Peak - With dev traffic
Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)
Design Life Analysis (Practical Capacity): Results for 7 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Milner - NB											
1	L2	56	0.0	0.122	10.3	LOS B	0.9	6.4	0.48	0.66	51.0
2	T1	4	0.0	0.122	4.6	LOS A	0.9	6.4	0.48	0.66	51.6
3	R2	17	0.0	0.122	10.2	LOS B	0.9	6.4	0.48	0.66	50.6
Approach		77	0.0	0.122	9.9	LOS A	0.9	6.4	0.48	0.66	51.0
East: Main - WB											
4	L2	80	0.0	0.057	6.3	LOS A	0.3	2.3	0.19	0.60	53.6
5	T1	700	0.0	0.613	8.7	LOS A	15.2	106.1	0.60	0.54	52.5
6	R2	22	0.0	0.053	16.7	LOS B	0.5	3.2	0.54	0.68	45.8
Approach		802	0.0	0.613	8.6	LOS A	15.2	106.1	0.56	0.55	52.4
North: Milner - SB											
7	L2	63	0.0	0.522	23.7	LOS C	5.1	35.6	0.91	0.82	43.1
8	T1	18	0.0	0.522	18.1	LOS B	5.1	35.6	0.91	0.82	43.5
9	R2	133	0.0	0.522	23.7	LOS C	5.1	35.6	0.91	0.82	42.8
Approach		214	0.0	0.522	23.2	LOS C	5.1	35.6	0.91	0.82	42.9
West: Weltevreden - WB											
10	L2	4	0.0	0.003	6.5	LOS A	0.0	0.1	0.21	0.57	53.5
11	T1	580	0.0	0.476	7.9	LOS A	11.5	80.3	0.55	0.49	53.1
12	R2	39	0.0	0.117	19.6	LOS B	0.9	6.4	0.61	0.71	44.1
Approach		623	0.0	0.476	8.6	LOS A	11.5	80.3	0.55	0.51	52.4
All Vehicles		1716	0.0	0.613	10.5	LOS B	15.2	106.1	0.60	0.57	50.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	60	6.8	LOS A	0.1	0.1	0.41	0.41
P2	East Full Crossing	60	30.7	LOS D	0.1	0.1	0.88	0.88
P3	North Full Crossing	60	6.8	LOS A	0.1	0.1	0.41	0.41
P4	West Full Crossing	60	30.7	LOS D	0.1	0.1	0.88	0.88
All Pedestrians		242	18.8	LOS B			0.65	0.65

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

MOVEMENT SUMMARY

Site: 101 [SC5 2019 PM Background]

Palmietkuilen Open Coal Mine
Weltevreden/Main & Milner
SC5 - 2019 PM Peak - Background traffic
Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)
Design Life Analysis (Practical Capacity): Results for 2 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Milner - NB											
1	L2	37	0.0	0.186	17.7	LOS B	1.4	9.6	0.75	0.69	46.8
2	T1	17	0.0	0.186	12.1	LOS B	1.4	9.6	0.75	0.69	47.3
3	R2	18	0.0	0.186	17.7	LOS B	1.4	9.6	0.75	0.69	46.5
Approach		72	0.0	0.186	16.4	LOS B	1.4	9.6	0.75	0.69	46.9
East: Main - WB											
4	L2	97	0.0	0.068	6.1	LOS A	0.3	2.2	0.17	0.59	53.7
5	T1	683	0.0	0.544	5.4	LOS A	11.5	80.8	0.47	0.43	55.1
6	R2	48	0.0	0.075	11.0	LOS B	0.7	4.8	0.39	0.67	49.3
Approach		828	0.0	0.544	5.8	LOS A	11.5	80.8	0.43	0.46	54.6
North: Milner - SB											
7	L2	21	0.0	0.449	27.6	LOS C	3.3	22.9	0.95	0.78	41.2
8	T1	10	0.0	0.449	22.0	LOS C	3.3	22.9	0.95	0.78	41.6
9	R2	89	0.0	0.449	27.5	LOS C	3.3	22.9	0.95	0.78	40.9
Approach		120	0.0	0.449	27.1	LOS C	3.3	22.9	0.95	0.78	41.0
West: Weltevreden - WB											
10	L2	23	0.0	0.018	7.0	LOS A	0.1	1.0	0.25	0.60	53.1
11	T1	410	0.0	0.289	4.4	LOS A	5.7	39.9	0.39	0.34	55.9
12	R2	17	0.0	0.041	14.0	LOS B	0.3	2.1	0.47	0.67	47.3
Approach		449	0.0	0.289	4.9	LOS A	5.7	39.9	0.38	0.37	55.4
All Vehicles		1469	0.0	0.544	7.8	LOS A	11.5	80.8	0.48	0.47	53.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	55	4.6	LOS A	0.0	0.0	0.34	0.34
P2	East Full Crossing	55	34.3	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	55	4.6	LOS A	0.0	0.0	0.34	0.34
P4	West Full Crossing	55	34.3	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		219	19.4	LOS B			0.63	0.63

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

MOVEMENT SUMMARY

Site: 101 [SC6 2024 PM Background]

Palmietkuilen Open Coal Mine
Weltevreden/Main & Milner
SC6 - 2024 PM Peak - Background traffic
Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)
Design Life Analysis (Practical Capacity): Results for 7 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Milner - NB											
1	L2	42	0.0	0.213	16.4	LOS B	1.4	9.7	0.74	0.70	47.6
2	T1	20	0.0	0.213	10.8	LOS B	1.4	9.7	0.74	0.70	48.2
3	R2	21	0.0	0.213	16.4	LOS B	1.4	9.7	0.74	0.70	47.3
Approach		83	0.0	0.213	15.1	LOS B	1.4	9.7	0.74	0.70	47.7
East: Main - WB											
4	L2	112	0.0	0.079	6.2	LOS A	0.4	2.8	0.18	0.60	53.6
5	T1	792	0.0	0.631	5.8	LOS A	14.6	102.3	0.52	0.47	54.7
6	R2	56	0.0	0.096	12.0	LOS B	0.9	6.1	0.42	0.68	48.6
Approach		960	0.0	0.631	6.2	LOS A	14.6	102.3	0.47	0.50	54.2
North: Milner - SB											
7	L2	24	0.0	0.521	30.9	LOS C	4.1	28.4	0.96	0.81	39.7
8	T1	12	0.0	0.521	25.3	LOS C	4.1	28.4	0.96	0.81	40.1
9	R2	103	0.0	0.521	30.8	LOS C	4.1	28.4	0.96	0.81	39.5
Approach		139	0.0	0.521	30.4	LOS C	4.1	28.4	0.96	0.81	39.6
West: Weltevreden - WB											
10	L2	26	0.0	0.021	7.2	LOS A	0.2	1.3	0.26	0.60	53.0
11	T1	475	0.0	0.335	4.6	LOS A	6.9	48.3	0.41	0.36	55.8
12	R2	20	0.0	0.058	15.7	LOS B	0.4	2.7	0.51	0.68	46.3
Approach		521	0.0	0.335	5.2	LOS A	6.9	48.3	0.40	0.38	55.2
All Vehicles		1703	0.0	0.631	8.3	LOS A	14.6	102.3	0.50	0.50	52.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	60	4.6	LOS A	0.0	0.0	0.34	0.34
P2	East Full Crossing	60	34.3	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	60	4.6	LOS A	0.0	0.0	0.34	0.34
P4	West Full Crossing	60	34.3	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		242	19.4	LOS B			0.63	0.63

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

MOVEMENT SUMMARY

Site: 101 [SC7 2019 PM With dev]

Palmietkuilen Open Coal Mine
Weltevreden/Main & Milner
SC7 - 2019 PM Peak - With dev traffic
Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)
Design Life Analysis (Practical Capacity): Results for 2 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Milner - NB											
1	L2	54	0.0	0.223	16.6	LOS B	1.7	11.9	0.72	0.70	47.3
2	T1	17	0.0	0.223	11.0	LOS B	1.7	11.9	0.72	0.70	47.8
3	R2	22	0.0	0.223	16.6	LOS B	1.7	11.9	0.72	0.70	47.0
Approach		92	0.0	0.223	15.6	LOS B	1.7	11.9	0.72	0.70	47.3
East: Main - WB											
4	L2	100	0.0	0.072	6.2	LOS A	0.4	2.5	0.18	0.59	53.6
5	T1	683	0.0	0.536	4.9	LOS A	11.0	77.2	0.45	0.41	55.5
6	R2	48	0.0	0.073	10.6	LOS B	0.7	4.7	0.37	0.67	49.5
Approach		832	0.0	0.536	5.4	LOS A	11.0	77.2	0.41	0.45	54.9
North: Milner - SB											
7	L2	21	0.0	0.481	28.1	LOS C	3.3	23.4	0.96	0.78	41.0
8	T1	10	0.0	0.481	22.4	LOS C	3.3	23.4	0.96	0.78	41.4
9	R2	89	0.0	0.481	28.0	LOS C	3.3	23.4	0.96	0.78	40.7
Approach		120	0.0	0.481	27.5	LOS C	3.3	23.4	0.96	0.78	40.8
West: Weltevreden - WB											
10	L2	23	0.0	0.018	6.8	LOS A	0.1	0.9	0.24	0.59	53.3
11	T1	410	0.0	0.284	4.0	LOS A	5.5	38.2	0.37	0.33	56.3
12	R2	34	0.0	0.080	13.3	LOS B	0.6	4.1	0.45	0.68	47.8
Approach		467	0.0	0.284	4.9	LOS A	5.5	38.2	0.37	0.36	55.4
All Vehicles		1510	0.0	0.536	7.6	LOS A	11.0	77.2	0.46	0.46	53.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	55	4.2	LOS A	0.0	0.0	0.33	0.33
P2	East Full Crossing	55	34.3	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	55	4.2	LOS A	0.0	0.0	0.33	0.33
P4	West Full Crossing	55	34.3	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		219	19.3	LOS B			0.63	0.63

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

MOVEMENT SUMMARY

Site: 101 [SC8 2024 PM With dev]

Palmietkuilen Open Coal Mine
Weltevreden/Main & Milner
SC8 - 2024 PM Peak - With dev traffic
Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)
Design Life Analysis (Practical Capacity): Results for 7 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Milner - NB											
1	L2	62	0.0	0.262	15.4	LOS B	1.7	11.9	0.71	0.70	48.1
2	T1	20	0.0	0.262	9.8	LOS A	1.7	11.9	0.71	0.70	48.6
3	R2	25	0.0	0.262	15.3	LOS B	1.7	11.9	0.71	0.70	47.7
Approach		107	0.0	0.262	14.3	LOS B	1.7	11.9	0.71	0.70	48.1
East: Main - WB											
4	L2	116	0.0	0.084	6.3	LOS A	0.5	3.4	0.20	0.60	53.6
5	T1	792	0.0	0.621	5.3	LOS A	14.0	97.8	0.49	0.45	55.1
6	R2	56	0.0	0.093	11.1	LOS B	0.8	5.7	0.39	0.68	49.2
Approach		964	0.0	0.621	5.8	LOS A	14.0	97.8	0.45	0.48	54.6
North: Milner - SB											
7	L2	24	0.0	0.558	31.4	LOS C	4.1	29.0	0.98	0.81	39.5
8	T1	12	0.0	0.558	25.8	LOS C	4.1	29.0	0.98	0.81	39.8
9	R2	103	0.0	0.558	31.4	LOS C	4.1	29.0	0.98	0.81	39.3
Approach		139	0.0	0.558	30.9	LOS C	4.1	29.0	0.98	0.81	39.3
West: Weltevreden - WB											
10	L2	26	0.0	0.022	7.2	LOS A	0.2	1.3	0.26	0.60	53.0
11	T1	475	0.0	0.329	4.2	LOS A	6.6	46.2	0.39	0.34	56.1
12	R2	40	0.0	0.113	15.0	LOS B	0.8	5.4	0.50	0.69	46.7
Approach		541	0.0	0.329	5.2	LOS A	6.6	46.2	0.39	0.38	55.1
All Vehicles		1751	0.0	0.621	8.1	LOS A	14.0	97.8	0.49	0.49	52.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	60	4.2	LOS A	0.0	0.0	0.33	0.33
P2	East Full Crossing	60	34.3	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	60	4.2	LOS A	0.0	0.0	0.33	0.33
P4	West Full Crossing	60	34.3	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		242	19.3	LOS B			0.63	0.63

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection 2: Road D1255 & Proposed Site Access

MOVEMENT SUMMARY

Site: 102 [SC3 2019 AM With Dev]

Palmietkuilen Open Coal Mine
Road D1255 & Site Access
SC3 - 2019 AM Peak - With Dev Traffic
Stop (Two-Way)
Design Life Analysis (Practical Capacity): Results for 2 years

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Site Access - NB											
1	L2	39	0.0	0.039	8.1	LOS A	0.1	1.0	0.05	0.96	51.8
3	R2	12	0.0	0.039	7.9	LOS A	0.1	1.0	0.05	0.96	51.4
Approach		51	0.0	0.039	8.0	LOS A	0.1	1.0	0.05	0.96	51.7
East: Road D1255 - WB											
4	L2	12	0.0	0.013	5.5	LOS A	0.0	0.0	0.00	0.30	55.9
5	T1	12	0.0	0.013	0.0	LOS A	0.0	0.0	0.00	0.30	57.4
Approach		25	0.0	0.013	2.8	NA	0.0	0.0	0.00	0.30	56.6
West: Road D1255 - EB											
11	T1	12	0.0	0.028	0.1	LOS A	0.1	0.9	0.09	0.43	55.9
12	R2	37	0.0	0.028	5.5	LOS A	0.1	0.9	0.09	0.43	54.1
Approach		50	0.0	0.028	4.2	NA	0.1	0.9	0.09	0.43	54.5
All Vehicles		126	0.0	0.039	5.5	NA	0.1	1.0	0.06	0.62	53.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [SC4 2024 AM With Dev]

Palmietkuilen Open Coal Mine
Road D1255 & Site Access
SC4 - 2024 AM Peak - With Dev Traffic
Stop (Two-Way)
Design Life Analysis (Practical Capacity): Results for 7 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Site Access - NB											
1	L2	45	0.0	0.045	8.1	LOS A	0.2	1.2	0.06	0.96	51.8
3	R2	14	0.0	0.045	7.9	LOS A	0.2	1.2	0.06	0.96	51.4
Approach		59	0.0	0.045	8.0	LOS A	0.2	1.2	0.06	0.96	51.7
East: Road D1255 - WB											
4	L2	14	0.0	0.015	5.5	LOS A	0.0	0.0	0.00	0.30	55.9
5	T1	14	0.0	0.015	0.0	LOS A	0.0	0.0	0.00	0.30	57.4
Approach		29	0.0	0.015	2.8	NA	0.0	0.0	0.00	0.30	56.6
West: Road D1255 - EB											
11	T1	14	0.0	0.032	0.1	LOS A	0.1	1.0	0.10	0.42	55.9
12	R2	43	0.0	0.032	5.6	LOS A	0.1	1.0	0.10	0.42	54.1
Approach		58	0.0	0.032	4.2	NA	0.1	1.0	0.10	0.42	54.5
All Vehicles		146	0.0	0.045	5.5	NA	0.2	1.2	0.06	0.61	53.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [SC7 2019 PM With Dev]

Palmietkuilen Open Coal Mine
Road D1255 & Site Access
SC7 - 2019 PM Peak - With Dev Traffic
Stop (Two-Way)
Design Life Analysis (Practical Capacity): Results for 2 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Site Access - NB											
1	L2	39	0.0	0.039	8.1	LOS A	0.1	1.0	0.05	0.96	51.8
3	R2	12	0.0	0.039	7.9	LOS A	0.1	1.0	0.05	0.96	51.4
Approach		51	0.0	0.039	8.0	LOS A	0.1	1.0	0.05	0.96	51.7
East: Road D1255 - WB											
4	L2	12	0.0	0.013	5.5	LOS A	0.0	0.0	0.00	0.30	55.9
5	T1	12	0.0	0.013	0.0	LOS A	0.0	0.0	0.00	0.30	57.4
Approach		25	0.0	0.013	2.8	NA	0.0	0.0	0.00	0.30	56.6
West: Road D1255 - EB											
11	T1	12	0.0	0.028	0.1	LOS A	0.1	0.9	0.09	0.43	55.9
12	R2	37	0.0	0.028	5.5	LOS A	0.1	0.9	0.09	0.43	54.1
Approach		50	0.0	0.028	4.2	NA	0.1	0.9	0.09	0.43	54.5
All Vehicles		126	0.0	0.039	5.5	NA	0.1	1.0	0.06	0.62	53.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

MOVEMENT SUMMARY

Site: 102 [SC8 2024 PM With Dev]

Palmietkuilen Open Coal Mine
Road D1255 & Site Access
SC8 - 2024 PM Peak - With Dev Traffic
Stop (Two-Way)
Design Life Analysis (Practical Capacity): Results for 7 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Site Access - NB											
1	L2	45	0.0	0.045	8.1	LOS A	0.2	1.2	0.06	0.96	51.8
3	R2	14	0.0	0.045	7.9	LOS A	0.2	1.2	0.06	0.96	51.4
Approach		59	0.0	0.045	8.0	LOS A	0.2	1.2	0.06	0.96	51.7
East: Road D1255 - WB											
4	L2	14	0.0	0.015	5.5	LOS A	0.0	0.0	0.00	0.30	55.9
5	T1	14	0.0	0.015	0.0	LOS A	0.0	0.0	0.00	0.30	57.4
Approach		29	0.0	0.015	2.8	NA	0.0	0.0	0.00	0.30	56.6
West: Road D1255 - EB											
11	T1	14	0.0	0.032	0.1	LOS A	0.1	1.0	0.10	0.42	55.9
12	R2	43	0.0	0.032	5.6	LOS A	0.1	1.0	0.10	0.42	54.1
Approach		58	0.0	0.032	4.2	NA	0.1	1.0	0.10	0.42	54.5
All Vehicles		146	0.0	0.045	5.5	NA	0.2	1.2	0.06	0.61	53.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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