

APPENDIX F: TRAFFIC STUDY (SIYAZI, 2020)

MEMORANDUM

TRAFFIC IMPACT ASSESSMENT

The proposed increase of the flash dryer capacity and associated feed circuit modifications at the Impala Rustenburg Smelter Complex



OCTOBER 2020

Prepared for:

**SLR Consulting (Africa) (Pty) Ltd.
P O Box 1596
Cramerview
South Africa
2060
SLR Reference: 710.09003.00140**

Prepared by:

**Siyazi Limpopo Consulting Services (Pty) Ltd
P O Box 11182
Bendor
Limpopo Province
Siyazi Reference: 20036**



This report was prepared taking into account the requirements of Appendix 6 as set out in the NEMA Regulations (2014) as amended in 2017.

NEMA Regulations (2014) (as amended) - Appendix 6	Relevant section in report
Details of the specialist who prepared the report	Refer to page V and attached curriculum vitae
The expertise of that person to compile a specialist report including a curriculum vitae	
A declaration that the person is independent in a form as may be specified by the competent authority	Refer to page IV
An indication of the scope of, and the purpose for which, the report was prepared	Section 1, Page 1
An indication of the quality and age of base data used for the specialist report	Section 2.1 Traffic count data
A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 3
The duration date and season of the site investigation and the relevance of the season to the outcome of the assessment	Not relevant to traffic data
A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 2.1 Traffic count data
Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure inclusive of a site plan identifying site alternatives	Section 2.4
An identification of any areas to be avoided, including buffers	Section 2.4
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 2.4
A description of any assumptions made and any uncertainties or gaps in knowledge;	Page 9, Section 2.1.1 Page 21, Section 2.2.1 Page 34, Section 3.2.1
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities	Section 3
Any mitigation measures for inclusion in the EMPr	Section 3
Any conditions for inclusion in the environmental authorisation	Section 3
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	None
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised and regarding the acceptability of the proposed activity or activities	Section 3
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 3
A description of any consultation process that was undertaken during the course of preparing the specialist report	Not relevant
A summary and copies of any comments received during any consultation process and where applicable all responses thereto	Appendix H, Comments and Responses
Any other information requested by the competent authority.	Not relevant

Requirements applied as part of this study when undertaking an Initial Site Sensitivity Verification for a site selected on the national web based environmental screening tool for which no specific assessment protocol related to any theme has been identified.

Requirements for initial site sensitivity verification	Comment
The Initial Site Sensitivity Verification must be undertaken by an environmental assessment practitioner or a registered specialist with expertise in the relevant environmental theme being considered.	Refer to verification page (Page V) for specialist details.
The Initial Site Sensitivity Verification must be undertaken through the use of:	
A desk top analysis, using satellite imagery.	Refer to section 2.4 of report.
A preliminary on-site inspection to identify if there are any discrepancies with the current use of land and environmental status quo versus the environmental sensitivity	Refer to section 2.4 of report.

Declaration of Independence

I, Leon Roets, hereby declare that Siyazi Limpopo Consulting Services (Pty) Ltd, an independent consulting firm, has no interest or personal gains in this project whatsoever, except receiving fair payment for rendering an independent professional service.

Consultant name: Leon Roets

Signature:

A handwritten signature in black ink, appearing to read 'Roets', is written over a horizontal line.

Date: 11 November 2020

VERIFICATION PAGE


PROJECT NAME:	TRAFFIC IMPACT ASSESSMENT FOR THE PROPOSED INCREASE OF THE FLASH DRYER CAPACITY AND ASSOCIATED FEED CIRCUIT MODIFICATIONS AT THE IMPALA RUSTENBURG SMELTER COMPLEX	
Project No: 20036	Date: October 2020	Report Status: Draft F1-0
Prepared by: SIYAZI LIMPOPO CONSULTING SERVICES (PTY) LTD P O BOX 11182 BENDOR LIMPOPO PROVINCE		Commissioned by: SLR Consulting (Africa) (Pty) Ltd. P O Box 1596 Cramerview South Africa 2060
Author: Paul van der Westhuizen Contact information: Cell: +27 79 690 8069 Email: paul@siyazi.co.za		Report reviewed by and compiled under the supervision of: Leon Roets (Pr Eng) Professional Number: 960547 Contact information: Cell: +27 82 371 0253 Email: leon@siyazi.co.za
<u>Declaration by registered professional:</u> The undersigned has been appointed as the registered professional for this Traffic Impact Statement and has applied due diligence to the content of this report and endeavoured to ensure that the TIS is free of technical errors and takes full responsibility for its contents.		
Name:	Leon Roets	
Address:	Plot 22 Doornbult, Polokwane, Limpopo Province	
Contact Details:	Cell: +27 82 371 0253 Email: leon@siyazi.co.za	
Qualifications:	B Eng (Civil Eng.)	
ECSA Registration Number:	960547 (Attached to report)	
Signature:		

TABLE OF CONTENTS

1.	INTRODUCTION	1
2.	DETAILED INFORMATION RELATED DATA COLLECTED AND INVESTIGATIONS	8
2.1	STATUS QUO OF LAND USE, AS WELL AS ROAD NETWORK CHARACTERISTICS	9
2.1.1	<i>EXISTING LAND USE INFORMATION.....</i>	<i>9</i>
2.1.2	<i>EXISTING ROAD CHARACTERISTICS AND MODAL DISTRIBUTION</i>	<i>9</i>
2.1.3	<i>TRAFFIC COUNTS AS BASIS FOR MAKING TRAFFIC-ENGINEERING CALCULATIONS</i>	<i>18</i>
2.2	FUTURE LAND USE AND ROAD CHARACTERISTICS.....	21
2.2.1	<i>LAND USE INFORMATION, INCLUDING EXISTING AND PROPOSED LATENT DEVELOPMENTS IN THE AREA.....</i>	<i>21</i>
2.2.2	<i>INFORMATION ABOUT THE EXPECTED FUTURE MODAL DISTRIBUTION</i>	<i>21</i>
2.2.3	<i>DETERMINATION OF VEHICLE TRIPS EXPECTED TO BE GENERATED DUE TO THE PROPOSED PROJECT</i>	<i>21</i>
2.2.4	<i>DETERMINATION OF THE TOTAL TRAFFIC EXPECTED TO BE GENERATED AT THE RELEVANT INTERSECTIONS.....</i>	<i>24</i>
2.3	DETERMINATION OF THE LEVELS OF SERVICE AT THE RELEVANT INTERSECTIONS	24
2.4	SENSITIVE ROAD SECTIONS AND INTERSECTIONS RELATED TO EXISTING AND PROPOSED CONDITIONS.....	27
2.5	INFORMATION REQUESTED BY RELEVANT ROAD AUTHORITY	31
2.6	OTHER TRAFFIC-RELATED MATTERS.....	31
3.	FINDINGS AND RECOMMENDATIONS	33
3.1	FINDINGS	33
3.1.1	<i>TRAFFIC IMPACT WITHOUT THE PROPOSED PROJECT.....</i>	<i>33</i>
3.1.2	<i>TRAFFIC IMPACT DURING THE RESPECTIVE PHASES WITH THE PROPOSED PROJECT</i>	<i>34</i>
3.1.3	<i>SITE ACCESSIBILITY.....</i>	<i>35</i>
3.2	RECOMMENDATIONS	35
3.2.1	<i>SUMMARY OF RECOMMENDED INTERSECTION IMPROVEMENTS WITHOUT THE PROPOSED PROJECT ACTIVITIES</i>	<i>35</i>
3.2.2	<i>DETAILED SUMMARY OF RECOMMENDED IMPROVEMENTS WITHOUT THE PROPOSED PROJECT</i>	<i>35</i>
3.2.3	<i>SUMMARY OF RECOMMENDED INTERSECTION IMPROVEMENTS WITH THE PROPOSED PROJECT</i>	<i>40</i>
3.2.4	<i>DETAILED SUMMARY OF RECOMMENDED IMPROVEMENTS WITH THE PROPOSED PROJECT</i>	<i>40</i>
3.2.5	<i>INSTITUTIONAL ARRANGEMENTS</i>	<i>45</i>
3.2.6	<i>REASONED OPINION FOR AUTHORISATION.....</i>	<i>45</i>

APPENDICES

APPENDIX A:	INFORMATION RELATED TO STATUS QUO
APPENDIX B:	TRIP INFORMATION RELATED TO THE EXISTING TRAFFIC
APPENDIX C:	SIDRA CALCULATION RESULTS
APPENDIX D:	LEVEL OF SERVICE CRITERIA
APPENDIX E:	SUMMARY OF IMPACT RATINGS
APPENDIX F:	IMPACT RATING CRITERIA
APPENDIX G:	PROFESSIONAL REGISTRATION AND CURRICULUM VITAE
APPENDIX H:	COMMENTS AND RESPONSES

LIST OF FIGURES

- FIGURE 1.1:** GRAPHICAL PRESENTATION OF THE LOCALITY OF THE EXISTING IMPALA SMELTER WHERE THE PROPOSED PROJECT WILL BE INSTALLED AND THE RELEVANT INTERSECTIONS UNDER INVESTIGATION
- FIGURE 2.1:** EXISTING ROAD NETWORK LAYOUT
- FIGURE 2.2:** HOURLY TRAFFIC PATTERN PER 15-MINUTE INTERVAL FOR ALL MODES OF VEHICLES (06:00 TO 18:00) AT THE RELEVANT INTERSECTIONS
- FIGURE 2.3:** SENSITIVE ROAD SECTIONS AND INTERSECTIONS INDICATING EXISTING SENSITIVE AREAS AND INTERSECTIONS WITHOUT THE PROPOSED PROJECT WITHOUT RECOMMENDED MITIGATING MEASURES
- FIGURE 2.4:** SENSITIVE ROAD SECTIONS AND INTERSECTIONS INDICATING EXISTING SENSITIVE AREAS AND INTERSECTIONS WITHOUT THE PROPOSED PROJECT WITH RECOMMENDED MITIGATING MEASURES
- FIGURE B-1:** 2020 PEAK HOUR TRAFFIC (BACKGROUND TRAFFIC) WITHOUT THE PROPOSED PROJECT (SCENARIO 1);
- FIGURE B-2:** PROJECTED VEHICLE TRIP DISTRIBUTION FOR THE PROPOSED PROJECT (LIGHT VEHICLES);
- FIGURE B-3:** PROJECTED VEHICLE TRIP DISTRIBUTION FOR THE PROPOSED PROJECT (HEAVY VEHICLES);
- FIGURE B-4:** PROJECTED VEHICLE TRIPS TO BE GENERATED BY THE PROPOSED PROJECT (CONSTRUCTION PHASE);
- FIGURE B-5:** PROJECTED 2020 PEAK HOUR TRAFFIC WITH THE PROPOSED PROJECT (SCENARIO 2);
- FIGURE B-6:** PROJECTED 2030 PEAK HOUR TRAFFIC WITHOUT THE PROPOSED PROJECT (SCENARIO 3);
- FIGURE B-7:** PROJECTED VEHICLE TRIPS TO BE GENERATED BY THE PROPOSED PROJECT (OPERATIONAL PHASE); AND
- FIGURE B-8:** PROJECTED 2030 PEAK HOUR TRAFFIC WITH THE PROPOSED PROJECT (SCENARIO 4).
- FIGURE 3.1:** GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS WITHOUT THE PROPOSED PROJECT
- FIGURE 3.2:** GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS WITH THE PROPOSED PROJECT
- FIGURE A-1:** RELEVANT MOVEMENTS RELATED TO TRAFFIC COUNTS

LIST OF TABLES

TABLE 1.1:	SUMMARY OF THE EXTENT OF THE PROPOSED PROJECT
TABLE 1.2:	RELEVANT INTERSECTIONS UNDER INVESTIGATION
TABLE 2.1:	SUMMARY OF INTERSECTION CONTROL AT EXISTING INTERSECTIONS UNDER INVESTIGATION
TABLE 2.2:	SUMMARY OF ROAD CHARACTERISTICS
TABLE 2.3:	URBAN ACCESS MANAGEMENT REQUIREMENTS AND FEATURES (COTO TRH26 - SOUTH AFRICAN ROAD CLASSIFICATION AND ACCESS MANAGEMENT MANUAL VERSION 1.0 AUGUST 2012)
TABLE 2.4:	RURAL ACCESS MANAGEMENT REQUIREMENTS AND FEATURES (COTO TRH26 - SOUTH AFRICAN ROAD CLASSIFICATION AND ACCESS MANAGEMENT MANUAL VERSION 1.0 AUGUST 2012)
TABLE 2.5:	PEAK HOUR PERIODS AT THE RELEVANT INTERSECTION
TABLE 2.6:	TRIP GENERATION RATES, EXPECTED NUMBER OF VEHICLE TRIPS TO BE GENERATED DUE TO THE PROPOSED PROJECT (CONSTRUCTION PHASE)
TABLE 2.7:	TRIP GENERATION RATES, EXPECTED NUMBER OF VEHICLE TRIPS TO BE GENERATED DUE TO THE PROPOSED PROJECT (OPERATIONAL PHASE)
TABLE 2.8:	AVAILABLE RESERVE CAPACITY FOR RELEVANT ROAD SECTIONS
TABLE 2.9:	SUMMARY OF OTHER TRAFFIC-RELATED MATTERS RELEVANT TO ALL PHASES OF THE PROPOSED PROJECT
TABLE 3.1:	SUMMARY OF INTERSECTION IMPROVEMENTS RECOMMENDED IN TERMS OF ROAD / EARTH WORKS WITHOUT THE PROPOSED PROJECT
TABLE 3.2:	RECOMMENDED ROAD NETWORK IMPROVEMENTS WITHOUT THE PROPOSED PROJECT
TABLE 3.3:	SUMMARY OF INTERSECTION IMPROVEMENTS RECOMMENDED IN TERMS OF ROAD / EARTH WORKS WITH THE PROPOSED ACTIVITIES AS PART OF THE PROPOSED PROJECT
TABLE 3.4:	RECOMMENDED ROAD NETWORK IMPROVEMENTS WITH THE PROPOSED PROJECT
TABLE A-1:	HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF IMPALA SMELTER COMPLEX ACCESS ROAD, ROAD 1 AND ROAD 2 (POINT A) (07 AUGUST 2020)
TABLE A-2:	HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF ROAD 2 AND ROAD 3 (POINT B) (07 AUGUST 2020)
TABLE A-3:	HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF LEFARAGATLHA ROAD, FREEDOM PARK ROAD AND ROAD 1 (POINT C) (07 AUGUST 2020)
TABLE A-4:	HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF ROAD R565 AND LEFARAGATLHA ROAD (POINT D) (07 AUGUST 2020)
TABLE A-5:	HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF ROAD R565 AND LUKA ROAD (POINT E) (07 AUGUST 2020)

TABLE A-6:	HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF LUKA ROAD AND ROAD 3 (POINT F) (07 AUGUST 2020)
TABLE C-1:	LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2020 (BACKGROUND TRAFFIC) WITHOUT THE PROPOSED PROJECT (SCENARIO 1)
TABLE C-2:	LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2030 (BACKGROUND TRAFFIC) WITHOUT THE PROPOSED PROJECT (SCENARIO 3)
TABLE C-3:	LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2020 (BACKGROUND TRAFFIC) WITH THE PROPOSED PROJECT (SCENARIO 2)
TABLE C-4:	LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2030 (BACKGROUND TRAFFIC) WITH THE PROPOSED PROJECT (SCENARIO 4)
TABLE D-1:	LEVEL OF SERVICE CRITERIA DESCRIPTION FOR UNSIGNALISED INTERSECTIONS
TABLE D-2:	LEVEL OF SERVICE CRITERIA DESCRIPTION FOR SIGNALISED INTERSECTIONS
TABLE E-1:	IMPACT RATING WITHOUT THE PROPOSED ACTIVITIES AS PART OF THE PROPOSED PROJECT
TABLE E-2:	IMPACT RATING DUE TO THE PROPOSED ACTIVITIES AS PART OF THE PROPOSED PROJECT
TABLE F-1:	CRITERIA USED IN THE ASSESSMENT OF IMPACTS – DEFINITIONS AND CRITERIA
TABLE F-2:	CRITERIA USED IN THE ASSESSMENT OF IMPACTS – DETERMINING CONSEQUENCE
TABLE F-3:	CRITERIA USED IN THE ASSESSMENT OF IMPACTS – DETERMINING SIGNIFICANCE

Section 1

INTRODUCTION

Siyazi Limpopo Consulting Services (Pty) Ltd was appointed by SLR Consulting (Africa) (Pty) Ltd to conduct a Traffic Impact Assessment (TIA) for the proposed increase of the flash dryer capacity and associated feed circuit modifications at the Impala Rustenburg Smelter Complex, hereafter referred to as the proposed project, situated in Rustenburg, North West Province.

Impala is planning to increase its flash drying capacity, which requires the installation of a second flash dryer (Phase 1) and associated feed circuit modifications (Phase 2). This will increase filter cake treatment capacity, which in turn will increase and improve toll concentrate stockpile reclamation capabilities. The main proposed project components that make up each phase are listed below.

<u>Second Flash Dryer (Phase 1)</u>	<u>Flash Drying Feed Circuit Upgrade (Phase 2)</u>
The main components of Phase 1 include: Transfer Tower; Wet Feeder; Wet Feed Conveyors; Flash Dryer (similarly sized unit (45 tph dry) to the existing dryer); and Bag House.	The main components of Phase 2 include: Structural modifications include; Feed Distribution Tower; Filter Plant; and Wet Feed Conveyors.

Access to the smelter complex is via an access road that runs between two communities (Phokeng and Bobuampja) and is known as the Lefaragatlha Road as illustrated in Figure 1.1. On occasions, the Luka road can be utilised as an alternative road. The installation of a second flash dryer will increase the filter cake treatment capacity at Impala, which in turn will increase and improve toll concentrate stockpile reclamation capabilities. It follows that the proposed project will allow Impala to process additional third-party toll material through the installation of the second flash dryer. This will result in an increase in the number of third parties, delivering toll material to Impala, via the Lefaragatlha Road. It is however important to note, that the number of vehicles transporting matte from site will not change as a result of the proposed project, given that even though additional toll material will be processed, the smelter treatment capacities remain unchanged.

The purpose of this study is to undertake an assessment of the implications of the vehicle traffic that could potentially be generated due to an increase in traffic volumes as a result of the proposed project and:

- The traffic impact that the change in land use would have on road and transport related infrastructure;
- Whether it is possible to accommodate the proposed project within acceptable norms from a traffic engineering point of view; and
- The mitigating measures required to accommodate the proposed project within acceptable traffic engineering norms.

Figure 1.1 provides a graphical presentation of the locality of the existing Impala Smelter where the proposed project activities will be installed, and the relevant intersections investigated as part of this investigation.

Table 1.1 provides a summary of information of the proposed project activities. It is important to take note that the anticipated timeline as depicted by the last mentioned table provides an estimated timeline in terms of months and or years that is planned for and does not depict the exact month and or year that implementing and operations of the proposed new flash dryer will take place.

Table 1.2 provides information on the relevant intersections under investigation as part of the proposed activities anticipated as part of the proposed project.

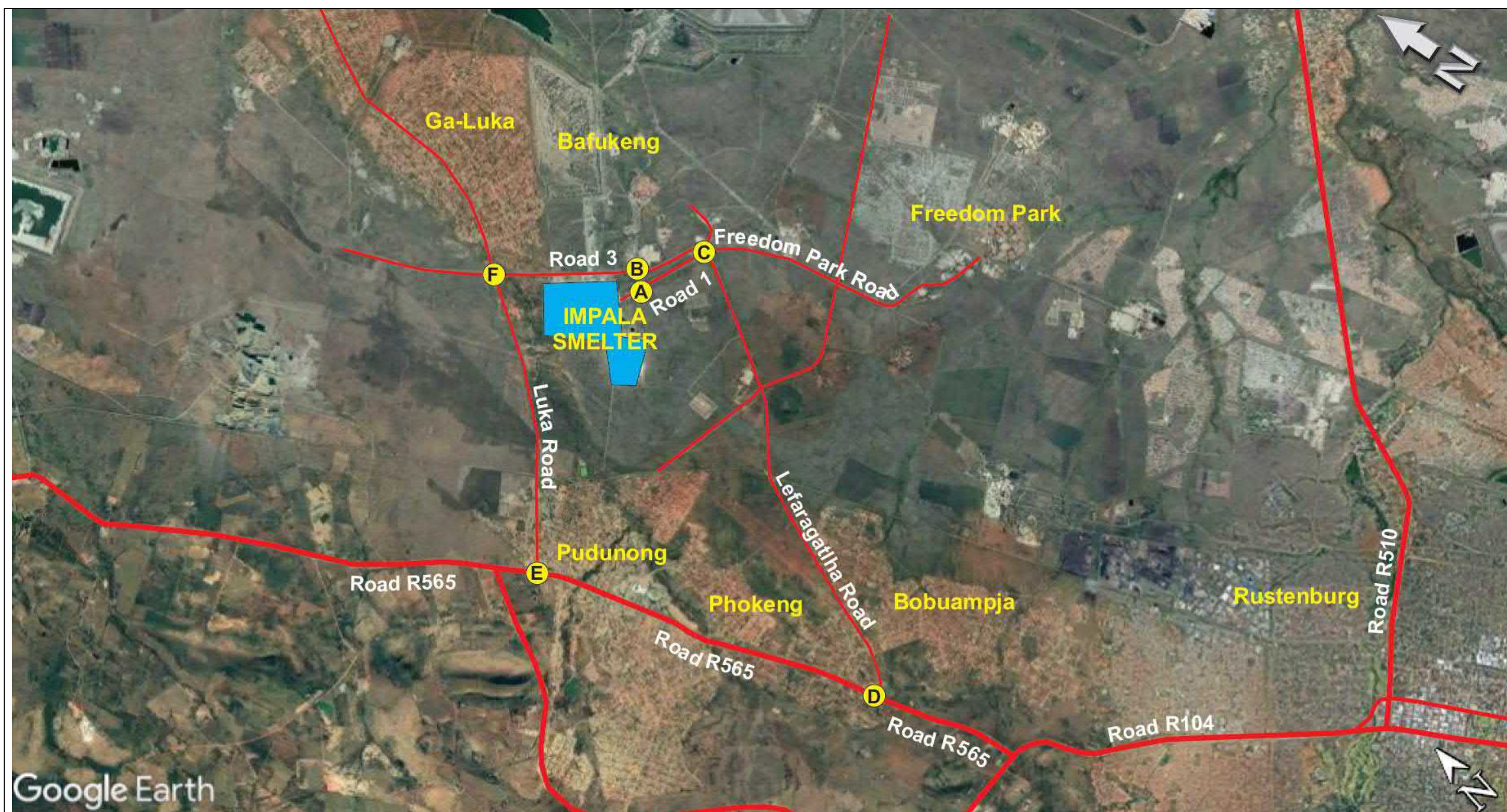


FIGURE 1.1: GRAPHICAL PRESENTATION OF THE LOCALITY OF THE EXISTING IMPALA SMELTER WHERE THE PROPOSED PROJECT WILL BE INSTALLED AND THE RELEVANT INTERSECTIONS UNDER INVESTIGARION

TABLE 1.1: SUMMARY OF THE EXTENT OF THE PROPOSED ACTIVITIES AS PART OF THE PROPOSED PROJECT

DESCRIPTION	CONSTRUCTION PHASE	OPERATIONAL PHASE
Activities	Construction of flash dryer, feed circuit upgrades and supporting infrastructure	Existing operations
Duration	±27 months	Approximately 30 Years for the remaining life of mine
Relevant time frame	2021 to 2024	2024 to 2054
Additional third-party ore to be processed by new flash dryer	N/a	At peak, 26 deliveries per day consisting of 30 tonnes per truck. Other ROM ore to be transported by rail.
Destination of processed product	N/a	Market dependant.
Number of workers per shift	25 construction staff per day	No additional workers due to new flash dryer. Existing staff will be utilised.
Shift times of workers	1 shift per day.	Not relevant. Existing operations.
Anticipated location of workers	Surrounding areas.	Not relevant. Existing operations.
Mode of transport for workers	Own transport to be provided by contractors. Most likely private light and 10-seater vehicles	Not relevant. Existing operations.
Anticipated number of additional heavy vehicles delivering consumables per day	At peak, 5 per day.	Consumables will be offset against the reduced or non-operations of other units and therefore no additional heavy vehicles anticipated.







TABLE 1.2: RELEVANT INTERSECTIONS UNDER INVESTIGATION					
POINT	INTERSECTION STATUS	INTERSECTION	GPS CO-ORDINATES		INTERSECTION PHOTO
			LATITUDE	LONGITUDE	
A	Existing	Impala Smelter Access Road, Road 1 and Road 2	S 25°32'38.51"	E 27°11'31.84"	
B	Existing	Road 2 and Road 3	S 25°32'30.80"	E 27°11'36.65"	
C	Existing	Lefaragatlha Road, Freedom Park Road and Road 1	S 25°32'46.81"	E 27°12'13.10"	

TABLE 1.2: RELEVANT INTERSECTIONS UNDER INVESTIGATION (Continue...)

POINT	INTERSECTION STATUS	INTERSECTION	GPS CO-ORDINATES		INTERSECTION PHOTO
			LATITUDE	LONGITUDE	
D	Existing	Road R565 and Lefaragatlha Road	S 25°36'38.03"	E 27°10'36.10"	
E	Existing	Road R565 and Luka Road	S 25°34'4.75"	E 27° 9'6.20"	
F	Existing	Luka Road and Road 3	S 25°31'40.07"	E 27°10'32.81"	

The following scenarios were investigated as part of the TIA:

- a) **Scenario 1:** 2020 peak hour traffic **without** the proposed activities as part of the proposed new flash dryer;
- b) **Scenario 2:** 2020 peak hour traffic **with** the proposed activities as part of the proposed new flash dryer (**Construction Phase**);
- c) **Scenario 3:** 2030 peak hour traffic **without** the proposed activities as part of the proposed new flash dryer; and
- d) **Scenario 4:** 2030 peak hour traffic **with** the proposed activities as part of the proposed new flash dryer (**Operational Phase**).

Although the proposed project is anticipated to be operational past the year 2030, anticipated vehicle traffic predictions past a 10 year scenario becomes unpredictable due to factors that are not known at the time of preparing this report, which include future developments in the area and potential road network changes.

The following sections of the report elaborate on the:

- a) **Section 2:** Detailed information related to data collected and investigations.
- b) **Section 3:** Findings and recommendations

Section 2

DETAILED INFORMATION RELATED TO DATA COLLECTED AND INVESTIGATIONS

The purpose of **Section 2** is to provide the detailed information related to the data collected and investigations and consists of:

- a) The *status quo* of the land use and road network characteristics of roads relevant to the proposed project which consists of the following information;
 - i. Existing land use information;
 - ii. Existing road characteristics and modal distribution; and
 - iii. Traffic counts as basis for making traffic-engineering calculations.
- b) The future land use and road network characteristics relevant to the proposed project which consists of the following information;
 - i. Land use information, including existing and proposed approved future developments in the area other than the existing Impala Smelter; and
 - ii. Determination of vehicle trips expected to be generated due to the proposed project.
- c) The current and future levels of service at the relevant intersections under investigation; and
- d) Other traffic-related matters.

The following subsection elaborates on the above mentioned.

2.1 STATUS QUO OF LAND USE, AS WELL AS ROAD NETWORK CHARACTERISTICS

The following information is discussed in terms of the *status quo* of the existing land use and road characteristics:

- a) Existing land use information;
- b) Existing road characteristics and modal distribution; and
- c) Traffic counts conducted as a basis for making traffic calculations.

2.1.1 EXISTING LAND USE INFORMATION

The relevant property where the proposed project components will be established are located within the footprint of the existing Impala Smelter Complex.

For the purpose of this traffic impact assessment, it is assumed that

- a) The vehicle traffic absorption rate (rate at which existing developments attract vehicular traffic) by all other types of completed developments will maintain the same status for the next ten years; and
- b) That the average rate of growth of vehicle traffic in the area under investigation that is not relevant to the proposed project activities (background traffic) between the 2020 to 2030 scenarios was anticipated at 3% per annum.







2.1.2 EXISTING ROAD CHARACTERISTICS AND MODAL DISTRIBUTION

The following are relevant as part of this section:

- a) **Table 2.1** contains information related to the existing intersections under investigation.
- b) **Figure 2.1** provides the existing road network layout for the area under investigation.
- c) **Table 2.2** provides information concerning the relevant road sections under investigation and includes the following:
 - i) Relevant road section;
 - ii) Picture of road section;
 - iii) Existing class of road;
 - iv) Proposed class of road;
 - v) Road reserve widths;
 - vi) Lane widths; and
 - vii) Median widths.

- d) **Tables 2.3** provide a copy of the Guidelines (COTO TRH26 “*South African Road Classification and Access Management Manual, Version 1.0, August 2012*” Urban areas) of typical road characteristics and access management requirements.
- e) **Tables 2.4** provide a copy of the Guidelines (COTO TRH26 “*South African Road Classification and Access Management Manual, Version 1.0, August 2012*” Rural areas) of typical road characteristics and access management requirements.

TABLE 2.1: SUMMARY OF INTERSECTION CONTROL AT EXISTING INTERSECTIONS UNDER INVESTIGATION

POINT	DESCRIPTION	INTERSECTION CONTROL	PEDESTRIAN ACTIVITIES	INTERSECTION PHOTO
A	Impala Smelter Complex Access Road, Road 1 and Road 2	Stop-controlled on all approaches	Pedestrian activity observed during surveys	
B	Road 2 and Road 3	Stop-controlled on all approaches	Pedestrian activity observed during surveys	
C	Lefaragatlha Road, Freedom Park Road and Road 1	Stop-controlled on all approaches	Pedestrian activity observed during surveys	
D	Road R565 and Lefaragatlha Road	Stop-controlled on all approaches	Pedestrian activity observed during surveys	
E	Road R565 and Luka Road	Stop-controlled on all approaches	Pedestrian activity observed during surveys	
F	Luka Road and Road 3	Stop-controlled on all approaches	Pedestrian activity observed during surveys	

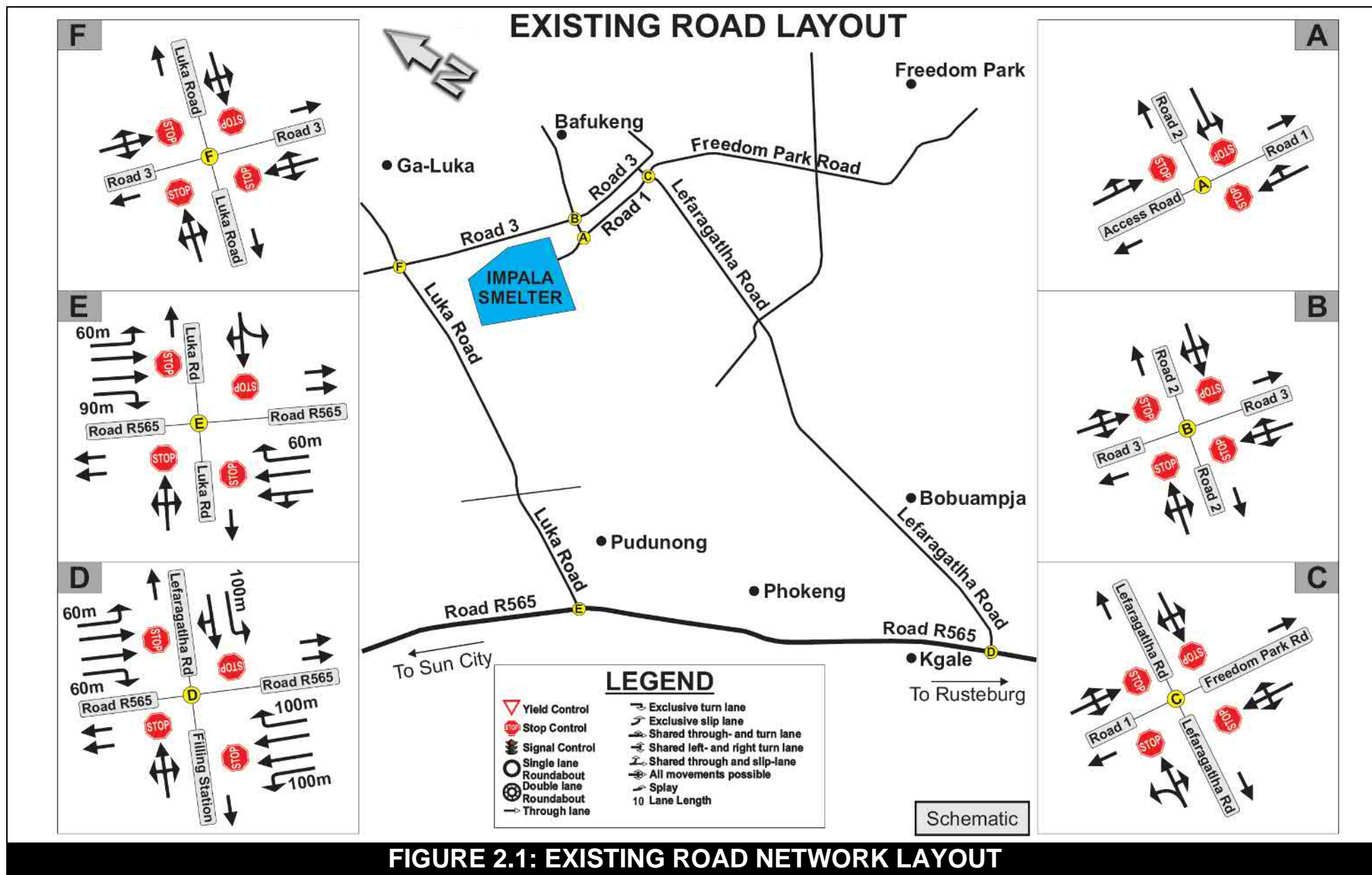


FIGURE 2.1: EXISTING ROAD NETWORK LAYOUT

TABLE 2.2: SUMMARY OF ROAD CHARACTERISTICS



RELEVANT ROAD SECTION	PICTURE OF ROAD SECTION	EXISTING CLASS OF ROAD			FUNCTIONAL CLASS OF ROAD			Road Authority	Road Reserve (M)	Number of Lanes	Lane Width	Type of Surface	Median	Anticipated Traffic Growth per Annum over 5 Years	Speed Limit
<u>Road Section 1</u> Road R565		<u>Primary Function:</u> Access / Activity			<u>Operational Function:</u> Access / Activity			South African National Roads Agency SOC Ltd	±30m	Two lane per direction	3.7m wide	Asphalt	6 meters	3%	60 km/h
		Class	Class No.	Route No.	Class	Class No.	Route No.								
		Collector Street	U4a	R	Collector Street	U4a	R								
		<u>Description:</u> Collector			<u>Description:</u> Collector										
		<u>Spacing between Intersections:</u> > 150m			<u>Spacing between Intersections:</u> > 150m										
<u>Road Section 2</u> Lefaragatlha Road		<u>Primary Function:</u> Access / Activity			<u>Operational Function:</u> Access / Activity			Rustenburg Local Municipality	±50m	One lane per direction	3.7m wide	Asphalt	None.	3%	80 km/h
		Class	Class No.	Route No.	Class	Class No.	Route No.								
		Collector Road	R4	N/a	Collector Road	R4	N/a								
		<u>Description:</u> Collector			<u>Description:</u> Collector										
		<u>Spacing between Intersections:</u> 600 - 800m			<u>Spacing between Intersections:</u> 600 - 800m										

TABLE 2.2: SUMMARY OF ROAD CHARACTERISTICS (Continue...)



RELEVANT ROAD SECTION	PICTURE OF ROAD SECTION	EXISTING CLASS OF ROAD			FUNCTIONAL CLASS OF ROAD			Road Authority	Road Reserve (M)	Number of Lanes	Lane Width	Type of Surface	Median	Anticipated Traffic Growth per Annum over 5 Years	Speed Limit
<u>Road Section 3</u> Luka Road		<u>Primary Function:</u> Access / Activity			<u>Operational Function:</u> Access / Activity			Rustenburg Local Municipality	±25m	One lane per direction	3.7m wide	Asphalt	None	3%	60 km/h
		Class	Class No.	Route No.	Class	Class No.	Route No.								
		Collector Street	U4a	R	Collector Street	U4a	R								
		<u>Description:</u> Collector			<u>Description:</u> Collector										
		<u>Spacing between Intersections:</u> > 150m			<u>Spacing between Intersections:</u> > 150m										
<u>Road Section 4</u> Freedom Park Road		<u>Primary Function:</u> Access / Activity			<u>Operational Function:</u> Access / Activity			Rustenburg Local Municipality	±50m	One lane per direction	3.7m wide	Asphalt	None.	3%	80 km/h
		Class	Class No.	Route No.	Class	Class No.	Route No.								
		Collector Road	R4	N/a	Collector Road	R4	N/a								
		<u>Description:</u> Collector			<u>Description:</u> Collector										
		<u>Spacing between Intersections:</u> 600 - 800m			<u>Spacing between Intersections:</u> 600 - 800m										

TABLE 2.2: SUMMARY OF ROAD CHARACTERISTICS (Continue...)



RELEVANT ROAD SECTION	PICTURE OF ROAD SECTION	EXISTING CLASS OF ROAD			FUNCTIONAL CLASS OF ROAD			Road Authority	Road Reserve (M)	Number of Lanes	Lane Width	Type of Surface	Median	Anticipated Traffic Growth per Annum over 5 Years	Speed Limit
<u>Road Section 5</u> Road 1		<u>Primary Function:</u> Access / Activity			<u>Operational Function:</u> Access / Activity			Rustenburg Local Municipality	±40m	One lane per direction	3.7m wide	Asphalt	None.	3%	60 km/h
		Class	Class No.	Route No.	Class	Class No.	Route No.								
		Collector Road	R4	N/a	Collector Road	R4	N/a								
		<u>Description:</u> Collector			<u>Description:</u> Collector										
		<u>Spacing between Intersections:</u> 600 - 800m			<u>Spacing between Intersections:</u> 600 - 800m										
<u>Road Section 6</u> Road 2		<u>Primary Function:</u> Access / Activity			<u>Operational Function:</u> Access / Activity			Rustenburg Local Municipality	±40m	One lane per direction	3.7m wide	Asphalt	None.	3%	60 km/h
		Class	Class No.	Route No.	Class	Class No.	Route No.								
		Collector Road	R4	N/a	Collector Road	R4	N/a								
		<u>Description:</u> Collector			<u>Description:</u> Collector										
		<u>Spacing between Intersections:</u> 600 - 800m			<u>Spacing between Intersections:</u> 600 - 800m										

TABLE 2.2: SUMMARY OF ROAD CHARACTERISTICS (Continue...)


RELEVANT ROAD SECTION	PICTURE OF ROAD SECTION	EXISTING CLASS OF ROAD			FUNCTIONAL CLASS OF ROAD			Road Authority	Road Reserve (M)	Number of Lanes	Lane Width	Type of Surface	Median	Anticipated Traffic Growth per Annum over 5 Years	Speed Limit
<u>Road Section 7</u> Road 3		<u>Primary Function:</u> Access / Activity			<u>Operational Function:</u> Access / Activity			Rustenburg Local Municipality	±40m	One lane per direction	3.7m wide	Asphalt	None.	3%	60 km/h
		Class	Class No.	Route No.	Class	Class No.	Route No.								
		Collector Road	R4	N/a	Collector Road	R4	N/a								
		<u>Description:</u> Collector			<u>Description:</u> Collector										
		<u>Spacing between Intersections:</u> 600 - 800m			<u>Spacing between Intersections:</u> 600 - 800m										

TABLE 2.3: URBAN ACCESS MANAGEMENT REQUIREMENTS AND FEATURES
(EXTRACT FROM COTO TRH26 - SOUTH AFRICAN ROAD CLASSIFICATION AND ACCESS MANAGEMENT MANUAL VERSION 1.0 AUGUST 2012)

BASIC FUNCTION	DESCRIPTION		REQUIREMENTS					TYPICAL FEATURES (Use appropriate context sensitive standards for design)								
	CLASS NO. (U_)	CLASS NAME	DESIGN TOPOLOGY	ROUTE NO.	INTERSECTION SPACING	ACCESS TO PROPERTY	PARKING	SPEED km/h	INTERSECTION CONTROL	TYPICAL CROSS SECTION	ROADWAY / LANE WIDTH	ROAD RESERVE WIDTH	PUBLIC TRANSPORT AND PEDESTRIAN CROSSINGS	PEDESTRIAN FOOTWAYS (CONSTRUCTED)	CYCLE LANES	TRAFFIC CALMING
Mobility	U1	Principal arterial	Expressway	Yes (M/R/N)	2,4km (1.6km - 3.6km)	Not allowed *. **	No	100 - 120	Interchange	4/6/8 lane freeway	3.3 - 3.7m lanes	60 - 120m (60m)	No	No	No	No
	U2	Major arterial	Highway	Yes (M/R)	800m (±15%)	Not allowed *. **	No	80	Co-ordinated traffic signal, interchange	4/6 lane divided, kerbed	3.3 - 3.6m lanes	38 - 62m (40m)	Yes, at intersections	Off road	Yes, widen roadway	No
	U3	Minor arterial	Main road	Yes (M)	600m (±20%)	Not allowed *. **	No	70	Co-ordinated traffic signal, roundabout	4 lanes divided or undivided, kerbed	3.3 - 3.5m lanes	25 - 40m (30m)	Yes, at intersections	Yes	Yes, widen roadway	No
Access / Activity	U4a	Collector Street, commercial	Commercial major collector	No (A for temp. Routing)	> 150m	Yes (larger properties)	Yes, if conditional allow	60	Traffic signal, roundabout or priority	4 lanes, median at pedestrian crossings, boulevard, CBD one-way		20 - 40m (25m)	Yes, at intersections or midblock	Yes	Yes, widen roadway or on verge	Median for pedestrians, curved roadway
	U4b***	Collector street, residential	Residential minor collector	No	> 150m	Yes	Yes, if appropriate	50	Roundabout, mini-circle or priority	2/3 lane undivided	6-9m roadway, < 3.3m lanes	16 - 30m (20m)	Yes, anywhere	Yes	Yes, on road or verge	Raised pedestrian, median, narrow lanes
	U5a	Local street, commercial	Commercial access street	No		Yes	Yes, if conditions allow	40	Priority	2 lanes plus parking		15 - 25m (22m)	If applicable, anywhere	Normally yes	Use roadway	Raised pedestrian crossing
	U5b	Local street, residential	Local residential street	No		Yes	Yes, on verge	40	Mini-circle, priority or none	1/2 lane mountable kerb	3.0 - 5.5m roadway (two way)	10 - 16m (14m)	If applicable, anywhere	Not normally, pedestrians can use roadway	Use roadway	Yes, but should not be necessary
	U6a	Walkway, non-motorised priority	Pedestrian priority	No	500m maximum	Yes	Yes, if parking lot on woon erf	15	None, pedestrians have right of way	Surfaced			If applicable, anywhere	Yes, or use roadway	Rare	Yes
	U6b	Walkway, non-motorised priority	Pedestrian only	No	500m maximum	Yes	No vehicles	peds. 80m / minute	None, pedestrian signal	Block paving		6m		Yes	Yes	

* Access to properties sufficiently large to warrant a private intersection / interchange which can be considered if access spacing requirements are met and there is no future need for public road.

** Partial and marginal access at reduced spacing allowed relieving congestion, reducing excessive travel distance or removing the need for full intersections.

***Please note that the types of roads affected by the proposed project are shaded in grey above.

TABLE 2.4: RURAL ACCESS MANAGEMENT REQUIREMENTS AND FEATURES
(COTO TRH26 - SOUTH AFRICAN ROAD CLASSIFICATION AND ACCESS MANAGEMENT MANUAL VERSION 1.0 AUGUST 2012)

BASIC FUNCTION	DESCRIPTION		REQUIREMENTS				TYPICAL FEATURES (Use appropriate context sensitive standards for design)									
	CLASS NO (R_)	CLASS NAME	DESIGN TOPOLOGY	ROUTE NO.	ACCESS TO PROPERTY	PARKING	SPEED km/h	INTERSECTION CONTROL	INTERSECTION SPACING	TYPICAL CROSS SECTION	ROADWAY / LANE WIDTH	ROAD RESERVE WIDTH	PUBLIC TRANSPORT AND PEDESTRIAN CROSSINGS	PEDESTRIAN FOOTWAYS (CONSTRUCTED)	CYCLE LANES	ANIMAL DRAWN VEHICLES
Mobility	R 1	Principal arterial	Expressway	Yes (N)	Not allowed*	No (off road rest stops allowed)	120	Grade separated or priority to through	8.0km	2/3/4 lanes, surfaced shoulders, climbing lanes	3.5 - 3.7m	60 - 80m (62m)	No	No	No	No
	R 2	Major arterial	Highway	Yes (R: 2 or 3-digit; or N)	Not allowed */**	No (off road rest stops allowed)	120	Priority or grade separated	5.0km	2/3 lanes, surfaced shoulders, climbing lanes	3.5 - 3.7m	40-70m (48m)	As required	Isolated	Recreational on shoulder	No
	R 3	Minor arterial	Main road	Yes (R: 3 or 2-digit)	Not allowed */**	No (off road rest stops allowed)	100 - 120	Priority, roundabout	1.6km	2 lanes surfaced, gravel shoulders	4.0m	30-50m (30m)	As required	Isolated	Recreational widen roadway both sides	Widen shoulder
Access / Activity	R 4***	Collector road	Collector	Allowed, T (tourist) or D (district)	Yes	No (off road edge or in lay byes / viewpoints)	80 - 100	Priority	600 - 800m	2 lanes surfaced or gravel, gravel shoulders	3.5m	25m	As required	Rare, isolated	Widen roadway	Widen shoulder
	R 5	Local road	Farm road	Allowed, T (tourist) or L (local)	Yes	No (on verge or shoulder)	60 - 80	Priority	450 - 600m	1/2 lane/s gravel, 600mm concrete strips in environmental areas		20m	As required	Rare	Use roadway	Use roadway
	R 6	Walkway	Track or pathway	No	Yes	N/A			N/A					Not constructed, formed by use		

* Access to properties sufficiently large to warrant a private intersection / interchange which can be considered if access spacing requirements are met and there is no future need for public road.

** Low volume farm gate and tourist access (less than 10 vehicles per day) can be considered if no alternative exists.

***Please note that the types of roads affected by the proposed project are shaded in grey above.

2.1.3 TRAFFIC COUNTS AS BASIS FOR MAKING TRAFFIC-ENGINEERING CALCULATIONS

In order to gain a better understanding of the existing traffic patterns and movements adjacent to the existing Impala Smelter Complex, 12-hour manual traffic counts were conducted at the existing intersections that would potentially be affected by the proposed activities as part of the proposed project.

It is standard traffic engineering practice to conduct at least 12-hour manual traffic counts, as close as possible to a month-end Friday when traffic movement is expected to be at its highest.

The relevant 12-hour manual traffic counts were conducted on Friday 07 August 2020 at the following intersection under investigation:

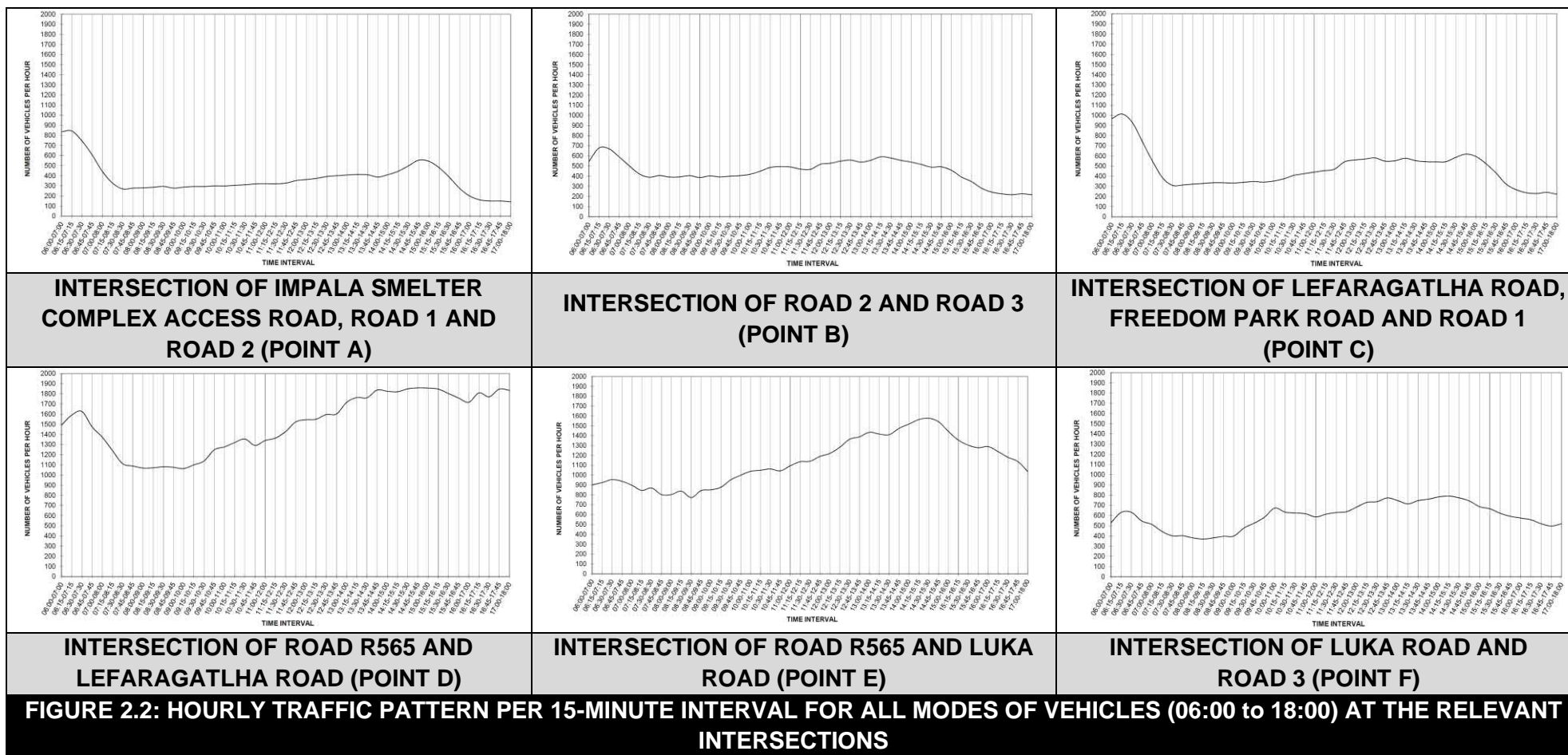
- a) **Point A**: Intersection of Impala Smelter Complex Access Road, Road 1 and Road 2;
- b) **Point B**: Intersection of Road 2 and Road 3;
- c) **Point C**: Intersection of Lefaragatlha Road, Freedom Park Road and Road 1;
- d) **Point D**: Intersection of Road R565 and Lefaragatlha Road;
- e) **Point E**: Intersection of Road R565 and Luka Road; and
- f)
- g) **Point F**: Intersection of Luka Road and Road 3.

The combined hourly totals of all the vehicle types for the traffic survey conducted on Friday 07 August 2020 between 06:00 and 18:00 are indicated in **Tables A-1 to A-6** of **Appendix A** of this report. The description of the relevant vehicle movements at the relevant intersections appears in **Figure A-1** of **Appendix A**. **Figure B-1** provides a graphical presentation of the peak-hour traffic volumes as derived from the relevant manual traffic counts.

The respective peak-hour flows for the traffic count at the relevant intersections were identified as indicated in **Table 2.5** below.

TABLE 2.5: PEAK HOUR PERIODS AT THE RELEVANT INTERSECTION					
POINT	INTERSECTION	AM PEAK		PM PEAK	
		TIME INTERVAL	NUMBER OF VEHICLES	TIME INTERVAL	NUMBER OF VEHICLES
A	Impala Smelter Complex Access Road, Road 1 and Road 2	06:15 – 07:15	843	14:45 to 15:45	554
B	Road 2 and Road 3	06:15 – 07:15	677	14:45 to 15:45	491
C	Lefaragatlha Road, Freedom Park Road and Road 1	06:15 – 07:15	1 012	14:45 to 15:45	617
D	Road R565 and Lefaragatlha Road	06:15 – 07:15	1 590	14:45 to 15:45	1858
E	Road R565 and Luka Road	06:15 – 07:15	924	14:45 to 15:45	1 540
F	Luka Road and Road 3	06:15 – 07:15	630	14:45 to 15:45	742

Figure 2.2 indicates the hourly traffic pattern, per 15-minute interval, for all modes of vehicles at the relevant intersections between 06:00 and 18:00 on Friday 07 August 2020. A graphical presentation of the peak-hour vehicle flows is indicated with **Figure B-1** of **Appendix B**.



2.2 FUTURE LAND USE AND ROAD CHARACTERISTICS

The following are relevant:

- a) Land use information, including existing and proposed future approved developments in the area; and
- b) Determination of the vehicle trips anticipated to be generated by the proposed project.

The subsections below elaborate on the above-mentioned future land use and road characteristics.

2.2.1 LAND USE INFORMATION, INCLUDING EXISTING AND PROPOSED LATENT DEVELOPMENTS IN THE AREA

No information of any latent rights (planned or other known developments within the study area) is readily available at the time of conducting this study, and it was therefore assumed that there were no known approved latent rights within the vicinity of the study area that would have a significant impact on vehicle traffic volumes within the area.

2.2.2 INFORMATION ABOUT THE EXPECTED FUTURE MODAL DISTRIBUTION

Figures B-2 and B-3 of Appendix B indicate, in percentages, the expected vehicle trips distribution, respectively, of light vehicles and heavy vehicles for the AM and PM peak periods for the relevant scenarios.

2.2.3 DETERMINATION OF VEHICLE TRIPS EXPECTED TO BE GENERATED DUE TO THE PROPOSED PROJECT

Table 2.6 indicate the trip generation rates, the number of vehicle trips which are expected to be generated due to the proposed project for the construction phase while **Table 2.7** provides the same for the operational phase.

The trip generation rates are based on the “*COTO TMH17, South African Trip Data Manual Version 1.01, September 2013*”, information provided by the project team and assumptions made based on professional experience where information was not available.

**TABLE 2.6: TRIP GENERATION RATES, EXPECTED NUMBER OF VEHICLE TRIPS TO BE GENERATED DUE TO THE PROPOSED PROJECT
(CONSTRUCTION PHASE)**

Item	Component	Num Workers per Day	% Workers active during Peak Hour	Num Workers Active per Peak Hour		Num Trucks Per Day	% Trucks active during Peak Hour	Num Trucks active during Peak Hour		Assumed Ave. Num Persons per Veh	Comments		Trip Generation Calculations for Peak Hour						Final Trip Information for Traffic Engineering Calculations				
													If Inward Movement is relevant Value = 1	Num Veh Trips for Inwards Direction	If Outward Movement is relevant Value = 1	Num Veh Trips for Outwards Direction	Total Num Veh Trips Generated during Peak Hour (In & Out)	Calculated Trip Generation Rate per Veh during Peak Hour	Trip Dist. %		Trip Generation		
																			In	Out	In	Out	
AM Peak Hour																							
1.	Construction workers (using own transport)	5	100%	5						1,2	Trips per Worker (1.2 Persons per Vehicle)		1	4	0	0	4	0,83		100%	0%	4	0
2.	Construction workers (Transported via 10-seater transport)	20	100%	20						10,0	10 persons per vehicle (Vehicle deliver workers and park on site)		1	2	0	0	2	0,10		100%	0%	2	0
3.	Heavy vehicles delivering consumables					5	20%	1		1,0	20% of delivery vehicles expected during peak periods		1	1	1	1	2	2,00		50%	50%	1	1
													TOTAL			8						7	1
PM Peak Hour																							
1.	Construction workers (using own transport)	5	100%	5						1,2	Trips per Worker (1.2 Persons per Vehicle)		0	0	1	4	4	0,83		0%	100%	0	4
2.	Construction workers (Transported via 10-seater transport)	20	100%	20						10,0	10 persons per vehicle (Vehicle deliver workers and park on site)		0	0	1	2	2	0,10		0%	100%	0	2
3.	Heavy vehicles delivering consumables					5	20%	1		1,0	20% of delivery vehicles expected during peak periods		1	1	1	1	2	2,00		50%	50%	1	1
													TOTAL			8						1	7

**TABLE 2.7: TRIP GENERATION RATES, EXPECTED NUMBER OF VEHICLE TRIPS TO BE GENERATED DUE TO THE PROPOSED PROJECT
(OPERATIONAL PHASE)**

Item	Component	Num Workers per Day	% Workers active during Peak Hour	Num Workers Active per Peak Hour		Num Trucks Per Day	% Trucks active during Peak Hour	Num Trucks active during Peak Hour		Assumed Ave. Num Persons per Veh	Comments		Trip Generation Calculations for Peak Hour						Final Trip Information for Traffic Engineering Calculations				
													If Inward Movement is relevant Value = 1	Num Veh Trips for Inwards Direction	If Outward Movement is relevant Value = 1	Num Veh Trips for Outwards Direction	Total Num Veh Trips Generated during Peak Hour (In & Out)	Calculated Trip Generation Rate per Veh during Peak Hour		Trip Dist. %		Trip Generation	
																				In	Out	In	Out
AM Peak Hour (Operational Phase)																							
1.	Additional staff due to new flash dryer	0	0%	0						1,2	No additional staff		0	0	0	0	0	0,00		0%	0%	0	0
2.	Additional heavy vehicles delivering ore to plant for processing due to new flash dryer					26	20%	5		1,0	20% of heavy vehicles expected during peak traffic periods		1	5	1	5	10	2,00		50%	50%	5	5
3.	Additional heavy vehicles exporting processed product due to new flash dryer					0	0%	0		1,0	No additional vehicles expected		0	0	0	0	0	0,00		0%	0%	0	0
4.	Heavy vehicles delivering consumables					0	0%	0		1,0	No additional delivery vehicles expected		0	0	0	0	0	0,00		0%	0%	0	0
													TOTAL			10						5	5
PM Peak Hour (Operational Phase)																							
1.	Additional staff due to new flash dryer	0	0%	0						1,2	No additional staff		0	0	0	0	0	0,00		0%	0%	0	0
2.	Additional heavy vehicles delivering ore to plant for processing due to new flash dryer					26	20%	5		1,0	20% of heavy vehicles expected during peak traffic periods		1	5	1	5	10	2,00		50%	50%	5	5
3.	Additional heavy vehicles exporting processed product due to new flash dryer					0	0%	0		1,0	No additional vehicles expected		0	0	0	0	0	0,00		0%	0%	0	0
4.	Heavy vehicles delivering consumables					0	0%	0		1,0	No additional delivery vehicles expected		0	0	0	0	0	0,00		0%	0%	0	0
													TOTAL			10						5	5

2.2.4 DETERMINATION OF THE TOTAL TRAFFIC EXPECTED TO BE GENERATED AT THE RELEVANT INTERSECTIONS

The detailed traffic-related investigation was conducted for the operational phase of the proposed project. The following figures are relevant:

- a) **Figure B-1:** 2020 peak hour traffic (background traffic) without the proposed project (**Scenario 1**);
- b) **Figure B-2:** Projected vehicle trip distribution for the proposed project (**Light Vehicles**);
- c) **Figure B-3:** Projected vehicle trip distribution for the proposed project (**Heavy Vehicles**);
- d) **Figure B-4:** Projected vehicle trips to be generated by the proposed project (**Construction Phase**);
- e) **Figure B-5:** Projected 2020 peak hour traffic with the proposed project (**Scenario 2**);
- f) **Figure B-6:** Projected 2030 peak hour traffic without the proposed project (**Scenario 3**);
- g) **Figure B-7:** Projected vehicle trips to be generated by the proposed project (**Operational Phase**); and
- h) **Figure B-8:** Projected 2030 peak hour traffic with the proposed project (**Scenario 4**).

2.3 DETERMINATION OF THE LEVELS OF SERVICE AT THE RELEVANT INTERSECTIONS

The “*SIDRA Intersection*” software was used as an aid for the design and evaluation of the relevant intersections. The following intersections were evaluated for levels of service:

- a) **Point A:** Intersection of Impala Smelter Complex Access Road, Road 1 and Road 2;
- b) **Point B:** Intersection of Road 2 and Road 3;
- c) **Point C:** Intersection of Lefaragatlha Road, Freedom Park Road and Road 1;
- d) **Point D:** Intersection of Road R565 and Lefaragatlha Road;
- e) **Point E:** Intersection of Road R565 and Luka Road; and
- f) **Point F:** Intersection of Luka Road and Road 3.

In **Appendix C Tables C-1 to C-4** indicates the levels of service and the degree of saturation calculated for the relevant intersections for the respective scenarios:

- a) **Table C-1:** Levels of service for various approaches for the year 2020 (background traffic) **without** the proposed project (**Scenario 1**);
- b) **Table C-2:** Levels of service for various approaches for the year 2030 (background traffic) **without** the proposed project (**Scenario 3**);
- c) **Table C-3:** Levels of service for various approaches for the year 2020 (background traffic) **with** the proposed project (**Scenario 2**); and
- d) **Table C-4:** Levels of service for various approaches for the year 2030 (background traffic) **with** the proposed project (**Scenario 4**).

From **Tables C-1 to C-4** it is possible to note that:

- a) Geometric upgrading (mitigating measures) is recommended as part of the existing circumstances without the proposed project;
- b) No further geometric upgrading (mitigating measures) is recommended due to the proposed project, as long as geometric improvements (mitigating measures) are implemented as recommended for the existing circumstances; and
- c) Refer to **Section 3** of this report for more information regarding required and/or recommended improvements (mitigating measures).

Refer to **Tables D-1 and D-2** of **Appendix D** for level of service criteria description respectively for unsignalised and signalised intersections.

Table 2.8 provides a summary of the predicted available reserve capacity on the various sections of roads that had been investigated with the proposed activities as part of the proposed new flash dryer.

TABLE 2.8: AVAILABLE RESERVE CAPACITY FOR RELEVANT ROAD SECTIONS

Point	Intersection	Direction of Road Section	Capacity per Lane	2020 Number of Lanes	2020 Total Capacity	2030 Number of Lanes	2030 Total Capacity	2020 Actual Number of Vehicles		2020 Reserve Capacity Available		2030 Actual Number of Vehicles		2030 Reserve Capacity Available	
								AM	PM	AM	PM	AM	PM	AM	PM
A	Intersection of Impala Smelter Access Road, Road 1 and Road 2	North (Road 2)	900	1	900	1	900	127	156	773	744	151	171	749	729
		East (Road 1)	900	1	900	1	900	370	360	530	540	388	400	512	500
		West (Impala Access)	900	1	900	1	900	354	46	546	854	361	52	539	848
B	Intersection of Road 2 and Road 3	North (Road 2)	700	1	700	1	700	289	60	411	640	388	80	312	620
		East (Road 3)	900	1	900	1	900	69	172	831	728	92	231	808	669
		South (Road 2)	900	1	900	1	900	173	110	727	790	210	142	690	758
		West (Road 3)	900	1	900	1	900	148	151	752	749	179	163	721	737
C	Intersection of Lefaragatlha Road, Freedom Park Road and Road 1	North (Lefaragatlha)	900	1	900	1	900	193	34	707	866	260	46	640	854
		East (Freedom Park)	900	1	900	1	900	289	180	611	720	322	211	578	689
		South (Lefaragatlha)	900	1	900	1	900	227	344	673	556	261	404	639	496
		West (Road 1)	900	1	900	1	900	309	65	591	835	333	84	567	816
D	Intersection of Road R565 and Lefaragatlha Road	North (Lefaragatlha)	900	1	900	1	900	439	154	461	746	593	213	307	687
		East (Road R565)	1100	2	2200	2	2200	656	982	1544	1218	887	1322	1313	878
		South (Access)	700	1	700	1	700	74	99	626	601	100	133	600	567
		West (Road R565)	1100	2	2200	2	2200	425	627	1775	1573	572	842	1628	1358
E	Intersection of Road R565 and Luka Road	North (Luka Road)	900	1	900	1	900	251	258	649	642	329	347	571	553
		East (Road R565)	1100	2	2200	2	2200	354	763	1846	1437	476	1020	1724	1180
		South (Luka Road)	700	1	700	1	700	13	32	687	668	17	43	683	657
		West (Road R565)	1100	2	2200	2	2200	312	493	1888	1707	420	660	1780	1540
F	Intersection of Luka Road and Road 3	North (Luka Road)	900	1	900	1	900	89	250	811	650	111	323	789	577
		East (Road 3)	900	1	900	1	900	211	84	689	816	245	108	655	792
		South (Luka Road)	900	1	900	1	900	234	385	666	515	303	490	597	410
		West (Road 3)	900	1	900	1	900	98	25	802	875	132	34	768	866

2.4 SENSITIVE ROAD SECTIONS AND INTERSECTIONS RELATED TO EXISTING AND PROPOSED CONDITIONS

It is important to determine the sensitivity of existing roads in order to assist in an understanding of the current baseline conditions. For the purpose of this project sections of the Lefaragatlha Road and Luka Road is located within a community and is therefore deemed a sensitive road.

Sensitive road sections and intersections related to existing conditions **without** and **with** the proposed project in terms of vehicular traffic include the following:

- a) Where residents and schools are located (vehicle / pedestrian conflict);
- b) Free-flow legs of intersections where right turning movements take place and where no dedicated right-turn lanes are provided;
- c) Intersections with high volumes of vehicular traffic conflicts; and
- d) Speeding.

The following figures are presented as part of the sensitive road sections **without** the proposed project (existing circumstances):

- a) **Figures 2.3:** Sensitive road sections and Intersections indicating existing sensitive areas and Intersections **WITHOUT** the proposed activities as part of the proposed project **WITHOUT** recommended mitigating measures; and
- b) **Figures 2.4:** Sensitive road sections and Intersections indicating existing sensitive areas and Intersections **WITHOUT** the proposed activities as part of the proposed project **WITH** recommended mitigating measures.

With reference to **Figure 2.3**, without recommended mitigation, sections of the Lefaragatlha Road, Luka Road and Road R565 is considered to have a medium sensitivity due to the following reasons:

- a) Sections of Lefaragatlha Road and Luka Road as depicted by **Figure 2.3** has housing located next to the roadway and it could therefore be expected that pedestrian movement (including children) would be present along these road sections;
- b) Sections of Road R565 as depicted by **Figure 2.3** has housing located next to the roadway and it could therefore be expected that pedestrian movement (including children) would be present along these road sections; and
- c) Vehicle traffic volumes along Road R565 are high which leads to a higher possibility of accidents.

Table 3.2 of **Section 3** outlines the recommended mitigation measures that are required along Lefaragatlha Road, Luka Road and Road R565 without the proposed project. These recommendations are required to assist in improving current third party and or animal road safety. With reference to **Figure 2.4**, even with the implementation of the recommended mitigation measures as outlined in **Table 3.2**, the road sensitivity remains medium. This is due to the fact that even with measures in place to improve road safety for third parties and/or animals, there is always a possibility of an accident or injury occurring

With the implementation of the recommended mitigation measures as outline in **Table 3.2**, intersection sensitivity improves from high to low for intersection D and E, while the intersection sensitivity of intersections C, B and F improves from a medium to very low sensitivity.

It is important to take into consideration that the anticipated vehicle traffic to be generated due to the proposed project as determined as part of **Section 2.2.3** is an insignificant volume of vehicle traffic during peak traffic times for the construction and operational phases.

It follows that the proposed project will not change the sensitivity of the relevant roads under investigation as part of this report and as such the road sensitivity for certain sections would remain a medium sensitivity, intersection sensitivity of intersections D and E would remain a low sensitivity and the intersection sensitivity of intersections B, C and F would remain a very low sensitivity.



FIGURE 2.3: SENSITIVE ROAD SECTIONS AND INTERSECTIONS INDICATING EXISTING SENSITIVE AREAS AND INTERSECTIONS WITHOUT THE PROPOSED PROJECT WITHOUT RECOMMENDED MITIGATING MEASURES



FIGURE 2.4: SENSITIVE ROAD SECTIONS AND INTERSECTIONS INDICATING EXISTING SENSITIVE AREAS AND INTERSECTIONS WITHOUT THE PROPOSED PROJECT WITH RECOMMENDED MITIGATING MEASURES

2.5 INFORMATION REQUESTED BY RELEVANT ROAD AUTHORITY

Input will be provided as part of the Detail Design Phase of the proposed project. All comments / approval from the relevant road authorities will be included as part of the applications for approval and detail design process as a separate document.

2.6 OTHER TRAFFIC-RELATED MATTERS

Table 2.9 provides a summary of the following:

- a) Access related matters;
- b) Road safety;
- c) Non-motorised transport; and
- d) Public transport.

TABLE 2.9: SUMMARY OF OTHER TRAFFIC-RELATED MATTERS RELEVANT TO ALL PHASES OF THE PROPOSED PROJECT

Item	Description of Element	General Comments	Specific Issues	Actions Required
1.	ACCESS RELATED MATTERS			
1.1	Access to the existing Impala Smelter	All access intersections are existing access intersections and comply with all relevant road related requirements.	a) None.	a) None.
2.	ROAD SAFETY MATTERS			
2.1	General road safety	<p>The following are typical elements related to the road network, which cause road safety problems in rural and urban areas and which need to be addressed on a continuous basis:</p> <ul style="list-style-type: none"> a) Intersection layout, with specific reference to dedicated right turn lanes, where there is heavy vehicle movement; b) Pedestrian movements (road crossings); c) Intersection alignment, such as staggered intersections; d) Insufficient public transport facilities; e) Access control for vehicle movement; f) Fencing to control animal movement; g) Lack of or deterioration of reflective road studs for visibility during the night at strategic points; h) Lack of pedestrian walkways to separate pedestrian and vehicle movements at strategic points; i) Lack of provision and quality of road markings; j) Lack of provision and quality of road signs; and k) Improper road safety training for workers as well as adjacent communities. 	<p>The following road safety concerns were observed at the relevant intersections adjacent to the Impala Smelter Complex (Intersections A, B, C and F):</p> <ul style="list-style-type: none"> a) No reflective road studs to improve intersection geometry visibility during night-time; b) Road markings are fading. 	<p>In general, the report was compiled to address the road safety issues as far as practically possible. Refer to Section 3.2 for the required and recommended intersection improvements.</p> <p>Road safety assessment on roads adjacent the Impala Smelter Complex is recommended (Intersections A, B, C and F) to determine the exact need for:</p> <ul style="list-style-type: none"> a) Reflective road studs at the relevant intersections and roadways in between intersections; b) Updating and maintaining road markings which are fading; and c) Need for relevant road traffic signs where not present or are required. <p><u>Other recommended road safety measures for consideration are:</u></p> <ul style="list-style-type: none"> a) Provide Impala Smelter Complex workers and contractor workers with training on road safety; and b) Run road safety and awareness campaigns at the mine.
3.	NON-MOTORISED TRANSPORT			
3.1	Non-motorised transport	a) Non-mine related pedestrian activity around the relevant intersections under investigation was observed during the site visit.	<ul style="list-style-type: none"> a) No pedestrian walkways are provided to split motorised and non-motorised traffic at most intersections under investigation. b) No pedestrian crossings are provided at the relevant intersections under investigation. 	<p><u>Impala in conjunction with other mining developments who also make use of Intersections A, B, and F, relevant road authority and municipality should provide:</u></p> <ul style="list-style-type: none"> a) Paved pedestrian walkways to create a safe environment for pedestrians to move around at intersections A, B and F. b) Provide pedestrian crossings at intersections A, B and F.
4.	PUBLIC TRANSPORT			
4.1	Public transport	<ul style="list-style-type: none"> a) Two types of public transport commuters are relevant: <ul style="list-style-type: none"> i) Firstly, workers who are travel to and from the proposed mining development during all phases; and ii) Secondly, visitors to the development during all phases. b) On site loading- and off-loading areas are provided where workers are loaded and off-loaded in a safe manner. 	a) None	a) None.

Section 3

FINDINGS AND RECOMMENDATIONS

Based on a site inspection of the existing road network adjacent to the site under investigation, traffic surveys, calculations and reference to the relevant traffic engineering guideline documents, the following findings and recommendations were made:

3.1 FINDINGS

The capacity calculations for the traffic impact assessment were conducted for the years 2020 and 2030 respectively. This time frame is in line with traffic engineering guidelines and practice and is determined by the expected number of vehicle trips that could potentially be generated during any specific peak hour by a specific development.

Although the proposed project is anticipated to be operational past the year 2030, anticipated vehicle traffic predictions past a 10 year scenario becomes unpredictable due to factors that are not known at the time of preparing this report, which include future developments in the area and potential road network changes.

The following are discussed in terms of the findings:

- a) Traffic impact during the respective phases
- b) Site accessibility; and
- c) Other traffic related matters.

3.1.1 TRAFFIC IMPACT WITHOUT THE PROPOSED PROJECT

Table E-1 presented as part of **Appendix E** provides a summary of the impact ratings respectively without the proposed project. **Table E-1** of **Appendix E** was derived from **Tables F-1 to F-3** of **Appendix F** of the report that provides the criteria used in terms of the assessments process.

It is possible to conclude from **Table E-1** that the existing conditions on the existing road network:

- a) That the existing road network without the proposed project currently from a road capacity perspective have a low to medium consequence without recommended road capacity mitigating measures implemented, and that the implementation of the recommended mitigating measures would result in an improvement to a positive high consequence;

- b) That the existing road network without the proposed project currently from a road capacity perspective have a very low to medium significance without recommended road capacity mitigating measures implemented, and that the implementation of the recommended mitigating measures would result in an improvement to a positive high significance; and
- c) That the existing road network without the proposed project currently from a road safety perspective has an insignificant to low significance and that no road safety mitigating measures are required.

3.1.2 TRAFFIC IMPACT DURING THE RESPECTIVE PHASES WITH THE PROPOSED PROJECT

Table E-2 presented as part of **Appendix E** provides a summary of the impact ratings respectively with the proposed project. **Table E-2** of **Appendix E** was derived from **Tables F-1** to **F-3** of **Appendix F** of the report that provides the criteria used in terms of the assessments process.

It is possible to conclude from **Table E-2** that in terms of the anticipated vehicle traffic to be generated by the proposed project:

- a) That the road related impact from a road capacity perspective would have a low to positive high consequence as long as the mitigating measures recommended without the proposed project is implemented and that no road capacity related mitigating measures would be required due to the proposed project;
- b) That the road related impact from a road capacity perspective would have a very low to positive high significance as long as the mitigating measures recommended without the proposed project is implemented and that no road capacity related mitigating measures would be required due to the proposed project;
- c) That the road related impact from a road safety perspective would have a low to medium consequence and that no road safety mitigating measures are required;
- d) That the road related impact from a road safety perspective would have a insignificant to low significance and that no road safety mitigating measures are required;

It is furthermore possible to conclude that owing to the type and nature of the proposed project, it is expected that the proposed project will have a manageable impact on vehicle traffic during all phases, provided that road infrastructure improvements are implemented as indicated in **Section 3.2**.

Key potential traffic related impacts include road vehicle capacity and public safety. From the investigation, calculations and intersection performance evaluations, Lefaragatlha Road, Luka Road and R565 are considered to have an acceptable level of service, therefore, the anticipated vehicle traffic to be generated by the proposed project would have an insignificant impact on the condition of the existing road network.

In terms of public safety (pedestrian and vehicle accidents), traffic accidents have the potential to injure people and/or animals. The use of the Lefaragatlha Road, Luka Road and Road R565 as part of the existing Impala operations already presents potential traffic safety risks. The

proposed project presents additional trucks transporting toll to the Smelter Complex along the Lefaragatlha Road.

This is considered to be a high significance in the unmitigated scenario, when considering the medium sensitivity of the road and the potential for traffic accidents to occur that could result in injury or death of people and/or animals. With the implementation of the recommendations as outlined in **Section 3.2**, the aim at improving key current intersections, the likelihood of traffic accidents occurring is reduced and as such significance of the impact reduces to medium. In terms of the proposed project, no additional geometric road improvements would be required provided that recommended road infrastructure improvements are implemented as part of existing conditions as indicated in Section 3.2.

3.1.3 SITE ACCESSIBILITY

The proposed new flash dryer will be installed on the property of the existing Impala Smelter and access would be gained by means of existing intersections. **Section 3.2** provides more information on the recommendations for geometric improvements.

3.2 RECOMMENDATIONS

The following are discussed in terms of the recommendations:

- a) Summary of recommended improvements without the proposed project activities;
- b) Detailed summary of recommended improvements without the proposed project activities;
- c) Summary of recommended improvements with the proposed project activities;
- d) Detailed summary of recommended improvements with the proposed project activities;
- e) Institutional arrangements; and
- f) Reasoned opinion for authorisation.

3.2.1 SUMMARY OF RECOMMENDED INTERSECTION IMPROVEMENTS WITHOUT THE PROPOSED PROJECT ACTIVITIES

Table 3.1 provides a short summary of the intersection improvements recommended without the proposed project, and whether the improvements are required from an Intersection performance point of view (Technical / Capacity) or a road safety point of view.

3.2.2 DETAILED SUMMARY OF RECOMMENDED IMPROVEMENTS WITHOUT THE PROPOSED PROJECT

Figure 3.1 provides a graphical presentation of the recommended intersection and road network improvements **WITHOUT** the proposed project while **Table 3.2** provides detailed information on Intersection improvements recommended **WITHOUT** the proposed project.

The TIA does not comment on pavement layer attributes in terms of the relevant road sections. The last-mentioned need to be based on recommendations to be made by a Pavement Design Specialist input.

TABLE 3.1: SUMMARY OF INTERSECTION IMPROVEMENTS RECOMENDED IN TERMS OF ROAD / EARTH WORKS WITHOUT THE PROPOSED PROJECT ACTIVITIES

Point	Intersection Description	<u>WITHOUT</u> proposed activities	
		Intersection Performance Perspective	Road Safety Perspective
A	Intersection of Impala Smelter Complex Access Road, Road 1 and Road 2	No improvements required.	
B	Intersection of Road 2 and Road 3	<ul style="list-style-type: none"> Provide 60-meter dedicated left-turn lane on western approach. 	None.
C	Intersection of Lefaragatlha Road, Freedom Park Road and Road 1	<ul style="list-style-type: none"> Provide 60 meters dedicated left-turn lane on northern approach. 	None.
D	Intersection of Road R565 and Lefaragatlha Road	<ul style="list-style-type: none"> Provide traffic light signal as intersection control. 	None.
E	Intersection of Road R565 and Luka Road	<ul style="list-style-type: none"> Provide traffic light signal as intersection control. 	None.
F	Intersection of Luka Road and Road 3	<ul style="list-style-type: none"> Provide 60 meters dedicated left-turn lane on eastern approach. 	None.

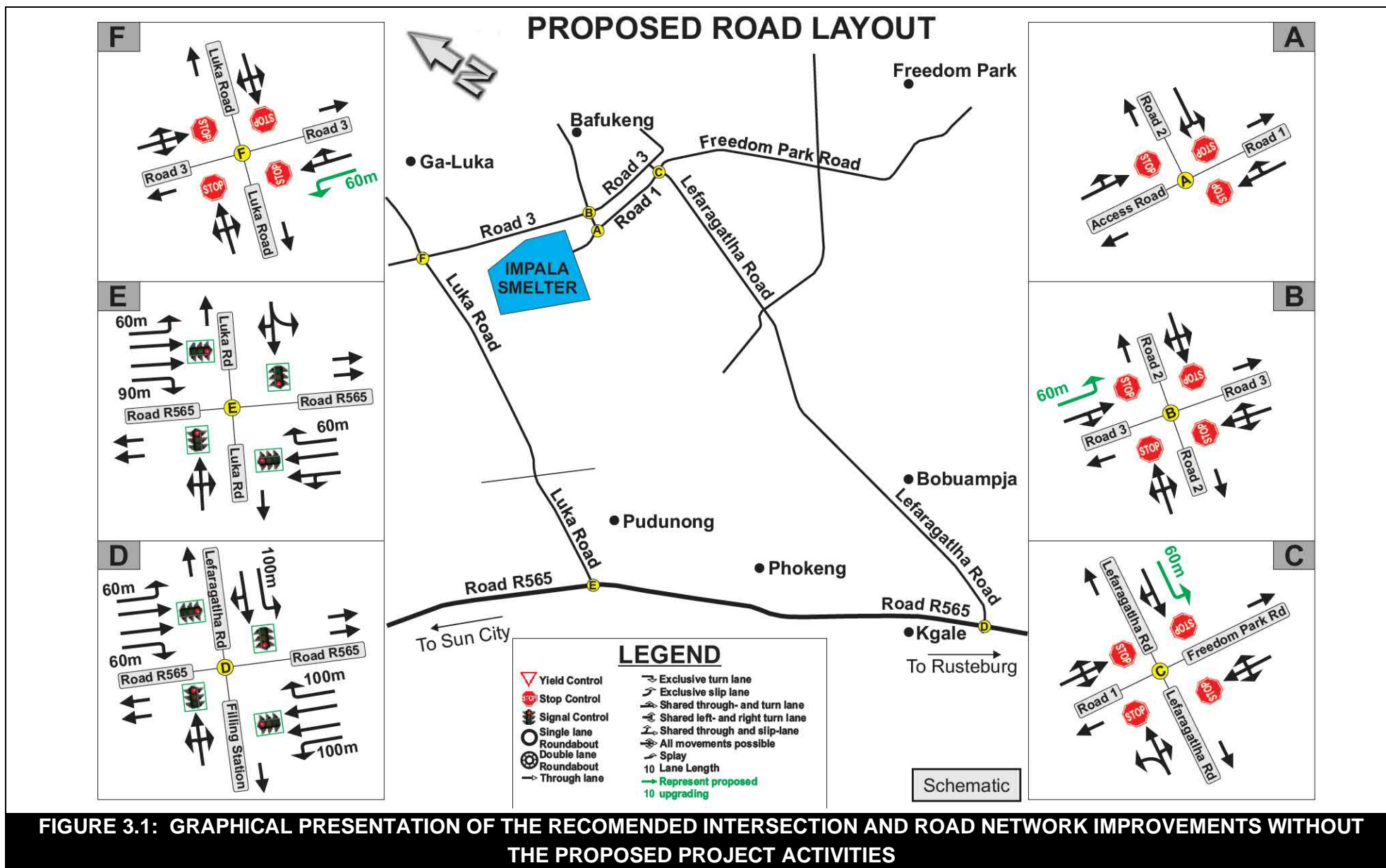


FIGURE 3.1: GRAPHICAL PRESENTATION OF THE RECOMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS WITHOUT THE PROPOSED PROJECT ACTIVITIES

TABLE 3.2: RECOMMENDED ROAD NETWORK IMPROVEMENTS WITHOUT THE PROPOSED PROJECT ACTIVITIES


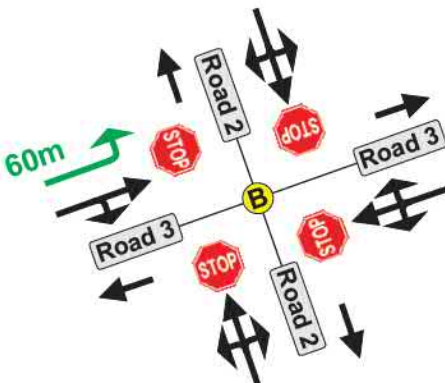
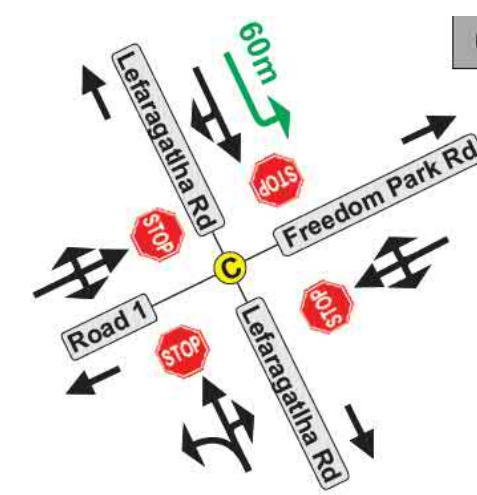
POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED													GEOMETRY DETERMINED BY MEANS OF SIDRA			
			Approach Traffic Control				Extra Lanes Required (m)						Improvements required from a Road Safety or intersection performance Perspective	Reflective Road Studs required at Intersection	Road Markings Required		Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane	Number of Extra Through Lanes							
A	Intersection of Impala Smelter Access Road, Road 1 and Road 2	North (Road 2)	-	Yes	-	-	No improvements required.						-	Yes	Yes	-	-	-	
		East (Road 1)	-	Yes	-	-							-		Yes	-	-	-	
		West (Access)	-	Yes	-	-							-		Yes	-	-	-	
B	Intersection of Road 2 and Road 3	North (Road 2)	-	Yes	-	-	-	-	-	-	-	-	-	Yes	Yes	-	-	-	
		East (Road 3)	-	Yes	-	-	-	-	-	-	-	-	-		Yes	-	-	-	
		South (Road 2)	-	Yes	-	-	-	-	-	-	-	-	-		Yes	-	-	-	
		West (Road 3)	-	Yes	-	-	-	Yes, 60m	-	-	-	-	Performance	Yes	-	-	-		
C	Intersection of Lefaragatlha Road, Freedom Park Road and Road 1	North (Lefaragatlha)	-	Yes	-	-	Yes, 60m	-	-	-	-	-	Performance	Yes	Yes	-	-	-	
		East (Freedom Park)	-	Yes	-	-	-	-	-	-	-	-	-		Yes	-	-	-	
		South (Lefaragatlha)	-	Yes	-	-	-	-	-	-	-	-	-		Yes	-	-	-	
		West (Road 1)	-	Yes	-	-	-	-	-	-	-	-	-		Yes	-	-	-	

TABLE 3.2: RECOMMENDED ROAD NETWORK IMPROVEMENTS WITHOUT THE PROPOSED PROJECT ACTIVITIES (Continue...)

POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED											GEOMETRY DETERMINED BY MEANS OF SIDRA					
			Approach Traffic Control				Extra Lanes Required (m)					Improvements required from a Road Safety or intersection performance Perspective	Reflective Road Studs required at Intersection		Road Markings Required	Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways	
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane								Number of Extra Through Lanes
D	Intersection of Road R565 and Lefaragatlha Road	North (Lefaragatlha)	-	-	-	Yes	-	-	-	-	-	-	Performance	Yes	Yes	-	-	-	
		East (Road R565)	-	-	-	Yes	-	-	-	-	-	-	Performance		Yes	-	-	-	
		South (Lefaragatlha)	-	-	-	Yes	-	-	-	-	-	-	Performance		Yes	-	-	-	
		West (Road R565)	-	-	-	Yes	-	-	-	-	-	-	Performance		Yes	-	-	-	
E	Intersection of Road R565 and Luka Road	North (Luka Road)	-	-	-	Yes	-	-	-	-	-	-	Performance	Yes	Yes	-	-	-	
		East (Road R565)	-	-	-	Yes	-	-	-	-	-	-	Performance		Yes	-	-	-	
		South (Luka Road)	-	-	-	Yes	-	-	-	-	-	-	Performance		Yes	-	-	-	
		West (Road R565)	-	-	-	Yes	-	-	-	-	-	-	Performance		Yes	-	-	-	
F	Intersection of Luka Road and Road 3	North (Luka Road)	-	Yes	-	-	-	-	-	-	-	-	-		Yes	-	-	-	
		East (Road 3)	-	Yes	-	-	-	Yes, 60m	-	-	-	-	Performance		Yes	-	-	-	
		South (Luka Road)	-	Yes	-	-	-	-	-	-	-	-	-		Yes	-	-	-	
		West (Road 3)	-	Yes	-	-	-	-	-	-	-	-	-		Yes	-	-	-	

3.2.3 SUMMARY OF RECOMMENDED INTERSECTION IMPROVEMENTS WITH THE PROPOSED PROJECT

Table 3.3 provides a short summary of the intersection improvements recommended with the proposed project, and whether the improvements are required from an Intersection performance point of view (Technical / Capacity) or a road safety point of view.

3.2.4 DETAILED SUMMARY OF RECOMMENDED IMPROVEMENTS WITH THE PROPOSED PROJECT

Figure 3.2 provides a graphical presentation of the recommended intersection and road network improvements **WITH** the proposed project while **Table 3.4** provides detailed information on Intersection improvements recommended **WITH** the proposed project.

TABLE 3.3: SUMMARY OF INTERSECTION IMPROVEMENTS RECOMENDED IN TERMS OF ROAD / EARTH WORKS WITH THE PROPOSED PROJECT

Point	Intersection Description	<u>WITH</u> proposed project	
		Intersection Performance Perspective	Road Safety Perspective
A	Intersection of Impala Smelter Complex Access Road, Road 1 and Road 2	No additional improvements required.	
B	Intersection of Road 2 and Road 3	No additional improvements required.	
C	Intersection of Lefaragatlha Road, Freedom Park Road and Road 1	No additional improvements required.	
D	Intersection of Road R565 and Lefaragatlha Road	No additional improvements required.	
E	Intersection of Road R565 and Luka Road	No additional improvements required.	
F	Intersection of Luka Road and Road 3	No additional improvements required.	

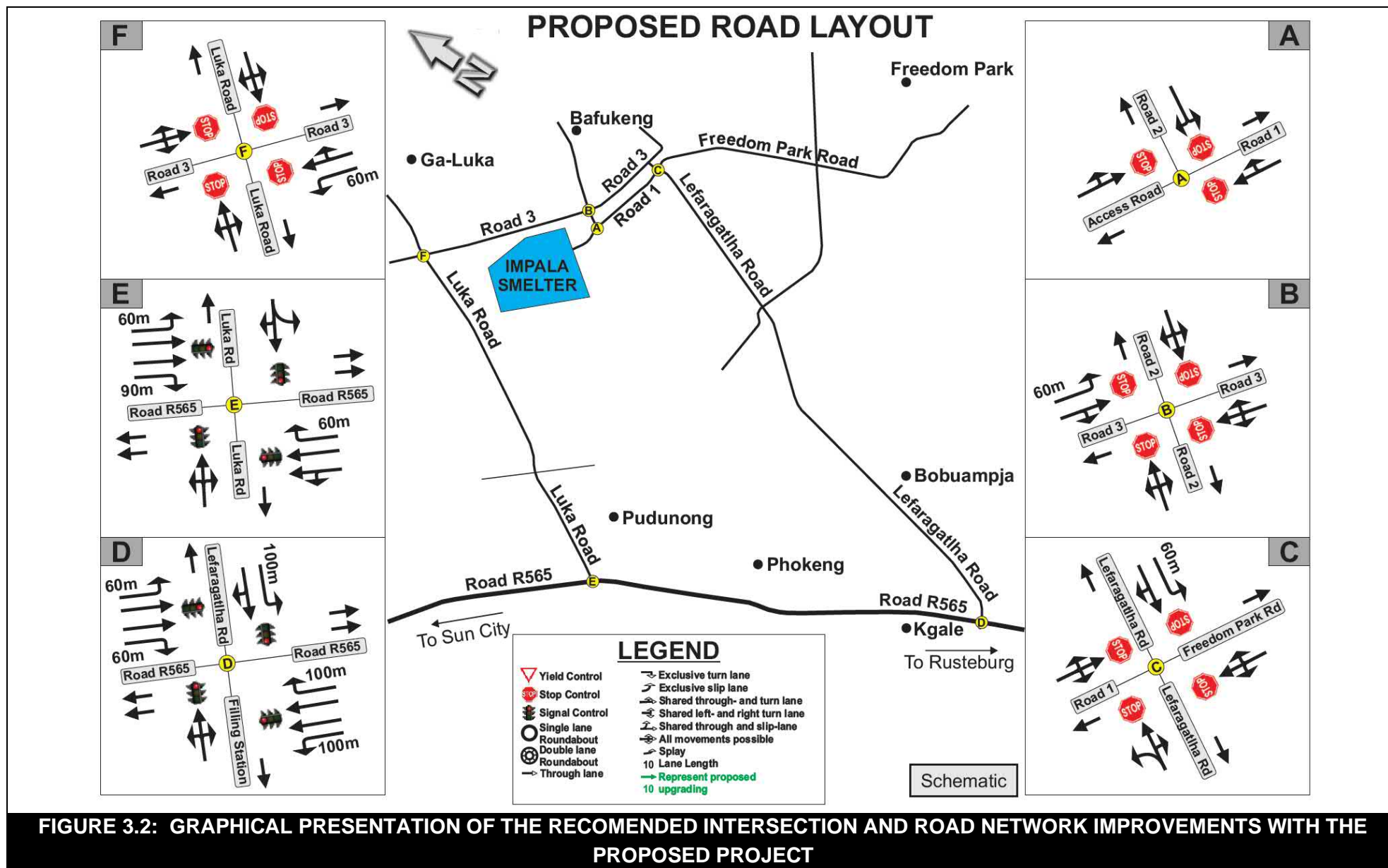


FIGURE 3.2: GRAPHICAL PRESENTATION OF THE RECOMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS WITH THE PROPOSED PROJECT

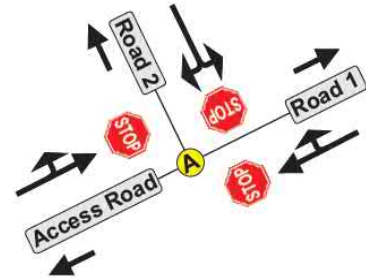
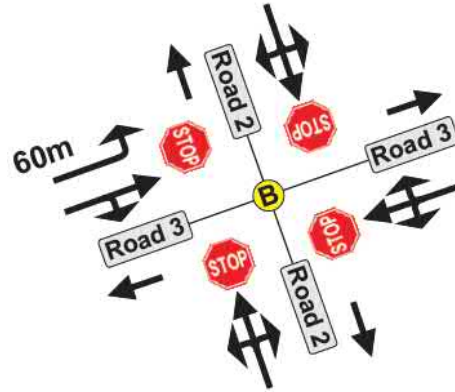

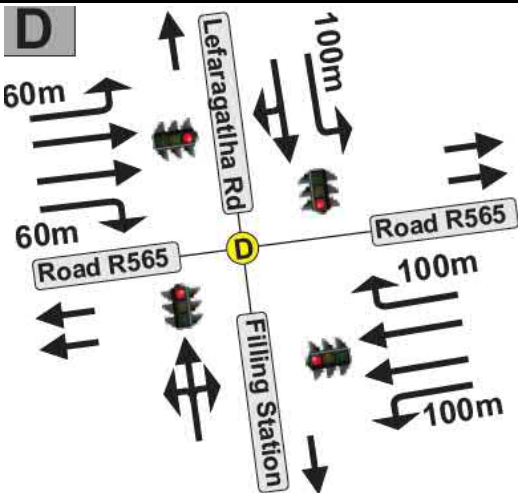
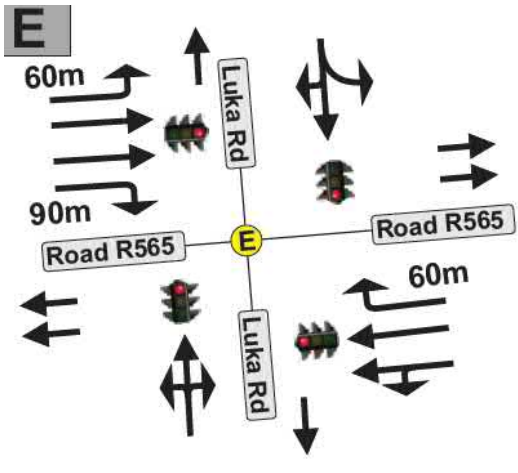
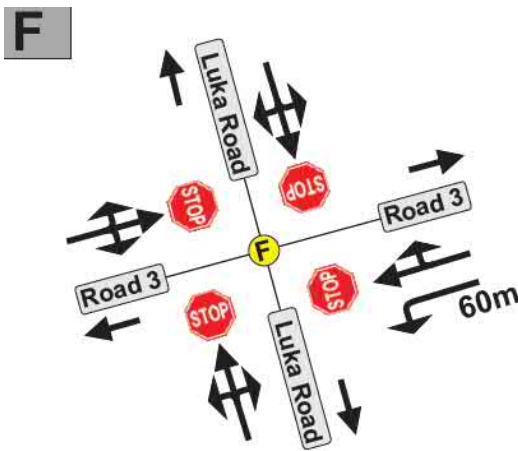
TABLE 3.4: RECOMMENDED ROAD NETWORK IMPROVEMENTS WITH THE PROPOSED PROJECT																		
POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED														GEOMETRY DETERMINED BY MEANS OF SIDRA	
			Approach Traffic Control			Extra Lanes Required (m)					Improvements required from a Road Safety or intersection performance Perspective	Reflective Road Studs required at Intersection	Road Markings Required	Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways		
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Lane	Acceleration Lane	Acceleration Lane in Middle of Road								Dedicated Right-Turn Lane
A	Intersection of Impala Smelter Complex Access Road, Road 1 and Road 2	North (Road 2)	No additional improvements required.															
		East (Road 1)																
		West (Access)																
B	Intersection of Road 2 and Road 3	North (Road 2)	No additional improvements required.															
		East (Road 3)																
		South (Road 2)																
		West (Road 3)																
C	Intersection of Lefaragatlha Road, Freedom Park Road and Road 1	North (Lefaragatlha)	No additional improvements required.															
		East (Freedom Park)																
		South (Lefaragatlha)																
		West (Road 1)																

TABLE 3.4: RECOMMENDED ROAD NETWORK IMPROVEMENTS WITH THE PROPOSED PROJECT (Continue...)																		
POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED														GEOMETRY DETERMINED BY MEANS OF SIDRA	
			Approach Traffic Control			Extra Lanes Required (m)					Improvements required from a Road Safety or intersection performance Perspective	Reflective Road Studs required at Intersection	Road Markings Required	Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways		
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Lane	Acceleration Lane	Acceleration Lane in Middle of Road								Dedicated Right-Turn Lane
D	Intersection of Road R565 and Lefaragatlha Road	North (Lefaragatlha)	No additional improvements required.															
		East (Road R565)																
		South (Lefaragatlha)																
		West (Road R565)																
E	Intersection of Road R565 and Luka Road	North (Luka Road)	No additional improvements required.															
		East (Road R565)																
		South (Luka Road)																
		West (Road R565)																
F	Intersection of Luka Road and Road 3	North (Luka Road)	No additional improvements required.															
		East (Road 3)																
		South (Luka Road)																
		West (Road 3)																

3.2.5 INSTITUTIONAL ARRANGEMENTS

The following recommendations are made in terms of the detailed design phase of roads for the existing Impala Smelter:

- a) Detailed investigations should be conducted in conjunction with the relevant road's authority in terms of the existing quality and potential life span of the existing road surface layers of the roads where consumables, ROM ore and workers will be transported; and
- b) A road maintenance plan should be prepared in conjunction with the relevant roads authority on public roads where trucks will operate as soon as the project has been approved in order to ensure that the consumables, ROM ore and workers can be transported at all times.

3.2.6 REASONED OPINION FOR AUTHORISATION

In conclusion of the findings as part of the investigations, Siyazi Limpopo Consulting Services (Pty) Ltd. is of the opinion that the proposed activities as part of the proposed project would have an insignificant impact for all phases on the relevant roads network as long as the mitigating measures are implemented as recommended as part of **Section 3** of this report and is therefore recommended to be granted authorisation.

APPENDIX A

INFORMATION RELATED TO STATUS QUO



FIGURE A-1: RELEVANT MOVEMENTS RELATED TO TRAFFIC COUNTS

**TABLE A-1: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE
INTERSECTION OF IMPALA SMELTER ACCESS ROAD, ROAD 1 AND ROAD 2 (POINT A)
(07 AUGUST 2020)**

TIME INTERVALS	MOVEMENTS						TOTAL
	5	6	7	9	10	11	
06:00-07:00	236	58	22	107	53	359	835
06:15-07:15	240	70	34	107	57	335	843
06:30-07:30	207	78	48	98	49	264	744
06:45-07:45	164	74	54	76	56	181	605
07:00-08:00	113	65	55	56	47	106	442
07:15-08:15	70	56	54	48	48	50	326
07:30-08:30	44	56	47	45	46	31	269
07:45-08:45	33	67	47	50	43	37	277
08:00-09:00	30	68	49	44	40	49	280
08:15-09:15	36	66	47	45	41	51	286
08:30-09:30	39	62	48	41	53	51	294
08:45-09:45	36	58	44	38	51	50	277
09:00-10:00	36	64	44	38	54	51	287
09:15-10:15	28	81	42	38	54	50	293
09:30-10:30	33	87	39	43	44	47	293
09:45-10:45	35	84	47	42	46	45	299
10:00-11:00	34	83	47	51	45	38	298
10:15-11:15	37	87	55	45	45	36	305
10:30-11:30	30	92	62	35	53	38	310
10:45-11:45	39	96	54	38	52	40	319
11:00-12:00	41	90	58	32	53	47	321
11:15-12:15	43	75	58	40	46	58	320
11:30-12:30	44	58	71	47	45	62	327
11:45-12:45	44	50	98	50	42	68	352
12:00-13:00	40	50	116	46	39	71	362
12:15-13:15	43	45	126	42	47	71	374
12:30-13:30	46	52	131	44	45	74	392
12:45-13:45	56	53	126	49	44	72	400
13:00-14:00	72	51	119	62	43	60	407
13:15-14:15	76	55	118	62	45	56	412
13:30-14:30	79	49	109	63	51	58	409
13:45-14:45	60	47	110	46	60	64	387
14:00-15:00	46	48	114	36	75	92	411
14:15-15:15	36	39	118	30	90	132	445
14:30-15:30	31	45	112	19	100	192	499
14:45-15:45	28	45	97	17	109	258	554
15:00-16:00	24	44	78	16	107	273	542
15:15-16:15	27	46	62	18	88	237	478
15:30-16:30	26	45	54	19	66	173	383
15:45-16:45	26	47	45	19	46	91	274
16:00-17:00	24	48	43	16	26	41	198
16:15-17:15	16	41	40	11	19	33	160
16:30-17:30	12	37	40	11	17	32	149
16:45-17:45	12	35	40	13	12	37	149
17:00-18:00	14	29	37	10	11	41	142

TABLE A-2: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF ROAD 2 AND ROAD 3 (POINT B) (07 AUGUST 2020)

TIME INTERVALS	MOVEMENTS												TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
06:00-07:00	55	50	3	2	14	106	26	102	46	59	25	57	545
06:15-07:15	56	71	3	4	18	145	36	99	74	73	30	68	677
06:30-07:30	49	76	3	6	22	130	45	87	71	76	37	67	669
06:45-07:45	48	80	1	5	22	106	42	66	68	62	39	51	590
07:00-08:00	33	75	2	6	22	84	43	48	61	52	37	39	502
07:15-08:15	29	65	2	5	23	65	49	52	41	31	33	27	422
07:30-08:30	25	71	2	3	20	57	50	47	34	27	24	29	389
07:45-08:45	25	81	1	3	23	53	56	51	30	24	27	32	406
08:00-09:00	23	80	1	2	26	44	59	58	26	20	25	27	391
08:15-09:15	20	84	1	1	28	42	54	60	27	24	24	27	392
08:30-09:30	28	81	3	1	25	53	54	63	26	22	25	24	405
08:45-09:45	33	75	3	2	16	57	55	56	24	22	19	24	386
09:00-10:00	42	73	2	3	11	72	53	51	27	22	19	27	402
09:15-10:15	54	74	2	3	7	66	53	45	27	20	15	26	392
09:30-10:30	58	69	0	5	11	65	52	47	26	22	19	25	399
09:45-10:45	61	62	1	4	18	57	52	53	27	21	21	28	405
10:00-11:00	65	63	1	4	26	47	50	54	24	22	26	36	418
10:15-11:15	76	58	1	5	29	44	60	54	26	26	30	39	448
10:30-11:30	89	57	1	2	28	43	62	50	36	35	39	43	485
10:45-11:45	94	53	1	2	34	40	67	46	38	37	38	43	493
11:00-12:00	86	52	4	1	32	46	70	46	32	34	45	42	490
11:15-12:15	71	51	4	2	36	44	68	53	23	28	49	40	469
11:30-12:30	56	47	5	5	36	38	86	62	18	23	49	42	467
11:45-12:45	45	50	6	8	37	50	95	88	15	20	59	44	517
12:00-13:00	42	50	3	11	41	41	96	103	21	22	56	41	527
12:15-13:15	43	50	3	9	38	40	116	113	20	19	53	44	548
12:30-13:30	42	52	2	9	42	35	117	123	16	15	56	49	558
12:45-13:45	40	48	1	9	33	24	119	113	16	19	57	59	538
13:00-14:00	42	45	3	9	29	22	143	103	11	18	58	74	557
13:15-14:15	45	43	6	11	26	21	146	98	19	21	77	78	591
13:30-14:30	57	42	6	8	25	19	145	93	18	21	74	70	578
13:45-14:45	69	39	6	6	23	14	146	84	16	17	71	64	555
14:00-15:00	85	38	4	3	20	13	139	96	15	14	65	46	538
14:15-15:15	98	35	1	1	24	16	129	95	9	12	51	44	515
14:30-15:30	106	31	1	2	26	14	124	81	8	11	44	40	488
14:45-15:45	117	33	1	1	25	14	133	78	7	13	38	31	491
15:00-16:00	119	28	2	1	23	15	120	62	10	15	34	28	457
15:15-16:15	108	23	2	1	21	10	107	50	7	11	28	23	391
15:30-16:30	90	23	2	0	18	11	88	45	6	10	28	24	345
15:45-16:45	72	20	1	0	22	11	60	35	7	6	25	21	280
16:00-17:00	53	19	0	0	21	10	49	29	4	5	29	23	242
16:15-17:15	39	18	1	0	16	9	47	28	11	11	27	18	225
16:30-17:30	32	19	1	0	14	9	44	25	11	10	31	20	216
16:45-17:45	26	18	1	0	10	12	47	24	14	14	35	24	225
17:00-18:00	26	16	1	0	13	9	45	24	15	14	32	21	216

**TABLE A-3: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT
THE INTERSECTION OF LEFARAGATLHA ROAD, FREEDOM PARK ROAD AND ROAD 1
(POINT C) (07 AUGUST 2020)**

TIME INTERVALS	MOVEMENTS												TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
06:00-07:00	164	107	1	0	123	56	69	63	0	0	208	177	968
06:15-07:15	175	121	1	0	129	72	71	64	0	0	217	162	1012
06:30-07:30	165	116	1	1	123	74	74	57	1	0	190	129	931
06:45-07:45	136	93	0	1	100	70	62	36	1	0	151	91	741
07:00-08:00	105	66	0	1	63	62	55	31	1	0	102	64	550
07:15-08:15	68	45	0	1	47	42	57	24	1	0	57	42	384
07:30-08:30	53	34	0	1	33	36	55	21	0	0	43	33	309
07:45-08:45	51	31	0	1	40	33	53	23	0	0	42	39	313
08:00-09:00	42	27	0	3	48	31	58	18	1	0	43	51	322
08:15-09:15	49	25	0	3	48	31	54	21	1	0	38	58	328
08:30-09:30	47	26	0	4	56	30	57	21	1	0	35	58	335
08:45-09:45	44	22	0	4	53	30	57	22	2	0	43	58	335
09:00-10:00	48	20	1	2	55	33	51	23	1	0	42	56	332
09:15-10:15	52	19	1	2	59	37	49	21	2	0	44	53	339
09:30-10:30	51	22	1	1	65	43	40	27	2	0	42	53	347
09:45-10:45	46	21	1	1	69	47	44	26	1	0	32	53	341
10:00-11:00	43	27	0	1	72	46	47	29	1	0	37	49	352
10:15-11:15	36	29	0	1	82	47	53	38	0	0	41	47	374
10:30-11:30	37	31	0	0	82	50	75	38	1	0	48	46	408
10:45-11:45	46	33	0	1	83	51	80	38	1	0	48	43	424
11:00-12:00	47	29	0	1	78	55	86	41	1	0	46	56	440
11:15-12:15	47	26	0	1	66	59	90	52	1	0	48	64	454
11:30-12:30	47	21	0	2	52	56	98	62	0	0	46	85	469
11:45-12:45	48	27	1	1	48	57	114	76	0	0	58	111	541
12:00-13:00	45	28	3	1	48	53	117	77	0	0	63	124	559
12:15-13:15	47	25	3	1	46	44	125	76	0	0	72	129	568
12:30-13:30	43	23	4	3	54	42	131	71	0	0	79	130	580
12:45-13:45	42	13	3	4	59	34	123	74	0	0	74	122	548
13:00-14:00	46	8	1	4	62	32	132	93	0	0	68	106	552
13:15-14:15	49	9	4	9	67	32	139	100	0	0	65	102	576
13:30-14:30	56	9	3	6	61	27	121	112	0	0	63	95	553
13:45-14:45	46	8	4	7	56	27	120	107	0	0	63	104	542
14:00-15:00	35	9	4	7	54	26	99	106	0	0	75	126	541
14:15-15:15	25	13	1	3	47	25	81	101	0	0	80	166	542
14:30-15:30	19	13	1	4	51	25	77	93	1	0	90	211	585
14:45-15:45	18	12	0	3	44	22	68	97	2	0	110	241	617
15:00-16:00	19	13	0	4	41	19	66	84	2	0	108	237	593
15:15-16:15	23	10	0	3	40	20	58	73	2	0	97	196	522
15:30-16:30	25	10	0	3	38	21	47	66	1	0	78	140	429
15:45-16:45	27	12	0	2	36	28	37	50	0	0	47	81	320
16:00-17:00	33	13	0	4	34	29	34	40	0	0	27	52	266
16:15-17:15	31	13	0	4	25	24	39	33	0	0	21	46	236
16:30-17:30	28	13	0	3	17	23	44	31	0	0	25	45	229
16:45-17:45	28	14	0	3	22	22	46	30	0	0	25	50	240
17:00-18:00	27	14	0	0	18	22	43	29	0	0	27	42	222

**TABLE A-4: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT
THE INTERSECTION OF ROAD R565 AND LEFARAGATLHA ROAD (POINT D)
(07 AUGUST 2020)**

TIME INTERVALS	MOVEMENTS												TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
06:00-07:00	13	6	37	32	338	390	74	17	47	45	486	8	1493
06:15-07:15	19	5	37	40	336	377	91	19	70	54	527	15	1590
06:30-07:30	20	8	41	44	338	317	103	18	66	43	613	15	1626
06:45-07:45	16	7	42	42	323	261	107	18	66	30	545	17	1474
07:00-08:00	17	5	39	43	318	198	115	17	67	31	506	17	1373
07:15-08:15	11	6	39	36	297	156	113	14	49	28	478	14	1241
07:30-08:30	8	4	30	33	271	128	102	11	63	36	412	14	1112
07:45-08:45	9	6	26	26	272	112	98	11	72	44	401	12	1089
08:00-09:00	7	14	29	23	267	101	88	8	62	43	410	17	1069
08:15-09:15	6	13	28	30	260	92	88	5	61	43	424	21	1071
08:30-09:30	5	12	27	30	253	93	87	4	51	42	458	20	1082
08:45-09:45	4	11	23	33	246	100	83	1	54	41	459	21	1076
09:00-10:00	8	6	18	37	247	98	91	5	57	42	432	23	1064
09:15-10:15	13	11	18	34	262	109	103	10	54	37	427	23	1101
09:30-10:30	18	13	19	34	284	104	108	11	58	40	425	25	1139
09:45-10:45	23	15	24	37	313	102	121	12	47	44	481	29	1248
10:00-11:00	18	14	27	30	310	112	118	8	43	45	526	26	1277
10:15-11:15	18	9	23	30	354	110	110	5	43	51	543	24	1320
10:30-11:30	14	10	22	34	373	122	105	8	41	47	552	27	1355
10:45-11:45	8	7	20	32	377	121	107	7	46	42	499	26	1292
11:00-12:00	8	13	22	34	406	118	111	11	63	51	473	30	1340
11:15-12:15	2	13	28	32	398	120	129	12	64	49	484	33	1364
11:30-12:30	1	11	30	30	397	120	160	12	74	56	503	33	1427
11:45-12:45	1	17	38	32	403	110	157	13	78	60	580	34	1523
12:00-13:00	1	11	40	35	412	100	198	12	60	54	592	30	1545
12:15-13:15	1	10	39	39	417	90	195	12	59	57	596	35	1550
12:30-13:30	1	10	41	40	418	83	225	15	53	67	609	34	1596
12:45-13:45	2	7	43	44	417	89	245	18	52	72	568	44	1601
13:00-14:00	1	8	44	47	427	100	270	16	63	75	618	46	1715
13:15-14:15	1	9	42	46	443	105	262	16	63	77	659	40	1763
13:30-14:30	1	11	37	54	464	100	235	14	68	71	664	42	1761
13:45-14:45	1	10	27	54	488	100	253	17	73	76	711	27	1837
14:00-15:00	1	9	19	56	521	84	228	18	72	72	718	27	1825
14:15-15:15	1	11	19	53	531	75	278	21	82	71	650	28	1820
14:30-15:30	1	14	27	48	547	75	314	20	77	72	629	25	1849
14:45-15:45	0	19	31	48	551	65	374	18	76	69	574	33	1858
15:00-16:00	0	19	33	46	529	68	413	19	69	67	562	31	1856
15:15-16:15	0	21	32	49	547	80	390	19	60	62	558	28	1846
15:30-16:30	1	19	26	50	557	99	342	18	63	62	539	27	1803
15:45-16:45	1	17	22	45	585	124	270	14	62	55	540	23	1758
16:00-17:00	2	19	29	49	606	133	214	20	67	61	488	29	1717
16:15-17:15	2	22	27	48	631	143	197	22	89	105	492	31	1809
16:30-17:30	1	24	27	61	637	127	166	20	86	112	473	37	1771
16:45-17:45	1	21	30	73	742	115	144	24	86	129	442	39	1846
17:00-18:00	1	24	23	75	754	129	123	24	99	133	417	32	1834

TABLE A-5: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF ROAD R565 AND LUKA ROAD (POINT E) (07 AUGUST 2020)

TIME INTERVALS	MOVEMENTS												TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
06:00-07:00	2	9	11	6	279	123	149	8	40	96	177	1	901
06:15-07:15	2	7	18	5	259	134	162	7	51	104	174	1	924
06:30-07:30	2	6	16	4	236	155	174	12	65	104	180	0	954
06:45-07:45	1	7	20	6	195	181	182	12	73	84	176	0	937
07:00-08:00	1	6	17	6	171	194	175	8	59	83	177	0	897
07:15-08:15	3	6	11	9	142	194	177	10	52	52	189	0	845
07:30-08:30	3	5	15	7	144	184	203	10	37	61	197	3	869
07:45-08:45	3	2	12	6	159	144	173	11	24	55	209	4	802
08:00-09:00	5	4	15	7	148	133	176	11	22	39	239	4	803
08:15-09:15	3	3	17	5	153	142	177	10	20	37	266	4	837
08:30-09:30	2	2	13	8	143	137	140	4	21	21	280	1	772
08:45-09:45	2	3	13	6	145	177	168	2	27	23	277	0	843
09:00-10:00	2	2	10	9	154	177	174	2	29	22	267	3	851
09:15-10:15	2	2	8	12	157	184	186	2	35	26	259	4	877
09:30-10:30	3	2	12	11	165	211	210	2	37	27	268	4	952
09:45-10:45	3	2	10	12	169	214	232	3	36	28	286	4	999
10:00-11:00	3	3	11	7	174	240	235	3	38	31	292	1	1038
10:15-11:15	3	4	12	6	166	259	225	3	35	37	297	2	1049
10:30-11:30	2	5	9	7	174	268	207	4	35	47	301	3	1062
10:45-11:45	4	6	10	7	170	270	182	5	37	52	297	3	1043
11:00-12:00	2	5	13	12	194	277	194	7	39	51	295	5	1094
11:15-12:15	2	6	20	16	232	253	210	6	45	47	294	4	1135
11:30-12:30	2	6	20	14	235	233	228	6	47	34	311	4	1140
11:45-12:45	1	4	21	16	252	217	251	6	64	31	322	4	1189
12:00-13:00	2	3	15	19	255	204	273	3	76	28	339	3	1220
12:15-13:15	3	3	8	21	256	192	325	5	81	23	361	4	1282
12:30-13:30	4	4	8	25	292	185	359	7	96	26	352	5	1363
12:45-13:45	4	4	9	22	311	184	355	7	96	21	369	6	1388
13:00-14:00	4	5	14	17	316	190	354	8	100	25	394	7	1434
13:15-14:15	3	5	16	11	326	203	313	7	100	24	401	7	1416
13:30-14:30	2	6	18	17	314	190	293	4	98	22	441	5	1410
13:45-14:45	1	8	20	27	309	193	322	3	97	25	463	6	1474
14:00-15:00	2	9	20	32	326	185	323	3	100	26	486	6	1518
14:15-15:15	2	7	19	34	348	208	326	4	103	28	479	5	1563
14:30-15:30	5	9	20	30	364	221	304	6	119	32	459	7	1576
14:45-15:45	6	8	19	21	366	221	288	6	119	29	452	5	1540
15:00-16:00	5	7	20	13	341	248	252	8	116	22	404	5	1441
15:15-16:15	9	8	19	17	309	233	225	6	108	27	388	5	1354
15:30-16:30	6	4	14	13	291	240	242	6	87	23	373	4	1303
15:45-16:45	8	3	17	13	305	263	215	6	78	28	337	4	1277
16:00-17:00	7	2	18	19	333	257	222	4	63	36	326	2	1289
16:15-17:15	5	4	19	14	326	263	200	5	53	33	315	1	1238
16:30-17:30	6	3	22	14	329	260	165	5	42	32	302	0	1180
16:45-17:45	7	4	23	23	299	259	149	5	41	38	288	1	1137
17:00-18:00	9	4	22	28	285	216	111	9	35	35	282	1	1037

TABLE A-6: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF LUKA ROAD AND ROAD 3 (POINT F) (07 AUGUST 2020)

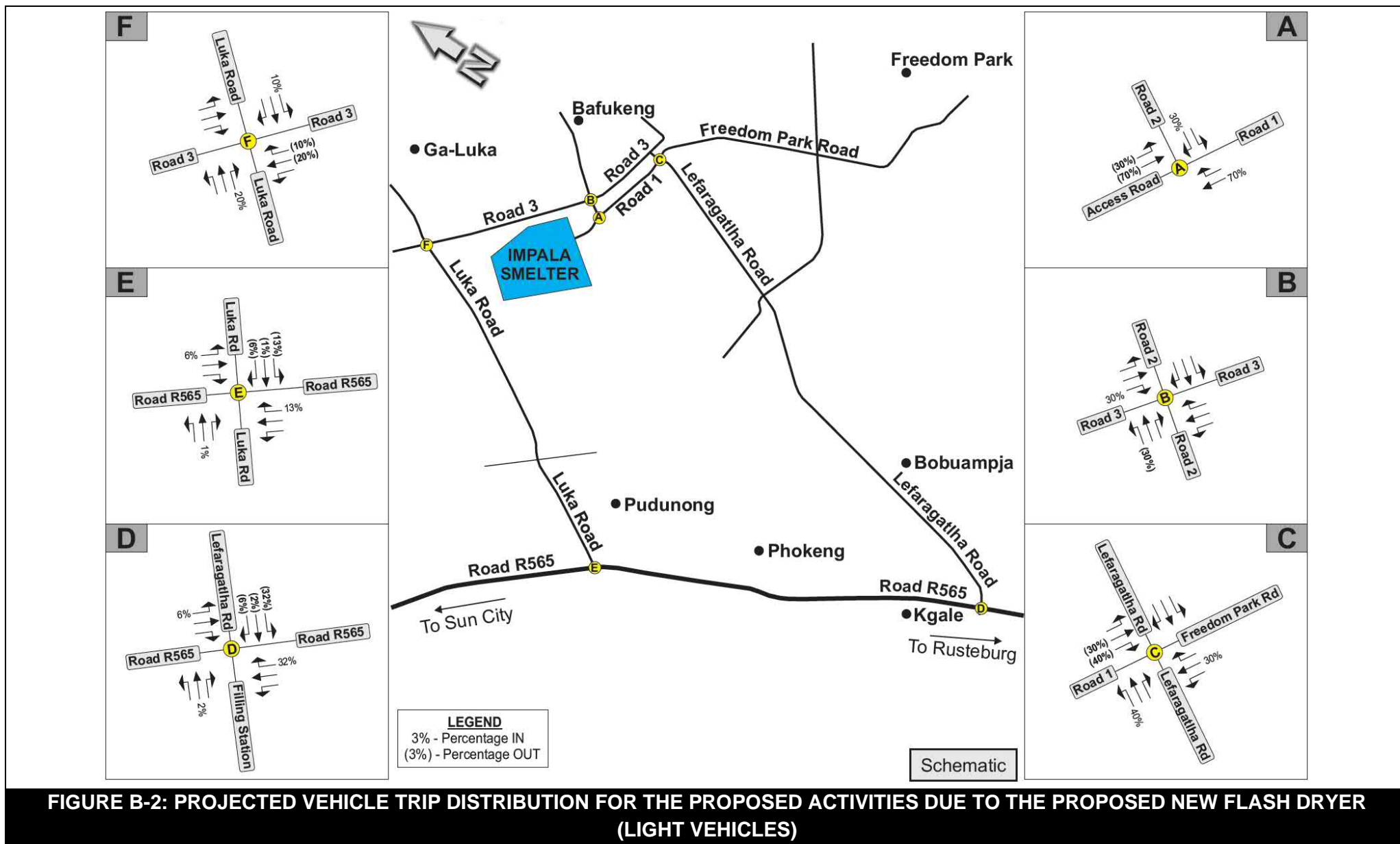
TIME INTERVALS	MOVEMENTS												TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
06:00-07:00	27	41	101	45	44	37	60	125	7	2	19	21	529
06:15-07:15	29	44	121	55	54	42	55	152	15	3	33	27	630
06:30-07:30	23	55	104	63	59	38	49	157	17	3	33	30	631
06:45-07:45	21	43	73	50	58	46	33	130	21	3	42	27	547
07:00-08:00	17	53	61	45	57	44	26	120	22	4	36	27	512
07:15-08:15	17	60	44	42	44	36	21	105	15	4	31	24	443
07:30-08:30	21	51	41	37	29	34	20	105	12	4	28	19	401
07:45-08:45	26	61	40	40	25	21	23	121	7	4	21	13	402
08:00-09:00	23	56	34	54	21	16	21	118	3	2	23	10	381
08:15-09:15	20	65	30	48	17	16	17	124	3	1	19	9	369
08:30-09:30	20	74	32	60	22	14	13	108	3	1	22	12	381
08:45-09:45	17	83	33	57	22	15	11	118	2	1	20	17	396
09:00-10:00	21	98	30	38	16	13	10	127	2	3	23	18	399
09:15-10:15	29	117	33	36	24	21	15	152	2	4	24	21	478
09:30-10:30	41	120	22	24	43	21	29	166	9	3	23	25	526
09:45-10:45	61	154	18	33	52	17	29	158	8	3	27	24	584
10:00-11:00	85	160	27	36	69	18	32	168	8	1	40	29	673
10:15-11:15	107	128	26	36	80	15	31	132	7	0	41	30	633
10:30-11:30	99	137	28	38	73	17	17	128	0	0	60	28	625
10:45-11:45	86	111	30	46	74	21	19	139	2	0	59	30	617
11:00-12:00	58	116	22	50	68	24	14	138	2	4	53	37	586
11:15-12:15	31	129	16	56	61	21	19	156	4	5	58	57	613
11:30-12:30	24	129	15	56	48	22	18	183	4	5	54	71	629
11:45-12:45	16	136	10	45	37	20	26	195	2	6	63	81	637
12:00-13:00	14	133	10	49	34	17	47	218	12	2	62	85	683
12:15-13:15	10	134	12	59	22	22	49	234	11	4	73	99	729
12:30-13:30	7	128	15	64	21	33	62	228	11	5	64	98	736
12:45-13:45	2	139	19	68	23	32	67	233	11	6	62	110	772
13:00-14:00	2	141	16	68	14	33	50	228	1	10	67	116	746
13:15-14:15	0	150	13	60	15	31	44	236	0	10	59	96	714
13:30-14:30	0	152	8	62	19	20	37	257	2	10	69	110	746
13:45-14:45	0	157	2	66	17	26	23	273	2	11	71	112	760
14:00-15:00	6	173	8	67	18	25	22	272	3	10	69	109	782
14:15-15:15	6	182	8	67	19	33	18	263	3	9	69	113	790
14:30-15:30	8	202	9	64	16	38	14	251	1	12	67	91	773
14:45-15:45	9	201	9	78	14	36	12	232	2	12	63	74	742
15:00-16:00	8	198	1	78	14	34	14	219	1	11	50	58	686
15:15-16:15	8	205	2	81	11	25	18	214	1	12	41	48	666
15:30-16:30	6	204	2	74	7	24	18	205	1	9	26	46	622
15:45-16:45	5	206	3	54	10	26	23	194	1	8	17	45	592
16:00-17:00	1	220	4	43	10	23	23	179	2	7	19	44	575
16:15-17:15	6	237	7	31	10	21	24	162	5	4	17	34	558
16:30-17:30	7	234	11	24	10	14	28	137	5	3	19	28	520
16:45-17:45	9	238	13	15	6	6	23	138	6	4	18	21	497
17:00-18:00	11	247	12	15	8	10	20	150	6	5	13	22	519

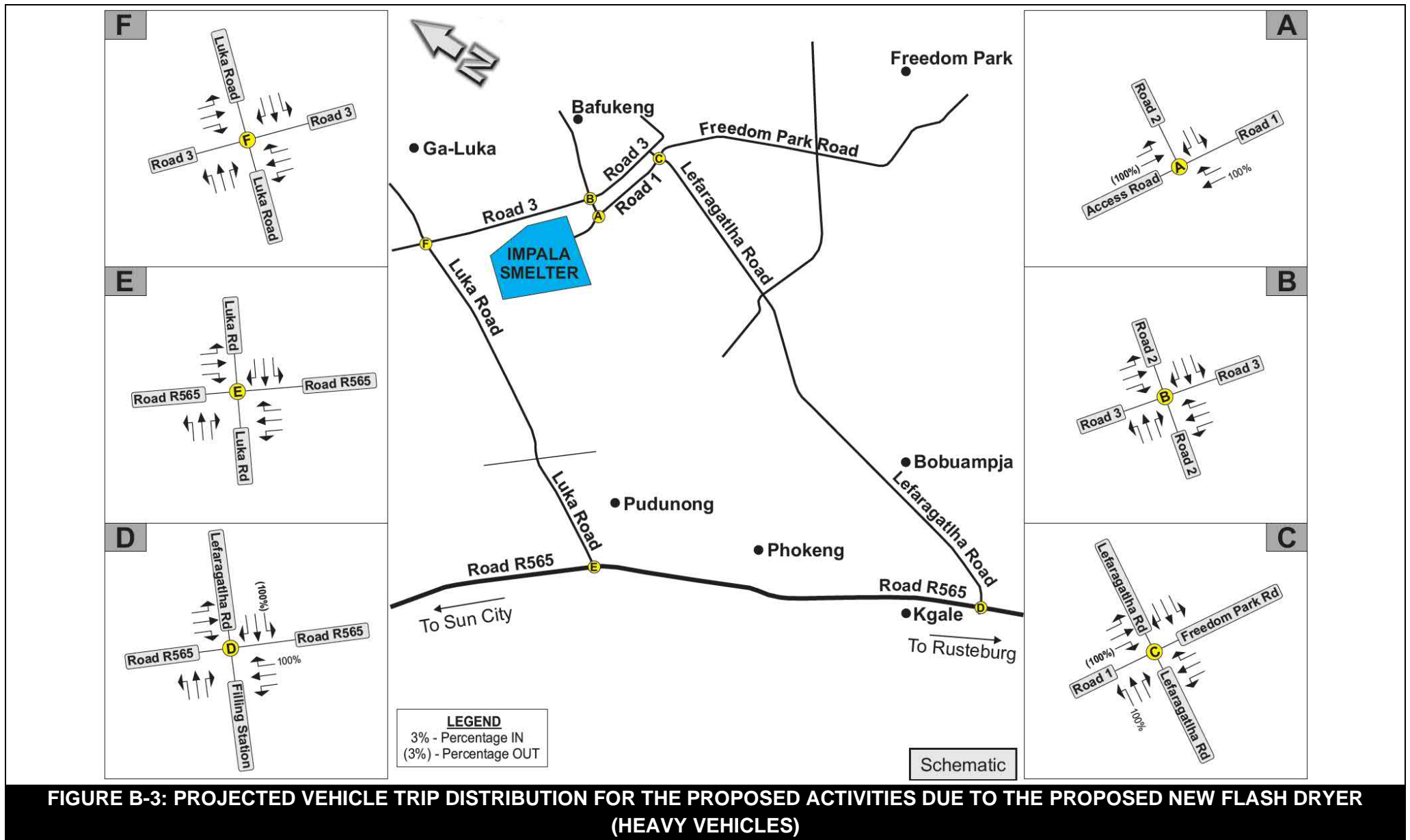
APPENDIX B

TRIP INFORMATION RELATED TO THE EXISTING TRAFFIC



FIGURE B-1: 2020 PEAK HOUR TRAFFIC (BACKGROUND TRAFFIC) WITHOUT THE PROPOSED ACTIVITIES DUE TO THE PROPOSED NEW FLASH DRYER (SCENARIO 1)





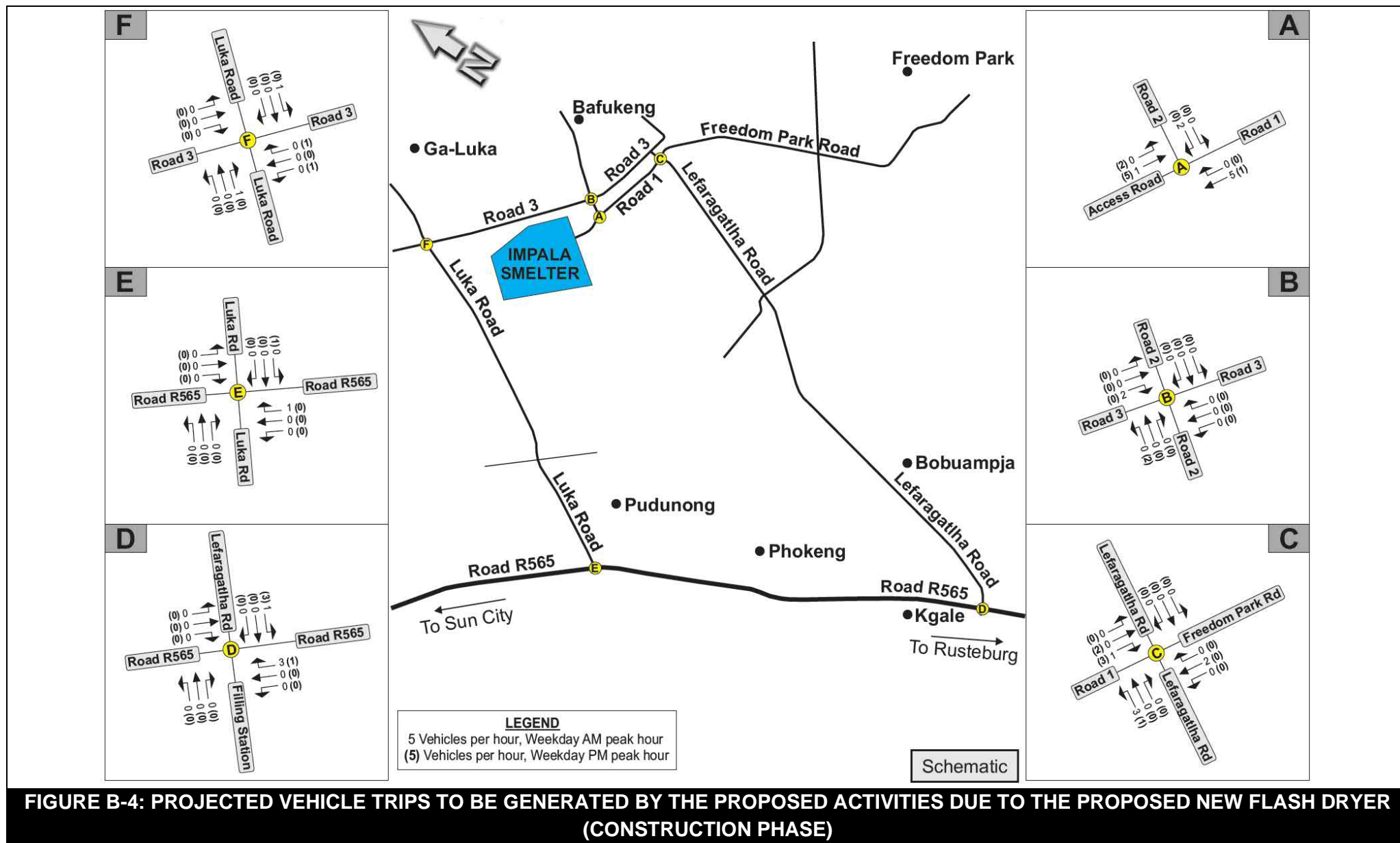
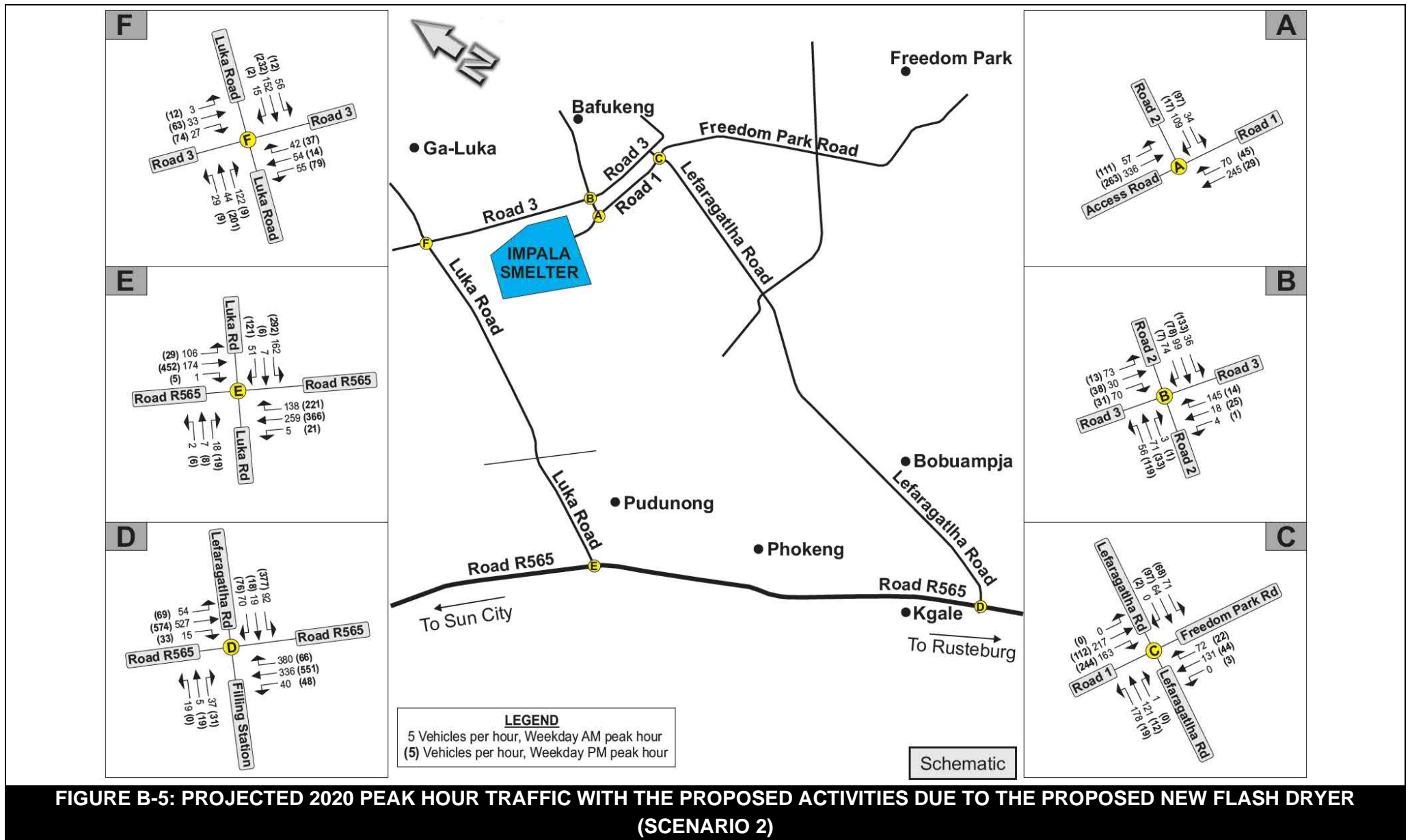
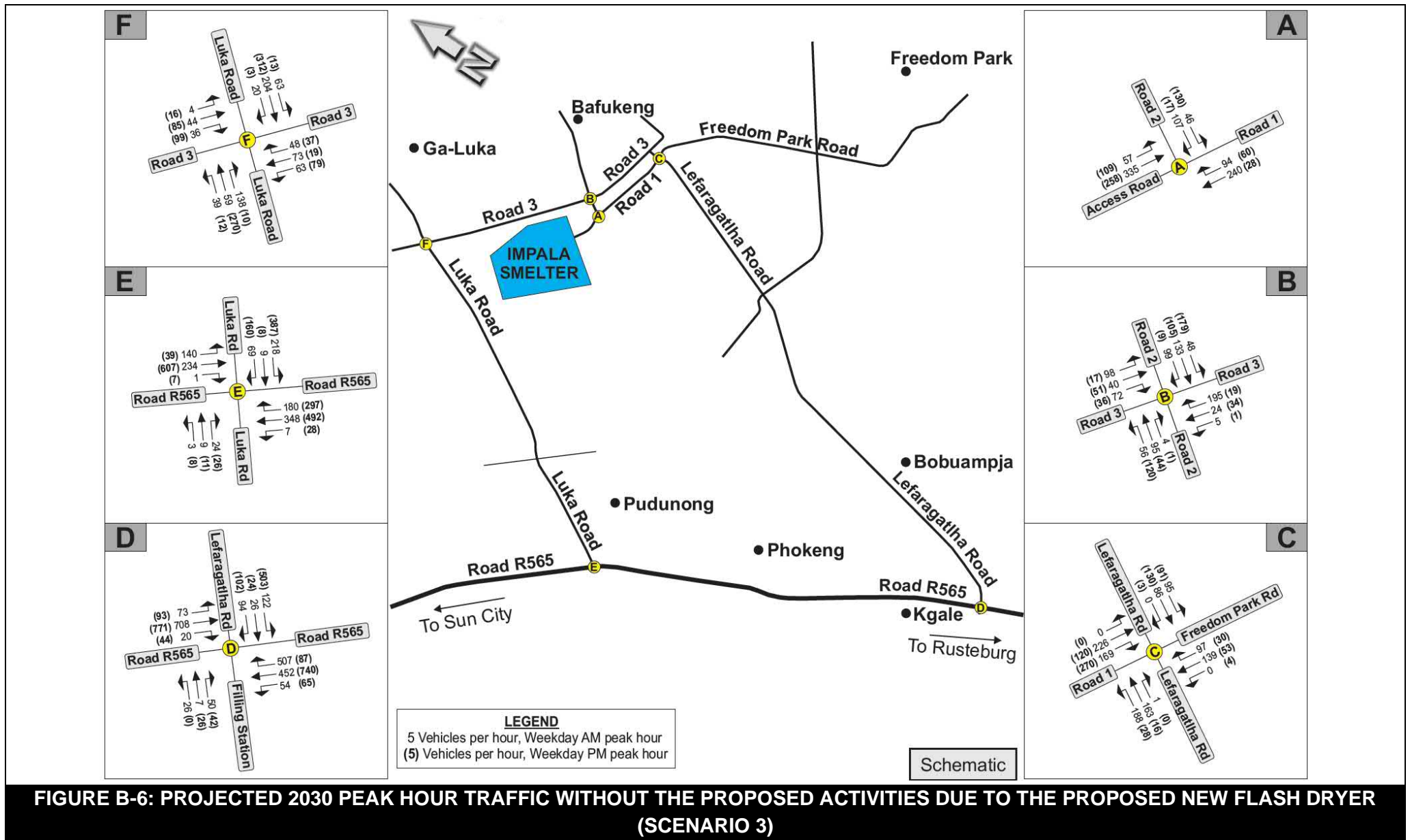
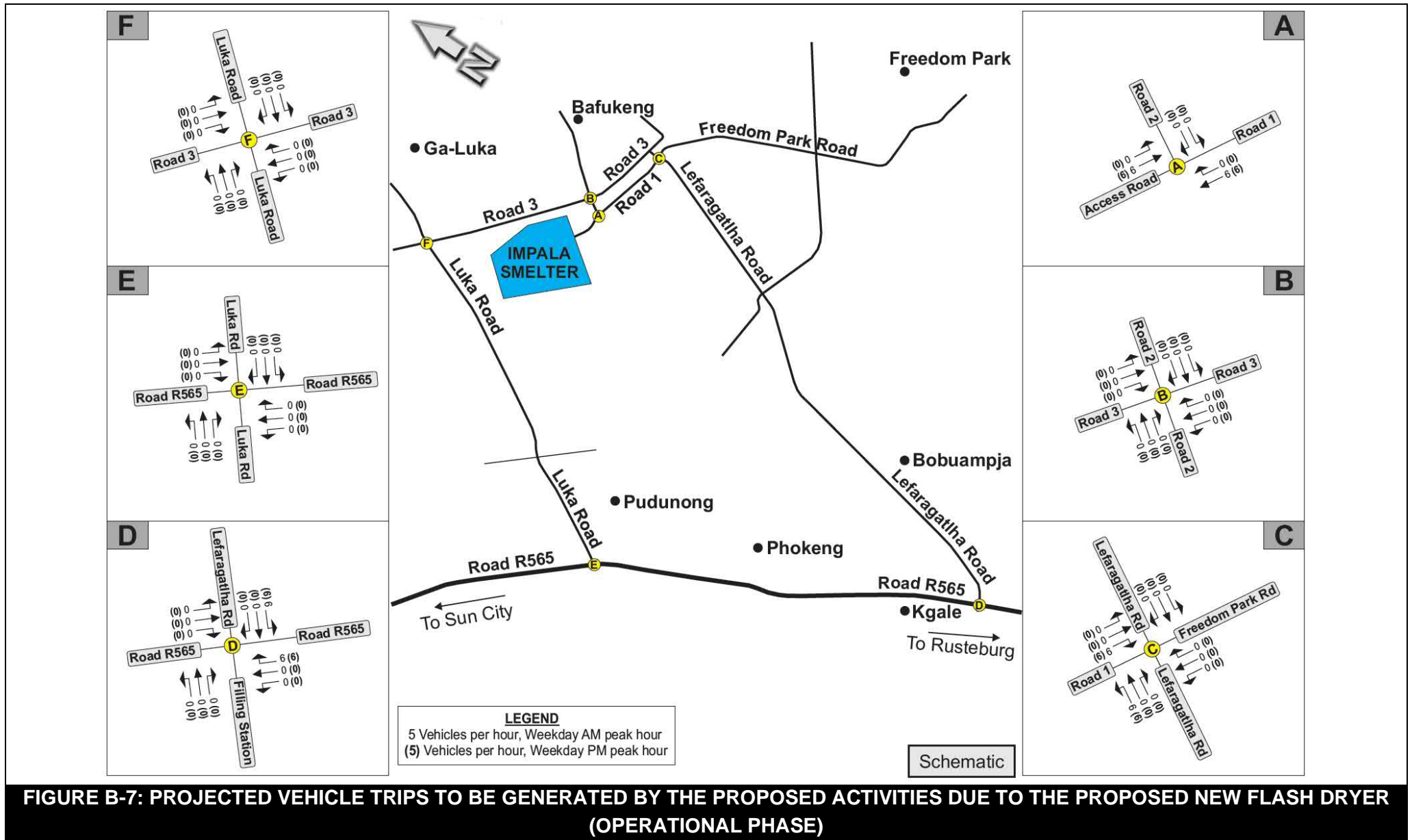


FIGURE B-4: PROJECTED VEHICLE TRIPS TO BE GENERATED BY THE PROPOSED ACTIVITIES DUE TO THE PROPOSED NEW FLASH DRYER (CONSTRUCTION PHASE)







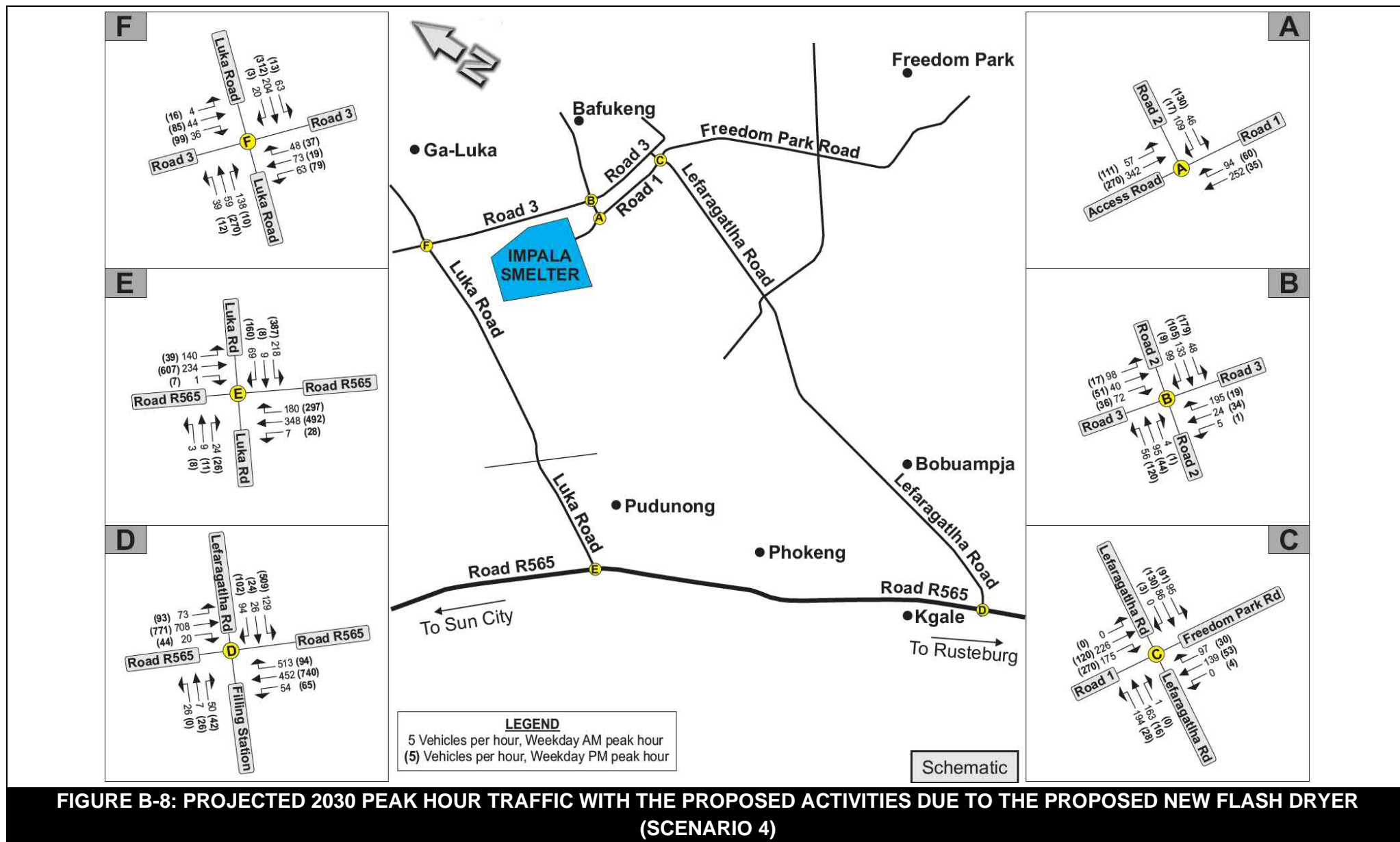


FIGURE B-8: PROJECTED 2030 PEAK HOUR TRAFFIC WITH THE PROPOSED ACTIVITIES DUE TO THE PROPOSED NEW FLASH DRYER (SCENARIO 4)

APPENDIX C

SIDRA CALCULATION RESULTS

**TABLE C-1: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2020
(BACKGROUND TRAFFIC) WITHOUT THE PROPOSED ACTIVITIES AS PART OF THE
PROPOSED NEW FLASH DRYER (SCENARIO 1)**

<i>POINT A: Intersection of Impala Smelter Access Road, Road 1 and Road 2</i>						
<i>Type of intersection control: Stop controlled on all approaches</i>						
<i>Levels of Service acceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road 2)	24.8	C	0.450	17.8	C	0.283
East (Road 1)	17.5	C	0.527	10.8	B	0.088
West (Access)	27.1	D	0.730	13.5	B	0.457
Intersection	23.2	D	0.730	14.1	B	0.457
<i>POINT B: Intersection of Road 2 and Road 3</i>						
<i>Type of intersection control: Stop controlled on all approaches</i>						
<i>Levels of Service Unacceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road 2)	21.7	C	0.479	12.2	B	0.281
East (Road 3)	17.6	C	0.373	16.1	C	0.106
South (Road 2)	26.2	D	0.434	12.5	B	0.217
West (Road 3)	46.2	E	0.682	16.9	C	0.212
Intersection	27.7	D	0.682	13.4	B	0.281
<i>POINT B: Intersection of Road 2 and Road 3</i>						
<i>Type of intersection control: Stop controlled on all approaches</i>						
<i>With intersection geometric improvements</i>						
<i>Levels of Service acceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road 2)	21.8	C	0.479	12.2	B	0.281
East (Road 3)	23.3	C	0.469	19.9	C	0.141
South (Road 2)	26.3	D	0.434	12.5	B	0.217
West (Road 3)	23.4	C	0.421	14.5	B	0.225
Intersection	23.4	C	0.479	13.3	B	0.281

**TABLE C-1: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2020
(BACKGROUND TRAFFIC) WITHOUT THE PROPOSED ACTIVITIES AS PART OF THE
PROPOSED NEW FLASH DRYER (SCENARIO 1) (Continue...)**

POINT C: Intersection of Lefaragatlha Road, Freedom Park Road and Road 1

Type of intersection control: Stop controlled on all approaches

Levels of Service Unacceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Lefaragatlha Rd)	24.7	C	0.430	63.1	F	0.761
East (Freedom Park Rd)	16.2	C	0.360	15.2	C	0.143
South (Lefaragatlha Rd)	21.9	C	0.526	18.3	C	0.089
West (Road 1)	19.2	C	0.598	14.8	B	0.478
Intersection	20.1	C	0.598	28.0	D	0.761

POINT C: Intersection of Lefaragatlha Road, Freedom Park Road and Road 1

Type of intersection control: Stop controlled on all approaches

With intersection geometric improvements

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Lefaragatlha Rd)	17.6	C	0.276	25.9	D	0.459
East (Freedom Park Rd)	16.4	C	0.380	15.4	C	0.143
South (Lefaragatlha Rd)	29.2	D	0.619	22.2	C	0.115
West (Road 1)	19.2	C	0.598	14.8	B	0.478
Intersection	21.3	C	0.619	18.2	C	0.478

POINT D: Intersection of Road R565 and Lefaragatlha Road

Type of intersection control: Stop controlled on all approaches

Levels of Service Unacceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Lefaragatlha Rd)	90.5	F	0.804	700.4	F	1.907
East (Road R565)	93.4	F	1.097	56.5	F	0.885
South (Lefaragatlha Rd)	340.3	F	1.070	20.4	C	0.172
West (Road R565)	98.3	F	0.981	63.5	F	0.910
Intersection	10.4	F	1.097	220.2	F	1.907

TABLE C-1: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2020 (BACKGROUND TRAFFIC) WITHOUT THE PROPOSED ACTIVITIES AS PART OF THE PROPOSED NEW FLASH DRYER (SCENARIO 1) (Continue...)

<i>POINT D: Intersection of Road R565 and Lefaragatlha Road</i>						
<i>Type of intersection control: Traffic Light Signal Controlled</i>						
<i>With intersection control improvements</i>						
<i>Levels of Service acceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Lefaragatlha Rd)	22.3	C	0.342	16.2	B	0.747
East (Road R565)	11.2	B	0.778	11.5	B	0.623
South (Lefaragatlha Rd)	22.3	C	0.271	13.4	B	0.174
West (Road R565)	16.3	B	0.622	11.4	B	0.647
Intersection	14.8	B	0.778	12.7	B	0.747
<i>POINT E: Intersection of Road R565 and Luka Road</i>						
<i>Type of intersection control: Stop controlled on all approaches</i>						
<i>Levels of Service Unacceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Luka Road)	84.1	F	0.902	341.2	F	1.445
East (Road R565)	15.3	C	0.388	27.6	D	0.653
South (Luka Road)	22.0	C	0.110	27.2	D	0.167
West (Road R565)	16.2	C	0.343	49.2	E	0.809
Intersection	32.2	D	0.902	118.5	F	1.445
<i>POINT E: Intersection of Road R565 and Luka Road</i>						
<i>Type of intersection control: Traffic Light Signal Controlled</i>						
<i>With intersection control improvements</i>						
<i>Levels of Service acceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Luka Road)	11.1	B	0.222	12.9	B	0.483
East (Road R565)	7.0	A	0.227	7.9	A	0.429
South (Luka Road)	21.6	C	0.107	21.9	C	0.136
West (Road R565)	15.1	B	0.221	14.5	B	0.458
Intersection	10.9	B	0.227	11.6	B	0.483

**TABLE C-1: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2020
(BACKGROUND TRAFFIC) WITHOUT THE PROPOSED ACTIVITIES AS PART OF THE
PROPOSED NEW FLASH DRYER (SCENARIO 1) (Continue...)**

<i>POINT F: Intersection of Luka Road and Road 3</i>						
<i>Type of intersection control: Stop controlled on all approaches</i>						
<i>Levels of Service Unacceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Luka Road)	19.8	C	0.478	16.2	C	0.428
East (Road 3)	43.0	E	0.629	29.3	D	0.470
South (Luka Road)	13.5	B	0.309	15.2	C	0.378
West (3)	20.1	C	0.208	17.6	C	0.641
Intersection	23.5	C	0.629	18.4	C	0.470
<i>POINT F: Intersection of Luka Road and Road 3</i>						
<i>Type of intersection control: Stop controlled on all approaches</i>						
<i>With intersection geometric improvements</i>						
<i>Levels of Service acceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Luka Road)	19.9	C	0.478	16.2	C	0.428
East (Road 3)	23.7	C	0.428	18.9	C	0.316
South (Luka Road)	13.7	B	0.309	15.3	C	0.378
West (3)	29.1	D	0.301	23.3	C	0.435
Intersection	19.8	C	0.478	17.8	C	0.435

TABLE C-2: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2030 (BACKGROUND TRAFFIC) WITHOUT THE PROPOSED ACTIVITIES AS PART OF THE PROPOSED NEW FLASH DRYER (SCENARIO 3)

<u>POINT A:</u> Intersection of Impala Smelter Access Road, Road 1 and Road 2						
<i>Type of intersection control: Stop controlled on all approaches</i>						
Levels of Service acceptable						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road 2)	26.7	D	0.494	18.2	C	0.344
East (Road 1)	17.2	C	0.541	10.8	B	0.106
West (Access)	26.1	D	0.720	14.3	B	0.479
Intersection	22.8	C	0.720	14.7	B	0.479
<u>POINT B:</u> Intersection of Road 2 and Road 3						
<i>Type of intersection control: Stop controlled on all approaches</i>						
With intersection geometric improvements from Scenario 1						
Levels of Service acceptable						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road 2)	28.1	D	0.641	13.2	B	0.378
East (Road 3)	27.9	D	0.598	20.2	C	0.184
South (Road 2)	28.8	D	0.509	12.8	B	0.242
West (Road 3)	29.3	D	0.499	15.6	C	0.285
Intersection	28.5	D	0.641	14.1	B	0.378
<u>POINT C:</u> Intersection of Lefaragatlha Road, Freedom Park Road and Road 1						
<i>Type of intersection control: Stop controlled on all approaches</i>						
With intersection geometric improvements from Scenario 1						
Levels of Service acceptable						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Lefaragatlha Rd)	19.6	C	0.361	29.7	D	0.571
East (Freedom Park Rd)	18.4	C	0.445	16.3	C	0.189
South (Lefaragatlha Rd)	33.2	D	0.643	21.5	C	0.130
West (Road 1)	24.0	C	0.683	17.0	C	0.557
Intersection	24.9	C	0.683	21.0	C	0.571

TABLE C-2: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2030 (BACKGROUND TRAFFIC) WITHOUT THE PROPOSED ACTIVITIES AS PART OF THE PROPOSED NEW FLASH DRYER (SCENARIO 3) (Continue...)

<i>POINT D: Intersection of Road R565 and Lefaragatlha Road</i>						
<i>Type of intersection control: Traffic Light Signal Controlled</i>						
<i>With intersection control improvements from Scenario 1</i>						
<i>Levels of Service acceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Lefaragatlha Rd)	33.4	C	0.662	19.3	B	0.819
East (Road R565)	11.0	B	0.746	14.3	B	0.715
South (Lefaragatlha Rd)	35.7	D	0.653	17.7	B	0.281
West (Road R565)	21.5	C	0.707	14.4	B	0.741
Intersection	18.4	B	0.746	15.7	B	0.819
<i>POINT E: Intersection of Road R565 and Luka Road</i>						
<i>Type of intersection control: Traffic Light Signal Controlled</i>						
<i>With intersection control improvements from Scenario 1</i>						
<i>Levels of Service acceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Luka Road)	11.4	B	0.300	13.8	B	0.658
East (Road R565)	7.2	A	0.321	8.4	A	0.625
South (Luka Road)	21.8	C	0.144	22.1	C	0.186
West (Road R565)	15.4	B	0.298	15.4	B	0.615
Intersection	11.1	B	0.321	12.4	B	0.658
<i>POINT F: Intersection of Luka Road and Road 3</i>						
<i>Type of intersection control: Stop controlled on all approaches</i>						
<i>With intersection geometric improvements from Scenario 1</i>						
<i>Levels of Service acceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Luka Road)	23.4	C	0.600	19.2	C	0.565
East (Road 3)	28.0	D	0.538	20.5	C	0.337
South (Luka Road)	14.8	B	0.383	17.6	C	0.503
West (3)	22.8	C	0.600	31.9	D	0.611
Intersection	22.8	C	0.600	21.5	C	0.611

**TABLE C-3: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2020
(BACKGROUND TRAFFIC) WITH THE PROPOSED ACTIVITIES AS PART OF THE
PROPOSED NEW FLASH DRYER (SCENARIO 2)**

<u>POINT A:</u> Intersection of Impala Smelter Access Road, Road 1 and Road 2						
<i>Type of intersection control: Stop controlled on all approaches</i>						
Levels of Service acceptable						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road 2)	24.9	C	0.456	17.9	C	0.284
East (Road 1)	17.7	C	0.537	10.8	B	0.089
West (Access)	27.6	D	0.735	13.6	B	0.462
Intersection	23.5	C	0.735	14.1	B	0.462
<u>POINT B:</u> Intersection of Road 2 and Road 3						
<i>Type of intersection control: Stop controlled on all approaches</i>						
With intersection geometric improvements from Scenario 1						
Levels of Service acceptable						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road 2)	21.7	C	0.478	12.2	B	0.281
East (Road 3)	23.4	C	0.466	19.9	C	0.414
South (Road 2)	26.1	D	0.432	12.5	B	0.220
West (Road 3)	23.5	C	0.428	14.5	B	0.225
Intersection	23.4	C	0.428	13.3	B	0.281
<u>POINT C:</u> Intersection of Lefaragatlha Road, Freedom Park Road and Road 1						
<i>Type of intersection control: Stop controlled on all approaches</i>						
With intersection geometric improvements from Scenario 1						
Levels of Service acceptable						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Lefaragatlha Rd)	17.6	C	0.276	25.8	D	0.458
East (Freedom Park Rd)	16.4	C	0.363	15.3	C	0.142
South (Lefaragatlha Rd)	29.6	D	0.629	22.4	C	0.122
West (Road 1)	19.1	C	0.598	14.8	B	0.483
Intersection	21.5	C	0.629	18.2	C	0.483

**TABLE C-3: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2020
(BACKGROUND TRAFFIC) WITH THE PROPOSED ACTIVITIES AS PART OF THE
PROPOSED NEW FLASH DRYER (SCENARIO 2) (Continue...)**

<i>POINT D: Intersection of Road R565 and Lefaragatlha Road</i>						
<i>Type of intersection control: Traffic Light Signal Controlled</i>						
<i>With intersection control improvements from Scenario 1</i>						
<i>Levels of Service acceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Lefaragatlha Rd)	25.9	C	0.395	16.3	B	0.753
East (Road R565)	9.1	A	0.634	11.5	B	0.623
South (Lefaragatlha Rd)	26.9	C	0.326	13.4	B	0.175
West (Road R565)	17.5	B	0.587	11.4	B	0.647
Intersection	14.8	B	0.634	12.7	B	0.753
<i>POINT E: Intersection of Road R565 and Luka Road</i>						
<i>Type of intersection control: Traffic Light Signal Controlled</i>						
<i>With intersection control improvements from Scenario 1</i>						
<i>Levels of Service acceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Luka Road)	11.2	B	0.227	12.9	B	0.491
East (Road R565)	6.9	A	0.230	7.9	A	0.429
South (Luka Road)	22.2	C	0.110	21.9	C	0.136
West (Road R565)	14.8	B	0.212	14.5	B	0.458
Intersection	10.8	B	0.230	11.6	B	0.491
<i>POINT F: Intersection of Luka Road and Road 3</i>						
<i>Type of intersection control: Stop controlled on all approaches</i>						
<i>With intersection geometric improvements from Scenario 1</i>						
<i>Levels of Service acceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Luka Road)	19.9	C	0.480	16.2	C	0.429
East (Road 3)	23.7	C	0.429	19.0	C	0.319
South (Luka Road)	13.7	B	0.310	15.3	C	0.379
West (3)	29.2	D	0.302	23.3	C	0.435
Intersection	19.8	C	0.480	17.8	C	0.435

**TABLE C-4: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2030
(BACKGROUND TRAFFIC) WITH THE PROPOSED ACTIVITIES AS PART OF THE
PROPOSED NEW FLASH DRYER (SCENARIO 4)**

<u>POINT A:</u> Intersection of Impala Smelter Access Road, Road 1 and Road 2						
<i>Type of intersection control: Stop controlled on all approaches</i>						
Levels of Service acceptable						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road 2)	27.1	D	0.503	18.5	C	0.350
East (Road 1)	17.7	C	0.560	10.9	B	0.114
West (Access)	26.9	D	0.731	14.2	B	0.485
Intersection	23.4	C	0.731	14.7	B	0.485
<u>POINT B:</u> Intersection of Road 2 and Road 3						
<i>Type of intersection control: Stop controlled on all approaches</i>						
With intersection geometric improvements from Scenario 1						
Levels of Service acceptable						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road 2)	28.1	D	0.641	13.2	B	0.378
East (Road 3)	27.9	D	0.598	20.2	C	0.184
South (Road 2)	28.8	D	0.509	12.8	B	0.242
West (Road 3)	29.3	D	0.499	15.6	C	0.285
Intersection	28.5	D	0.641	14.1	B	0.378
<u>POINT C:</u> Intersection of Lefaragatlha Road, Freedom Park Road and Road 1						
<i>Type of intersection control: Stop controlled on all approaches</i>						
With intersection geometric improvements from Scenario 1						
Levels of Service acceptable						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Lefaragatlha Rd)	19.7	C	0.361	28.4	D	0.557
East (Freedom Park Rd)	18.5	C	0.447	16.3	C	0.189
South (Lefaragatlha Rd)	34.2	D	0.665	22.2	C	0.165
West (Road 1)	24.4	C	0.691	20.7	C	0.564
Intersection	25.4	D	0.691	20.7	C	0.564

**TABLE C-4: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2030
(BACKGROUND TRAFFIC) WITH THE PROPOSED ACTIVITIES AS PART OF THE
PROPOSED NEW FLASH DRYER (SCENARIO 4) (Continue...)**

<i>POINT D: Intersection of Road R565 and Lefaragatlha Road</i>						
<i>Type of intersection control: Traffic Light Signal Controlled</i>						
<i>With intersection control improvements from Scenario 1</i>						
<i>Levels of Service acceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Lefaragatlha Rd)	31.4	C	0.640	19.7	B	0.828
East (Road R565)	12.2	B	0.795	14.4	B	0.715
South (Lefaragatlha Rd)	33.6	C	0.617	17.7	B	0.283
West (Road R565)	20.8	C	0.716	14.4	B	0.741
Intersection	18.4	B	0.716	15.8	B	0.828
<i>POINT E: Intersection of Road R565 and Luka Road</i>						
<i>Type of intersection control: Traffic Light Signal Controlled</i>						
<i>With intersection control improvements from Scenario 1</i>						
<i>Levels of Service acceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Luka Road)	11.4	B	0.300	13.8	B	0.658
East (Road R565)	7.2	A	0.321	8.4	A	0.625
South (Luka Road)	21.8	C	0.144	22.1	C	0.186
West (Road R565)	15.4	B	0.298	15.4	B	0.615
Intersection	11.1	B	0.321	12.4	B	0.658
<i>POINT F: Intersection of Luka Road and Road 3</i>						
<i>Type of intersection control: Stop controlled on all approaches</i>						
<i>With intersection geometric improvements from Scenario 1</i>						
<i>Levels of Service acceptable</i>						
APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Luka Road)	23.4	C	0.600	19.2	C	0.565
East (Road 3)	28.0	D	0.538	20.5	C	0.337
South (Luka Road)	14.8	B	0.383	17.6	C	0.503
West (3)	31.5	D	0.388	31.9	D	0.611
Intersection	22.8	C	0.600	21.5	C	0.611

APPENDIX D

LEVEL OF SERVICE CRITERIA DESCRIPTION

TABLE D-1: LEVEL OF SERVICE CRITERIA DESCRIPTION FOR UNSIGNALISED INTERSECTIONS

LEVEL OF SERVICE	AVERAGE TOTAL DELAY (SEC/VEH)	PERFORMANCE EVALUATION
A	≤ 5	Excellent
B	> 5 and ≤ 10	Very Good
C	>10 and ≤ 20	Good
D	>20 and ≤ 30	Average
E	>30 and ≤ 45	Poor
F	>45	Fail

TABLE D-2: LEVEL OF SERVICE CRITERIA DESCRIPTION FOR SIGNALISED INTERSECTIONS

LEVEL OF SERVICE	AVERAGE TOTAL DELAY (SEC/VEH)	PERFORMANCE EVALUATION
A	≤ 5	Excellent
B	> 5 and ≤ 15	Very Good
C	> 15 and ≤ 25	Good
D	> 25 and ≤ 40	Average
E	> 40 and ≤ 60	Poor
F	> 60	Fail

Level of Service criteria obtained from *The Highway Capacity Manual (Special Report 2009)*

APPENDIX E

SUMMARY OF IMPACT RATINGS

TABLE E-1: IMPACT RATING WITHOUT THE PROPOSED ACTIVITIES AS PART OF THE PROPOSED NEW FLASH DRYER

RECEPTOR	ACTIVITY	IMPACT	BEFORE BACKGROUND MITIGATION					AFTER BACKGROUND MITIGATION					Comments and Mitigation Measures		
			Intensity	Duration	Spatial Scale	Consequence	Probability	Significance	Intensity	Duration	Spatial Scale	Consequence		Probability	Significance
Road and Traffic	Road Capacity	1. Relevant road sections (reconstructing/repairing of roads)	L	H	M	Low	M	Very Low	L	H	M	Low	M	Very Low	Road vehicle capacity is no problem. No existing improvements recommended.
		2. Relevant intersections (need for additional lanes)	VL	H	M	Low	VL	Insignificant ant	VL	H	M	Low	VL	Insignificant ant	Road vehicle capacity is no problem. No existing improvements recommended.
	Road Safety Matters	3. Intersection (access) spacing	VL	H	M	Low	VL	Insignificant ant	VL	H	M	Low	VL	Insignificant ant	Existing intersections. No existing improvements recommended.
		4. Vertical road alignment	VL	H	M	Low	VL	Insignificant ant	VL	H	M	Low	VL	Insignificant ant	Vertical road alignment acceptable. No existing improvements recommended.
		5. Available sight distance at existing intersections	VL	H	M	Low	VL	Insignificant ant	VL	H	M	Low	VL	Insignificant ant	Sight distances acceptable. No existing improvements recommended.
		6. Relevant intersections (need for dedicated left- and right-turn lanes)	M	H	M	Med	M	Low	M+	H	M	High	M	Medium	Recommended improvements would create vehicle volume capacity at intersections.
		7. Pedestrian movements (with reference to access roads and intersections)	VL	H	M	Low	VL	Insignificant ant	VL	H	M	Low	VL	Insignificant ant	No existing improvements recommended.
		8. Public transport loading and off-loading	VL	H	M	Low	VL	Insignificant ant	VL	H	M	Low	VL	Insignificant ant	No existing improvements recommended.

TABLE E-2: IMPACT RATING DUE TO THE PROPOSED ACTIVITIES AS PART OF THE PROPOSED NEW FLASH DRYER															
RECEPTOR	ACTIVITY	IMPACT	DUE TO NEW FLASH DRYER WITHOUT MITIGATION					DUE TO NEW FLASH DRYER WITHOUT MITIGATION					Comments and Mitigation Measures		
			Intensity	Duration	Spatial Scale	Consequence	Probability	Significance	Intensity	Duration	Spatial Scale	Consequence		Probability	Significance
Road and Traffic	Road Capacity	1. Relevant road sections (reconstructing/repairing of roads)	VL	H	M	Low	VL	Insignificant	No mitigation required or recommended due to the proposed activities as part of the proposed new flash dryer as a very low number of vehicles to be generate is anticipated and would have an insignificant impact on the existing road network.						Road vehicle capacity is no problem and anticipated vehicle trips by new flash dryer very low.
		2. Relevant intersections (need for additional lanes)	VL	H	M	Low	VL	Insignificant							Road vehicle capacity is no problem and anticipated vehicle trips by new flash dryer very low.
	Road Safety Matters	3. Intersection (access) spacing	VL	H	M	Low	VL	Insignificant							Existing intersections. No improvements recommended due to new flash dryer activities.
		4. Vertical road alignment	VL	H	M	Low	VL	Insignificant							Vertical road alignment acceptable. No improvements recommended due to new flash dryer activities.
		5. Available sight distance at existing intersections	VL	H	M	Low	VL	Insignificant							Sight distances acceptable. No improvements recommended due to new flash dryer activities.
		6. Relevant intersections (need for dedicated left- and right-turn lanes)	VL	H	M	Low	VL	Insignificant							Anticipated vehicle trips by new flash dryer very low and would have an insignificant impact on vehicle volume capacity.
		7. Pedestrian movements (with reference to access roads and intersections)	VL	H	M	Low	VL	Insignificant							No improvements recommended due to new flash dryer activities.
		8. Public transport loading and off-loading	VL	H	M	Low	VL	Insignificant							No improvements recommended due to new flash dryer activities.

APPENDIX F

IMPACT RATINGS CRITERIA

TABLE F-1: CRITERIA USED IN THE ASSESSMENT OF IMPACTS – DEFINITIONS AND CRITERIA		
PART A: DEFINITIONS AND CRITERIA*		
Definition of SIGNIFICANCE		Significance = consequence x probability
Definition of CONSEQUENCE		Consequence is a function of intensity, spatial extent and duration
Criteria for ranking of the INTENSITY of environmental impacts	VH	Severe change, disturbance or degradation. Associated with severe consequences. May result in severe illness, injury or death. Targets, limits and thresholds of concern continually exceeded. Substantial intervention will be required. Vigorous/widespread community mobilization against project can be expected. May result in legal action if impact occurs.
	H	Prominent change, disturbance or degradation. Associated with real and substantial consequences. May result in illness or injury. Targets, limits and thresholds of concern regularly exceeded. Will definitely require intervention. Threats of community action. Regular complaints can be expected when the impact takes place.
	M	Moderate change, disturbance or discomfort. Associated with real but not substantial consequences. Targets, limits and thresholds of concern may occasionally be exceeded. Likely to require some intervention. Occasional complaints can be expected.
	L	Minor (Slight) change, disturbance or nuisance. Associated with minor consequences or deterioration. Targets, limits and thresholds of concern rarely exceeded. Require only minor interventions or clean-up actions. Sporadic complaints could be expected.
	VL	Negligible change, disturbance or nuisance. Associated with very minor consequences or deterioration. Targets, limits and thresholds of concern never exceeded. No interventions or clean-up actions required. No complaints anticipated.
	VL+	Negligible change or improvement. Almost no benefits. Change not measurable/will remain in the current range.
	L+	Minor change or improvement. Minor benefits. Change not measurable/will remain in the current range. Few people will experience benefits.
	M+	Moderate change or improvement. Real but not substantial benefits. Will be within or marginally better than the current conditions. Small number of people will experience benefits.
	H+	Prominent change or improvement. Real and substantial benefits. Will be better than current conditions. Many people will experience benefits. General community support.
	VH+	Substantial, large-scale change or improvement. Considerable and widespread benefit. Will be much better than the current conditions. Favourable publicity and/or widespread support expected.
Criteria for ranking the DURATION of impacts	VL	Very short, always less than a year. Quickly reversible
	L	Short term, occurs for more than 1 but less than 5 years. Reversible over time.
	M	Medium term, 5 to 10 years.
	H	Long term, between 10 and 20 years. (Likely to cease at the end of the operational life of the activity.)
	VH	Very long, permanent, +20 years. (Irreversible. Beyond closure)
Criteria for ranking the EXTENT of impacts	VL	A part of the site/property.
	L	Whole site.
	M	Beyond the site boundary, affecting immediate neighbours.
	H	Local area, extending far beyond site boundary.
	VH	Regional/National

TABLE F-2: CRITERIA USED IN THE ASSESSMENT OF IMPACTS – DETERMINING CONSEQUENCE

PART B: DETERMINING CONSEQUENCE

INTENSITY = VL							
DURATION	Very long	VH	Low	Low	Medium	Medium	High
	Long term	H	Low	Low	Low	Medium	Medium
	Medium term	M	Very Low	Low	Low	Low	Medium
	Short term	L	Very low	Very Low	Low	Low	Low
	Very short	VL	Very low	Very Low	Very Low	Low	Low
INTENSITY = L							
DURATION	Very long	VH	Medium	Medium	Medium	High	High
	Long term	H	Low	Medium	Medium	Medium	High
	Medium term	M	Low	Low	Medium	Medium	Medium
	Short term	L	Low	Low	Low	Medium	Medium
	Very short	VL	Very low	Low	Low	Low	Medium
INTENSITY = M							
DURATION	Very long	VH	Medium	High	High	High	Very High
	Long term	H	Medium	Medium	Medium	High	High
	Medium term	M	Medium	Medium	Medium	High	High
	Short term	L	Low	Medium	Medium	Medium	High
	Very short	VL	Low	Low	Low	Medium	Medium
INTENSITY = H							
DURATION	Very long	VH	High	High	High	Very High	Very High
	Long term	H	Medium	High	High	High	Very High
	Medium term	M	Medium	Medium	High	High	High
	Short term	L	Medium	Medium	Medium	High	High
	Very short	VL	Low	Medium	Medium	Medium	High
INTENSITY = VH							
DURATION	Very long	VH	High	High	Very High	Very High	Very High
	Long term	H	High	High	High	Very High	Very High
	Medium term	M	Medium	High	High	High	Very High
	Short term	L	Medium	Medium	High	High	High
	Very short	VL	Low	Medium	Medium	High	High

VL	L	M	H	VH
A part of the site/ property	Whole site	Beyond the site, affecting neighbours	Extending far beyond site but localised	Regional/ National
EXTENT				

TABLE F-3: CRITERIA USED IN THE ASSESSMENT OF IMPACTS – DETERMINING SIGNIFICANCE

PART C: DETERMINING SIGNIFICANCE							
PROBABILITY (of exposure to impacts)	Definite/ continuous	VH	Very Low	Low	Medium	High	Very High
	Probable	H	Very Low	Low	Medium	High	Very High
	Possible/ frequent	M	Very Low	Very Low	Low	Medium	High
	Conceivable	L	Insignificant	Very Low	Low	Medium	High
	Unlikely/ improbable	VL	Insignificant	Insignificant	Very Low	Low	Medium
			VL	L	M	H	VVH
CONSEQUENCE							

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	Decision guideline
Very High	Potential fatal flaw unless mitigated to lower significance.
High	It must have an influence on the decision. Substantial mitigation will be required.
Medium	It should have an influence on the decision. Mitigation will be required.
Low	Unlikely that it will have a real influence on the decision. Limited mitigation is likely to be required.
Very Low	It will not have an influence on the decision. Does not require any mitigation
Insignificant	Inconsequential, not requiring any consideration.

APPENDIX G

PROFESSIONAL REGISTRATION AND CIRICULAM VITAE

Suid-Afrikaanse Raad vir Ingenieurswese



Hiermee word
gesertifiseer
dat

Leon Roets

geregistreer is as

Professionele Ingenieur

kragtens die Wet op die Ingenieurswese-professie van Suid-Afrika
1990 (Wet 114 van 1990)

Datum *14 November 1996*

Registrasienommer *960547*

A handwritten signature in black ink, appearing to read 'L. Roets', written over a horizontal line.

President

A large, stylized handwritten signature in black ink, written over a horizontal line.

Registrateur





Die Suid-Afrikaanse Instituut van Siviele Ingenieurswese

Hiermee word gesertifiseer dat

Leon Roetz

behoorlik verkies is as

Lid

Lidnommer: 206744

van

Die Suid-Afrikaanse
Instituut van Siviele Ingenieurswese
op

29 September 2006

Uitgereik onder die seël van die Instituut
Onder resoluë van die Raad

President

Uitvoerende Direkteur





SOUTH AFRICAN ROAD FEDERATION

This is to certify that

Leon Roets

ID No: 6510145135085

Has successfully attended a 5 day course on

ROAD SAFETY AUDITS

CPD VALIDATION NUMBER: SARF 14/0003/17 (5 CREDITS)

SARF

better roads

Stefan Lotter
Presenter

Innocent Jumo
SARF President

13TH JULY – 17TH JULY 2015
GAUTENG – SANRAL – NORTHERN REGION

TRANSPORT & TRAFFIC ENGINEER CV

PERSONAL PARTICULARS

Name and Surname: Leon Roets
 Identity Number: 6510145135085
 Nationality: South African
 Prof. Registration: 960547 - Professional Engineer

ACADEMIC QUALIFICATIONS

B Eng. (Civil Eng.) University of Pretoria, 1988

PROFESSIONAL MEMBERSHIP

Engineering Council of South Africa (ECSA)



EMPLOYMENT RECORD

01/2002 – Current: Traffic Engineer Technical Director to SIYAZI Group of Companies
 01/2002 – Current: Office Manager for SIYAZI Limpopo (Pty) Ltd
 01/2002 – Current: Director and shareholder, SIYAZI Holdings (Pty) Ltd, SIYAZI Limpopo, SIYAZI-Thula, SIYAZI Gauteng and SIYAZI Free State
 07/1996 – 12/2003: Office Manager for all SIYAZI activities in the Limpopo Province
 07/1996 – 12/2003: Director and shareholder, SIYAZI Transportation & Services CC
 11/1994 – 06/1996: Representative of Africon Consulting Engineers Inc., Transportation Planning Division in the then Northern Province, based in Polokwane
 08/1992 - 10/1994: Africon Consulting Engineers Inc., Transport Planning Division in Pretoria
 06/1990 - 08/1992: Lexetran, Transport Planning Division of the then Van Wyk & Louw Group

Mr Roets has a total of 24 years experience. He is a Transport and Traffic Engineer with wide experience in transportation planning and modelling, data processing as well as Traffic Impact Studies.

MR ROETS COMPLETED A CONSIDERABLE NUMBER OF TRAFFIC IMPACT STUDIES FOR ALL TYPES OF DEVELOPMENTS, WHICH VARIES FROM BASIC RESIDENTIAL DEVELOPMENTS TO MAJOR SHOPPING CENTRE DEVELOPMENTS. THE FOLLOWING PROVIDES A SUMMARY OF SOME OF THE PROJECTS SPECIFICALLY RELATED TO MINE ACTIVITY:

Project	Client
Siyazi Transport & Technical and Liaison Assistance for Tripartite Forum (Twickenham)	Rustenburg Platinum Mine Limited-Mogalakwena Section
Mogalakwena Section Mine - Road Safety	Anglo American
Existing Aquarius Platinum Mine (Rustenburg) Transport Route Investigation (Proposed ROM Ore Transport by Road from K6 and Kwezi Shafts to AQPSA Kroondal Smelter)	SLR Consulting Engineers (Metago)
Twickenham Platinum Mines Integrated Transport Management Plan	WorleyParsons
7-day Electronic Counts for Two Rivers Platinum Mines	Two Rivers Platinum Mine
Proposed Scheiding Chrome Mine, Limpopo Province	Prime Resources (Pty) Ltd
Traffic Impact Assessment for Fumani Gold Mine	Ages (Pty) Ltd
Proposed CSP and PV Solar Power Plants near Jacobsdal, Free State	SLR Consulting Engineers
Proposed Siyanda Chrome Smelter, Northam, Limpopo	SLR Consulting Engineers
Traffic assessment for AQPSA, Rustenburg	SLR Consulting Engineers
Existing PPM mine near Pilanesberg, North West Province expansion	SLR Consulting Engineers
Proposed Musonoi Mine Situated near the Town of Kolwezi, Democratic Republic of Congo: Traffic Impact Assessment	Metago Environmental Engineers (PTY) Ltd
Botswana Traffic Impact Assessment	SLR Consulting Engineers (Metago)
Proposed division of Road P50-1 near Pilanesberg	SLR Consulting Engineers (Metago)
Development of The Eastern Limb Mining Land Transport Strategy (ELM-LTS)	Steelpoort Valley Producers Forum
Proposed Kotulo Tsatsi Solar Park near Kenhardt, Northern Cape	Savannah Environmental (Pty) Ltd
Proposed Leeuw Mining Coral Mine: Utrecht KZN	SLR Consulting Engineers (Metago)
Proposed Moonlight Iron Ore Mining Development situated in the Waterberg District of the Limpopo Province: Traffic Impact Assessment	SLR Consulting Engineers (Metago)

Project	Client
Proposed Upgrading Kinsenda Copper Mine, Situated near the town of Likasi, in the DRC	SLR Consulting Engineers (Metago)
Traffic Impact Assessment for Intersection between Windhoek and Swakopmund	Metago Environmental Engineers (Pty) Ltd
Traffic Impact Assessment: Proposed Hawerklip Railway Station Situated on the Farm Matjisgoedkuil 266-IR Near Delmas	Metago Environmental Engineers (Pty) Ltd
Road Safety Project for Road R555	Steelpoort Producers Forum
Road Safety Project for Road R37, between Olifantsrivier and Burgersfort	Steelpoort Producers Forum
Kameni Product Transport Feasibility Study	Kameni
Proposed New PGM Mine Situated on the Farms Kalkfontein and Buffelshoek in the Steelpoort Area	Metago Environmental Engineers (Pty) Ltd
Proposed New Manganese Mining Operation, NCMC: Traffic Impact Assessment, Kuruman	Metago Environmental Engineers (Pty) Ltd
Project Management Road N11, Road Safety Project	Economic Sector Forum
Twickenham Public Transport System	Twickenham Platinum Mine
Road Master Plan for Mines in the Sekhukhune District	Steelpoort Producers Forum
Traffic Related Input for Realignment of Road N11	Economic Sector Forum in conjunction with SANRAL
Access to the Polokwane Smelter (Road R37)	Economic Sector Forum
Greenfield Expansion Project, Traffic Impact Assessment for Lwala Smelter	Semancor
Road R37 upgrade in Burgersfort for SANRAL	Steelpoort Producers Forum
Road Master Plan for Burgersfort	Steelpoort Producers Forum
Application to upgrade the existing Access Road D4170 to Road R37 (Modikwa Platinum Mine)	Steelpoort Producers Forum
New concentrator and smelter complex at Hercul's Bokfontein Chrome Mine on the farm Bokfontein 448 JQ near Brits in North West Province	Metago Environmental Engineers (Pty) Ltd
Proposed Development of a Manganese Mining Operation	Metago Environmental Engineers (Pty) Ltd
R555/Tweefontein Road Safety Project (Xtrata)	Xstrata Alloys Lion Ferrochrome
Traffic Related Input for Road R555	Steelpoort Producers Forum
Proposed Manganese Mining Operation On Portion 1 Of The Farm Lehating 741 Near Hotazel, Northern Cape Province	SLR Consulting Engineers (Metago)
Proposed Mokala Manganese Mine Situated Near Hotazel, Northern Cape Province	SLR Consulting Engineers (Metago)
Background Information on the Environmental Assessment for the proposed expansion of Eland Platinum Mine	Metago Environmental Engineers (Pty) Ltd
Development of an opencast and underground coal mining operation – Keaton Mine	Metago Environmental Engineers (Pty) Ltd
Mogalakwena Economic Sector, Transport related input for Mogalakwena Economic Sector	Economic Sector Forum
Traffic Counts Road R37	Steelpoort Producers Forum
Planning of multi modal facility for Burgersfort	Steelpoort Producers Forum
Provide input into traffic safety along Road R37	Steelpoort Producers Forum
Input into the transport of workers (Dilokong corridor)	Steelpoort Producers Forum
Strategy for Travel Demand Management for the Greater Tubatse Municipality and modelling for the R37 road	Steelpoort Producers Forum
Strategy to transport workers at the Modikwa Shaft	Modikwa Mine

SOME OF MR ROETS' OTHER TRAFFIC AND TRANSPORT ENGINEERING EXPERTISE AND EXPERIENCE INCLUDE THE FOLLOWING:

- a) Shopping Centres that Range from 2 000 m² to 60 000 m²
- b) Various Filling Station Developments
- c) Integrated Transport Plans for Various Local and District Municipalities
 - Vhembe
 - Ba-Phalaborwa
 - Polokwane
 - Sekhukhune
 - Thulamela
 - Limpopo
 - Mogalakwena
- d) Public Transport Plans for Various Local and District Municipalities
 - Mopani
 - Vhembe
 - Tubatse
 - Capricorn
- e) Design and Layout of Traffic Light System
- f) Residential Development that vary from 100 to 12 000 stands

In conclusion the following are relevant:

The above-mentioned successful projects are a clear indication that Mr Roets is fully committed to sustainable development, and believes strongly in the following principles:

- a) Providing safe, secure and reliable traffic-related facilities
- b) Maintaining a balance between traffic engineering and the potential to create job opportunities. In other words, doing everything possible to take certain measures that would ensure the functionality of the proposed developments
- c) Acting as a link between the developer and the relevant authority to ensure that development takes place successfully
- d) Using his knowledge of local circumstances and conditions to the benefit of the local community, in order to stimulate job creation
- e) Using his expertise, experience and qualifications to best effect in the belief that these should serve as a catalyst for job creation as far as is practically possible.

Leon Roets has the distinct advantage of possessing profound knowledge of transport and traffic issues of engineering. This in-depth knowledge in various fields, combined with the extensive knowledge that Siyazi has gained and also his record of successful co-operation with transport-related role players, his knowledge of the road network and the transport environment, probably makes Leon Roets one of the best candidates to provide traffic-related input for this project.

SOME OF THE TRANSPORT PLANNING PROJECTS THAT LEON ROETS HAD BEEN INVOLVED IN THE LIMPOPO PROVINCE INCLUDE:																
Authority / Project Description	Transport Forum	CPTA	OLS	RATPlan	PTP	ITP	LITP	DITP	Business Plans	Liaison	Public Transport Facilities	Public Transport Facilities	Colour Coding	Transport Framework	Corridor Planning	Year
Technical Advisor – Taxi Industry Polokwane Integrated Rapid Transit									Y	Y			Y		Y	2015-2011
Elim Mall, Tzaneng Mall, Tzaneen Crossing, Tzaneen Lifestyle Centre, Burgersfort Mall, Malamulele													Y			2012-1998
Greater Tubatse Municipality	Y															2013-2003
Road R37 between Polokwane and Burgersfort (Dilokong Corridor)										Y					Y	2013-2003
Polokwane Intermodal Facilities, as part of Prism Consortium (Planning)											Y					2013-2010
Thohoyandou Intermodal Facilities, as part of MCE Consortium											Y					2013-2010
Giyani intermodal Facility, Taxi Facilitation																2013-2010
Giyani, Makhado, Thohoyandou, Burgersfort, Special advisor for Intersite											Y					2013-2010
Vhembe District Municipality								Y								2010
Burgersfort, Road Master Network															Y	2009-2007
Mogalakwena Local Municipality	Y															2009-2006
Ba-Phalaborwa Local Municipality						Y										2008
Mogalakwena Local Municipality							Y									2008
Mogalakwena, Relocation and Road Safety of Road N11															Y	2008
Fetakgomo Local Municipality	Y															2007-2005
Polokwane, 2010 Priority Statement (PTIS)									Y							2007-2005
Polokwane Local Municipality					Y	Y										2007
Mogalakwena Local Municipality					Y											2007
Polokwane Local Municipality	Y															2006-1997
Sekukhune District Municipality			Y	Y	Y	Y			Y							2006
Taxi Recapitalisation for Limpopo Department of Roads & Transport																2005-2004
Limpopo Department of Roads and Transport													Y			2004
Part of team for Limpopo in Motion														Y		2004
Greater Tubatse Municipality		Y	Y	Y	Y	Y										2003
Capricorn District Municipality		Y														2003
Vhembe District Municipality		Y	Y		Y	Y										2003
Mopani District Municipality		Y	Y		Y	Y										2003
Pietersburg-Polokwane Transport Strategy																2000
Polokwane, N1 Eastern bypass						Y									Y	2000
Pietersburg-Polokwane Public Transport Strategy					Y											1997