MEMORANDUM

TRAFFIC IMPACT ASSESSMENT

PROPOSED SIYANDA FERROCHROME SMELTER TO BE SITUATED NEAR NORTHAM WITHIN THE THABAZIMBI LOCAL MUNICIPALITY, LIMPOPO PROVINCE

FEBRUARY 2016

Prepared for:
SLR Consulting (Africa) (Pty) Ltd
P O Box 1596
Cramerview
2060

SLR Reference: Order 0159

Prepared by:
Siyazi Limpopo (Pty) Ltd
P O Box 11182
BENDOR
0699

Siyazi Reference: 14044

Declaration of Independence

I, Leon Roets, hereby declare that Siyazi Limpopo (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: 

Date: 22 February 2016

NEMA requirement checklist

Item	NEMA Regs (2014) - Appendix 6	Relevant section in report
1.	Details of the specialist who prepared the report	See cover page.
2.	The expertise of that person to compile a specialist report including a curriculum vitae	See Appendix G.
3.	A declaration that the person is independent in a form as may be specified by the competent authority	See previous page of report.
4.	An indication of the scope of, and the purpose for which, the report was prepared	See Section 1 (pages 1 to 6) for introduction and purpose of study.
5.	The date and season of the site investigation and the relevance of the season to the outcome of the assessment	See Section 2, point 2.1.3. Season not relevant.
6.	A description of the methodology adopted in preparing the report or carrying out the specialised process	Discussed as part of each specialist process conducted throughout report.
7.	The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	See Section 2, point 2.4 (page 27).
8.	An identification of any areas to be avoided, including buffers	See Section 2, point 2.4 (page 27).
9.	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;	See Section 2, point 2.4 (pages 28 and 29).
10.	A description of any assumptions made and any uncertainties or gaps in knowledge;	See Section 2, point 2.1.1 (page 7).
11.	A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	See Section 3 (page 40).
12.	Any mitigation measures for inclusion in the EMPr	See Section 3 (page 40).
13.	Any conditions for inclusion in the environmental authorisation	See Section 3 (page 40).
14.	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	See Section 3 (page 40).
15.	A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	See Section 3, point 3.2.4 (page 49).
16.	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	See Section 3 (page 40). Closure plan not applicable.
17.	A description of any consultation process that was undertaken during the course of carrying out the study	See Section 2, point 2.6 (page 30).
18.	A summary and copies if any comments that were received during any consultation process	See Section 2, table 2.12 (page 31).
19.	Any other information requested by the competent authority.	See Section 2, point 2.5 (page 30).

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

Section 1

INTRODUCTION

Siyazi Transportation Services Limpopo (Pty) Ltd was appointed by SLR Consulting (Africa) (Pty) Ltd during January 2015 to conduct a Traffic Impact Assessment (TIA) for the proposed Siyanda Ferrochrome (FeCr) smelter to be situated on Portion 3 of the Farm Grootkuil 409 KQ located approximately 5 kilometres from Northam within the Thabazimbi Local Municipality, Limpopo Province.

In broad terms the proposed Siyanda Ferrochrome Smelter project will comprise a railway siding, a raw materials offloading area, two 70 MW DC furnaces, crushing and screening plant, slag dump and baghouse dust slurry dam and related facilities such as material stockpiles, workshops, stores and various support infrastructure and services including power lines and pipelines.

Although a railway siding which will connect to the existing railway lines is part of the project plan will be used to import incoming chrome concentrate (ore) and export processed product. It is possible that the railway lines may be out of order at times in which case road transport would need to be utilised as an alternative. Two alternative investigations were therefore developed as part of this traffic impact assessment which are as follows:

a) **Alternative 1**: Transport of incoming ore, processed product Export and raw material deliveries via road transport only; and
b) **Alternative 2**: Transport of incoming ore and processed product export via railway (raw material deliveries via road transport).

Figure 1.1 provides a graphical presentation of the locality of the proposed development in relation to other activities including the location of the intersections under investigation while **Figure 1.2** provides the conceptual site layout. **Table 1.1** contains a summary of the extent of the proposed development for the respective phases identified as:

a) Construction;
b) Operational;
c) Decommissioning; and
d) Closure.

Vehicle access to and from the proposed development will be via an access road which will be constructed specifically for the purposes of the project. This access road will link Road D869 (Brits Road) to the smelter infrastructure area just to the south of Road D869. At the time of compiling this report, the exact location of the proposed access road from Road D869 was not fixed with several options being investigated. **Figure 1.2** provides a graphical presentation of the options for access to the proposed development of which **Option 2** was the preferred option.

POINT	INTERSECTION STATUS	INTERSECTION	GPS CO-ORDINATES	
			LATITUDE	LONGITUDE
A	Existing	Road R510 and Road D869 (Brits Road)	S 26°29'7.57"	E 29° 8'40.86"
B	Proposed	Road D869 (Brits Road) and Proposed Access Road	S 24°54'30.26"	E 27°11'21.08"
C	Existing	Road D869 (Brits Road) and Swartklip Road	S 26°28'30.95"	E 29°12'27.86"

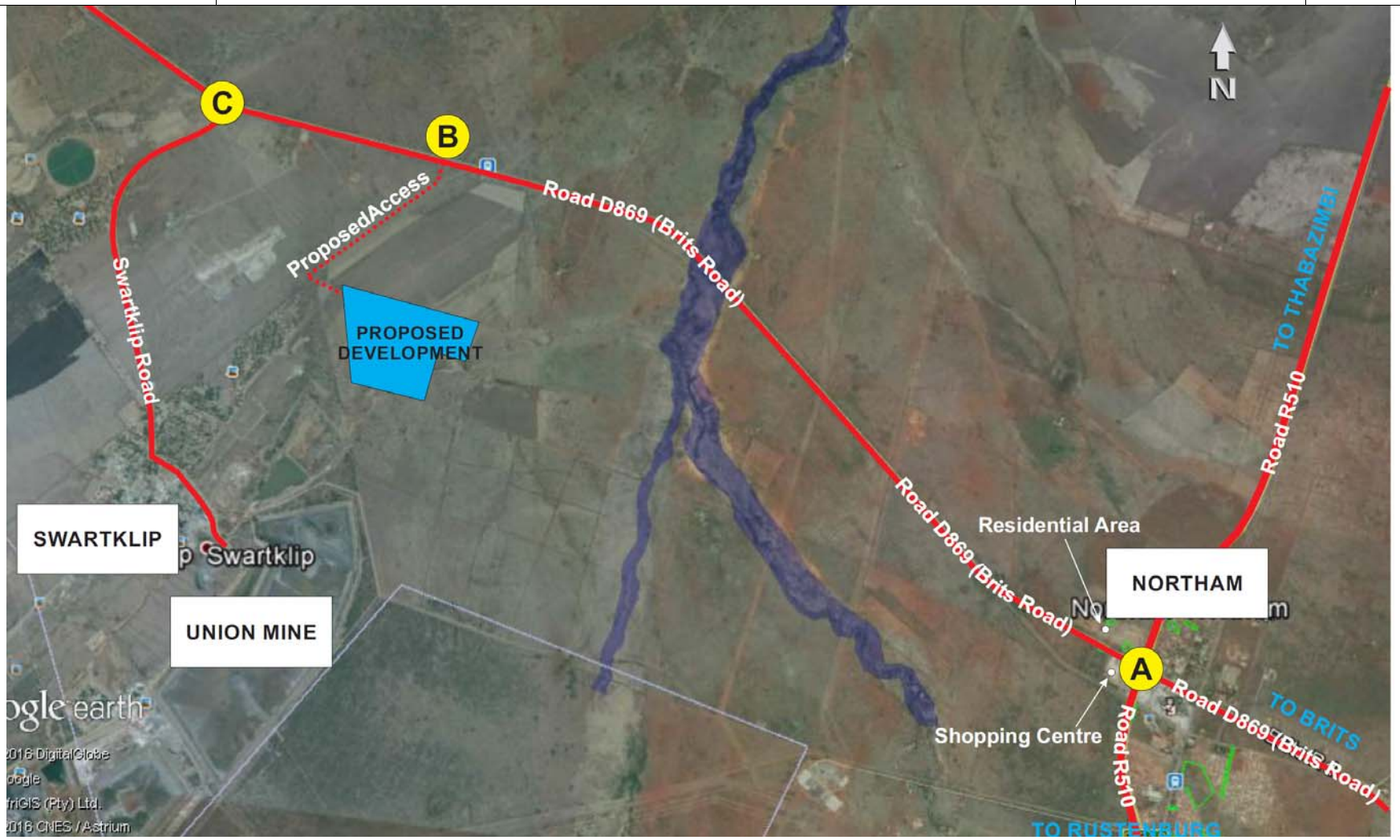


FIGURE 1.1: LOCALITY OF PROPOSED DEVELOPMENT AND RELEVANT INTERSECTIONS UNDER INVESTIGATION

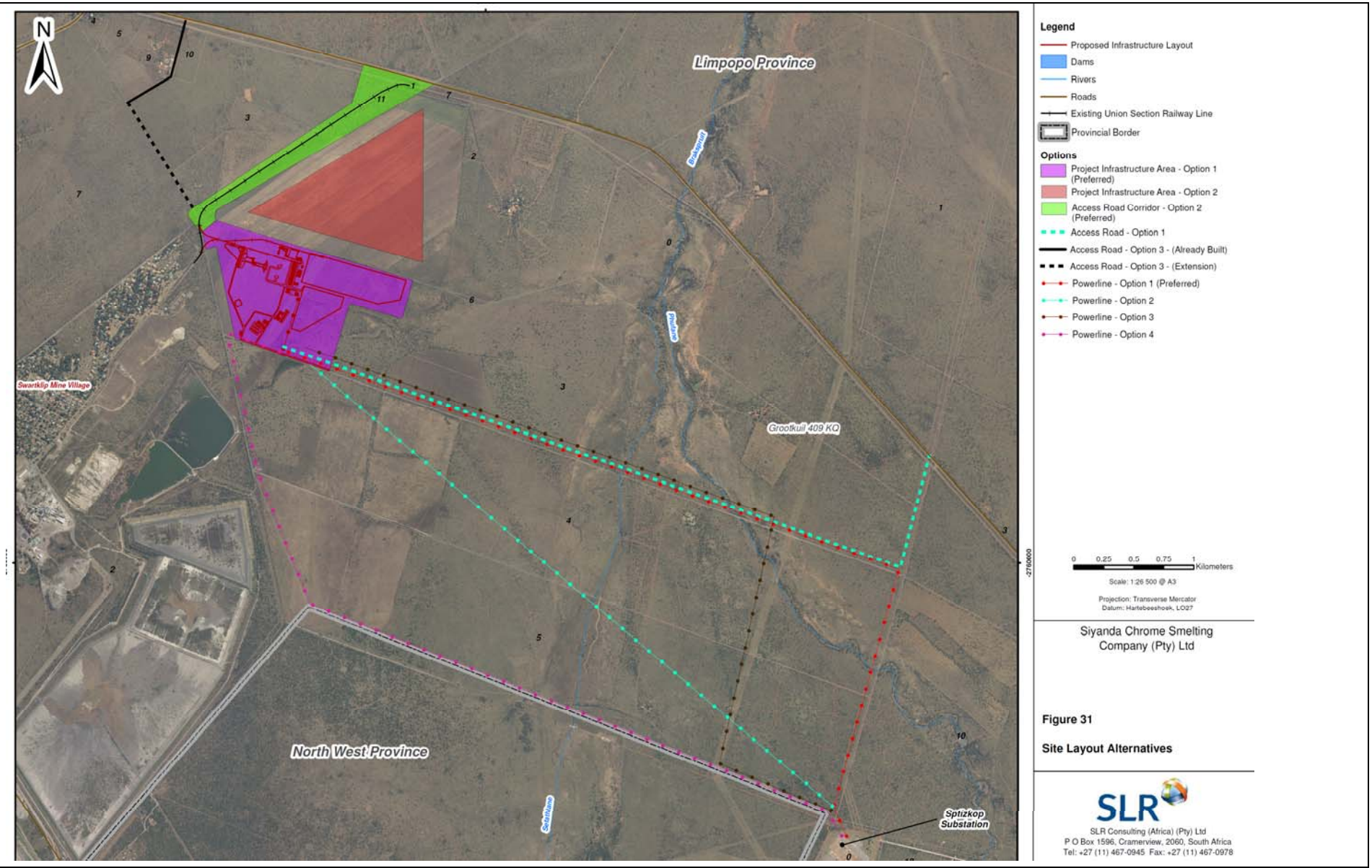


FIGURE 1.2: CONCEPT SITE LAYOUT AND ACCESS OPTIONS

Source: SLR Consulting (Pty) Ltd

TABLE 1.1: SUMMARY OF THE EXTENT OF THE PROPOSED DEVELOPMENT FOR THE RESPECTIVE PHASES				
DESCRIPTION	**PHASE**			
	CONSTRUCTION	**OPERATIONAL**	**DECOMMISSIONING**	**CLOSURE**
Raw materials for processing sourced from Union Section and Amandelbult Mines	Not relevant	35 000 tonnes per month per furnace, 2 furnaces Total: 70 000 tonnes per month Transported via Road or Rail (See alternatives in calculations)	Not relevant. (Activities include the demolition of all infrastructures and the rehabilitation of the site)	Not relevant. (All activities on the site, although limited, are planned to be completed and will leave the site)
Production (tonnes of Ferrochrome per month)	Not relevant.	15 000 tonnes per month per furnace, 2 furnaces Total 30 000 tonnes per month Transported via Road or Rail (See alternatives in calculations)	Not relevant. (Activities include the demolition of all infrastructures and the rehabilitation of the site)	Not relevant. (All activities on the site, although limited, are planned to be completed and will leave the site)
Duration	± 18 Months	± 30 years	± 18 Months	As long as monitoring is required. More than 5 years.
Relevant time frame	2016 to 2018	2018 to 2048	2048 to 2050	2050 >
Number of construction workers	± 700 temporary workers per day (350 workers per shift)	Not relevant	Less than construction phase	Less than construction phase
Assumed maximum % of construction workers transport that will occur during the AM or PM peaks respectively	100%	Not relevant	Not relevant	Not relevant
Location from where workers are expected to come for all phases	North of Point A (Within and beyond Northam)			25%
	East of Point A (Within and beyond Northam)			40%
	South of Point A (Within and beyond Northam)			15%
	Swartklip and surroundings			10%
	West of Swartklip			10%
Number of shift workers (Per Shift)	Refer to construction workers above.	±42 per shift (3 shifts per day)	Not relevant	Not relevant
Number of normal day workers	Not relevant	±27 (per day)	Not relevant	Not relevant

TABLE 1.1: SUMMARY OF THE EXTENT OF THE PROPOSED DEVELOPMENT FOR THE RESPECTIVE PHASES (Continued)

DESCRIPTION	PHASE							
	CONSTRUCTION		OPERATIONAL				DECOMMISSIONING	CLOSURE
Expected number of heavy vehicles delivering plant materials and consumables per day	35		32				Limited, occasionally.	Limited, occasionally.
Assumed maximum % of heavy vehicles during AM or PM peak respectively	20%		20%				Limited, occasionally.	Limited, occasionally.
Heavy vehicle distribution	See **Figure B-4** of **Appendix B**		See **Figures B-9 and B-10** of **Appendix B**				Same as for operational phase	Same as for operational phase
Abnormal vehicles delivering large components related to the proposed smelter	Once-off events.		Once-off events.				Once-off events.	Once-off events.
Access road to proposed development	Access from Road D869 (Brits Road) via Proposed New Access Road		Same as for construction phase.				Same as for construction phase.	Same as for construction phase.
Calculated number of vehicle trips to be generated per AM or PM peak hours	**CONSTRUCTION**		**ALT 1**		**ALT 2**		Less than Construction and Operational Phases.	Less than Construction and Operational Phases.
	AM	In = 58 Out = 35	AM	In = 37 Out = 35	AM	In = 16 Out = 14		
	Total	93	Total	72	Total	30		
	PM	In = 35 Out = 58	PM	In = 35 Out = 37	PM	In = 14 Out = 16		
	Total	93	Total	72	Total	30		
	(See **Table 2.6** of **Section 2**)		(See **Tables 2.7 to 2.10** of **Section 2**)					

Source: Project Team, assumptions and calculations.

The purpose of this study is to undertake an assessment of the implications of the vehicle traffic that could potentially be generated at the proposed development and to determine:

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

The following sections of the memorandum 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 that was collected and the relevant investigations that were conducted in terms of vehicular traffic which includes:

a) The *status quo* of the land use, as well as the road characteristics;
b) The future land use, as well as the future road characteristics;
c) The current and future levels of service at the relevant intersections that would provide access to the proposed development; and
d) Other traffic-related issues.

The following subsections elaborate on the above mentioned.

2.1 STATUS QUO OF LAND USE, AS WELL AS ROAD 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
c) Vehicle traffic counts conducted as a basis for making traffic calculations.

2.1.1 EXISTING LAND USE INFORMATION

The relevant property of the proposed development was utilised for agricultural purposes until it was bought by Siyanda. For the purpose of this TIA, the following assumptions are made:

a) That the anticipated average rate of growth will be included as background traffic for the respective road sections at 3% per annum;
b) The relevant manual traffic counts were conducted August 2014 and it was anticipated that vehicle traffic volumes grew at the last mentioned rate up to the timeframes for which the Traffic Impact Assessment was prepared; and
c) That the absorption rate by all other types of completed developments will maintain the same status for the next ten years.

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 and includes the following:

   i) Relevant intersections;
   ii) Intersection control;
   iii) Pedestrian activities; and
   iv) Photos of the intersections.

b) **Figure 2.1** provides the existing road 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 reserves widths;
   vi) Lane widths;
   vii) Median widths;
   viii) Type of pavement;
   ix) Anticipated traffic growth per annum; and
   x) Relevant road authority.

a) **Tables 2.3** and **2.4** provides 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 INTERSECTION UNDER INVESTIGATION

POINT	DESCRIPTION	INTERSECTION CONTROL	PEDESTRIAN ACTIVITIES	INTERSECTION PHOTO
A	Road R510 and Road D869 (Brits Road)	Stop controlled on all approaches	Pedestrian and Hawkers activity present	
B	Road D869 (Brits Road) and Proposed Access	Proposed intersection		
C	Road D869 (Brits Road) and Swartklip Road	Free-flow on Road D869 (Brits Road)	Low pedestrian activity	

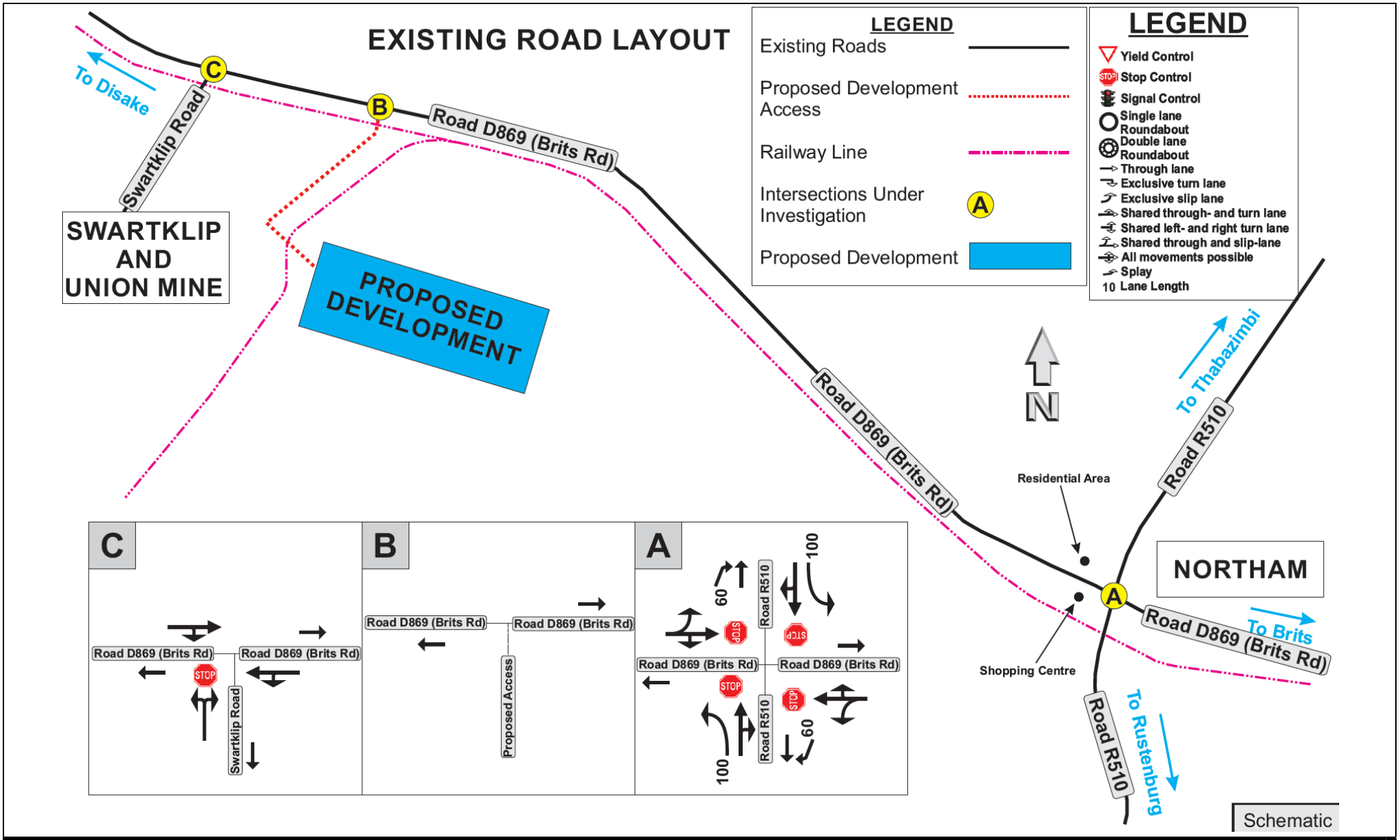


FIGURE 2.1: EXISTING ROAD NETWORK LAYOUT

TABLE 2.2: SUMMARY OF ROAD CHARACTERISTICS

RELEVANT ROAD SECTION	PICTURE OF ROAD SECTION	ASSUMED EXISTING CLASS OF ROAD			POSSIBLE FUTURE CLASS OF ROAD			Road Authority	Road Reserve (M)	Number of Lanes	Lane Width	Type Of Surface	Median	Anticipated Traffic Growth Per Annum Over 10 Years	Speed Limit
Road Section 1 **Road R510** Road link between Thabazimbi and Rustenburg		**Primary Function:** Mobility			**Proposed Function:** Mobility			SANRAL	60m	One / Two lane per direction	3.7m wide	Asphalt	None.	3%	120 km/h
		Class	**Class No.**	**Route No.**	**Class**	**Class No.**	**Route No.**								
		Major Arterial	U2	R	Major Arterial	U2	R								
		Description: Highway			**Description:** Highway										
		Access spacing: 800m (±15%)			Access spacing: 800m (±15%)										
Road Section 2 **Road D869** **(Brits Road)** Provides local communities access to main Road R510		**Primary Function:** Access / Activity			**Primary Function:** Access / Activity			Thabazimbi Local Municipality	40m	One lane per direction	3.7m wide	Asphalt	None.	3%	60 to 100 km/h
		Class	**Class No.**	**Route No.**	**Class**	**Class No.**	**Route No.**								
		Collector Street	U4a	N/A	Collector Street	U4a	N/A								
		Description: Commercial Major Collector			**Description:** Commercial Major Collector										
		Access spacing: > 150m			Access spacing: > 150m										

TABLE 2.2: SUMMARY OF ROAD CHARACTERISTICS

RELEVANT ROAD SECTION	PICTURE OF ROAD SECTION	ASSUMED EXISTING CLASS OF ROAD			POSSIBLE FUTURE CLASS OF ROAD			Road Authority	Road Reserve (M)	Number of Lanes	Lane Width	Type Of Surface	Median	Anticipated Traffic Growth Per Annum Over 10 Years	Speed Limit
Road Section 3 **Road D869 (Brits Road)** Provides local communities access to main Road R510		**Primary Function:** Access / Activity			**Primary Function:** Access / Activity			Roads Agency Limpopo	40m	One lane per direction	3.7m wide	Asphalt	None.	3%	60 to 100 km/h
		Class	**Class No.**	**Route No.**	**Class**	**Class No.**	**Route No.**								
		Collector Street	U4a	N/A	Collector Street	U4a	N/A								
		Description: Commercial Major Collector			**Description:** Commercial Major Collector										
		Access spacing: > 150m			Access spacing: > 150m										
Road Section 4 **Swartklip Road** Provides local area access to Road D869 (Brits Road)		**Primary Function:** Access / Activity			**Primary Function:** Access / Activity			North West Department of Roads and Public Works	40m	One lane per direction	3.7m wide	Asphalt	None.	3%	60km/h.
		Class	**Class No.**	**Route No.**	**Class**	**Class No.**	**Route No.**								
		Collector Street	U4a	N/A	Collector Street	U4a	N/A								
		Description: Commercial Major Collector			**Description:** Commercial Major Collector										
		Access spacing: > 150m			Access spacing: > 150m										

TABLE 2.3: RURAL ACCESS MANAGEMENT REQUIREMENTS AND FEATURES
URBAN FUNCTIONAL ROAD CLASIFICATION
(COTO TRH26 - SOUTH AFRICAN ROAD CLASIFICATION AND ACCESS MANAGEMENT MANUAL VERISON 1.0 AUGUST 2012)

FUNCTION			DESCRIPTION		MOBILITY				TRAFFIC	
BASIC FUNCTION	ALTERNATE FUNCTIONAL DESCRIPTION	DETERMINING FUNCTION	CLASS NO (U_)	CLASS NAME	THROUGH TRAFFIC COMPONANT	DISTANCE BETWEEN PARALLEL ROADS (km)	% OF BUILT KM	REACH OF CONNECTIVITY	EXPECTED RANGE OF ADT (AVERAGE DAILY TRAFFIC)	% OF TRAVEL VEH-KM
Mobility	Vehicle priority, vehicle only, long distance, through, high order, high speed, numbered, commercial, economic, strategic; route, arterial road or highway	Movement is dominant, through traffic is dominant, the majority of traffic does not originate or terminate in the immediate vicinity, the function of the road is to carry high volumes of traffic between urban areas.	U1	Principal arterial (freeway)	Exclusively	5 - 10km	5 - 10% Classes U1 and U2	> 20km	40 000 - 120 000+	40 - 65% Classes U1 and U2
			U2	Major arterial	Predominant	1.5 - 5.0km			20 000 - 60 000	
			U3	Minor arterial	Major	0.8 - 2.0km	15 - 25% Classes U1, U2 and U3	> 10km	10 000 - 40 000	65 - 80% Classes U1, U2 and U3
Access / Activity	Access, mixed pedestrian and vehicle traffic, short distance, low order, lower speed, community / farm, road or street.	Access, turning and crossing movements are allowed, the majority of traffic has an origin or destination in the district, the function of the road is to provide a safe environment for vehicles and pedestrians using access points.	U4a	Collector street, commercial	Discourage		5 - 10%	> 2km	< 25 000	5 - 10%
			U4b	Collector street, residential	Discourage			< 2 to 3km	< 10 000	
			U5a	Local street, commercial	Prevent		65 - 80%	< 1km	< 5 000	10 - 30%
			U5b	Local street, residential	Prevent			< 0.5km (1km Max)	< 1 000	
			U6a	Walkway, pedestrian priority	Ban					
			U6b	Walkway, pedestrian only	Ban					

TABLE 2.4: URBAN ACCESS MANAGEMENT REQUIREMENTS AND FEATURES
(COTO TRH26 - SOUTH AFRICAN ROAD CLASIFICATION AND ACCESS MANAGEMENT MANUAL VERISON 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 lane 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 lane , 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, residentail	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 lane 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, ut should not be necessary
	U6a	Walkway, non-motorized priority	Pedestrian priority	No	500m maximum	Yes	Yes if parking lot on woonerf	15	None, pedestrians have right of way	Surfaced			If applicable, anywhere	Yes or use roadway	Rare	Yes
	U6b	Walkway, non-motorized 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 can be considered if access spacing requirements 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.

2.1.3 TRAFFIC COUNTS AS BASIS FOR MAKING TRAFFIC CALCULATIONS

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

It is standard traffic engineering practice to conduct 12-hour manual traffic counts at all intersections that could potentially be affected by a proposed development, as close as possible to a month-end Friday when traffic movement is expected to be at its highest. From the 12-hour manual traffic counts, the AM and PM peak hours are determined respectively, and used for any further calculations.

The relevant 12-hour manual traffic counts were conducted on Friday 01 August 2014 at the following intersections under investigation:

a) **Point A**: Intersection of Road R510 and Road D869 (Brits Road); and
b) **Point C**: Intersection of Road D869 (Brits Road) and Swartklip Road.

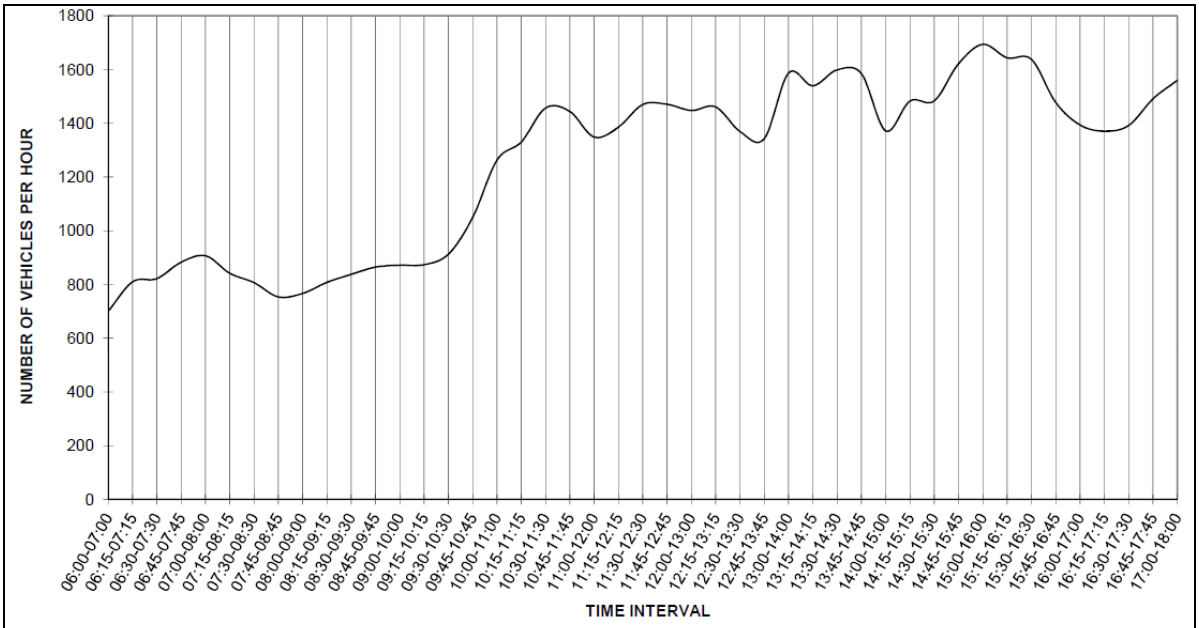
The combined hourly totals of all the vehicle types for the traffic survey conducted on Friday 01 August 2014 between 06:00 and 18:00 are indicated in **Tables A-1 to A-2** of **Appendix A** of this report. The description of the relevant vehicle movements at the relevant intersections appears in **Figure A-1** of **Appendix A**.

The respective peak-hour flows that were used for calculations as part of this report at the relevant intersections were identified as indicated in **Table 2.5** below.

TABLE 2.5: PEAK HOUR PERIODS AT THE RELEVANT INTERSECTION

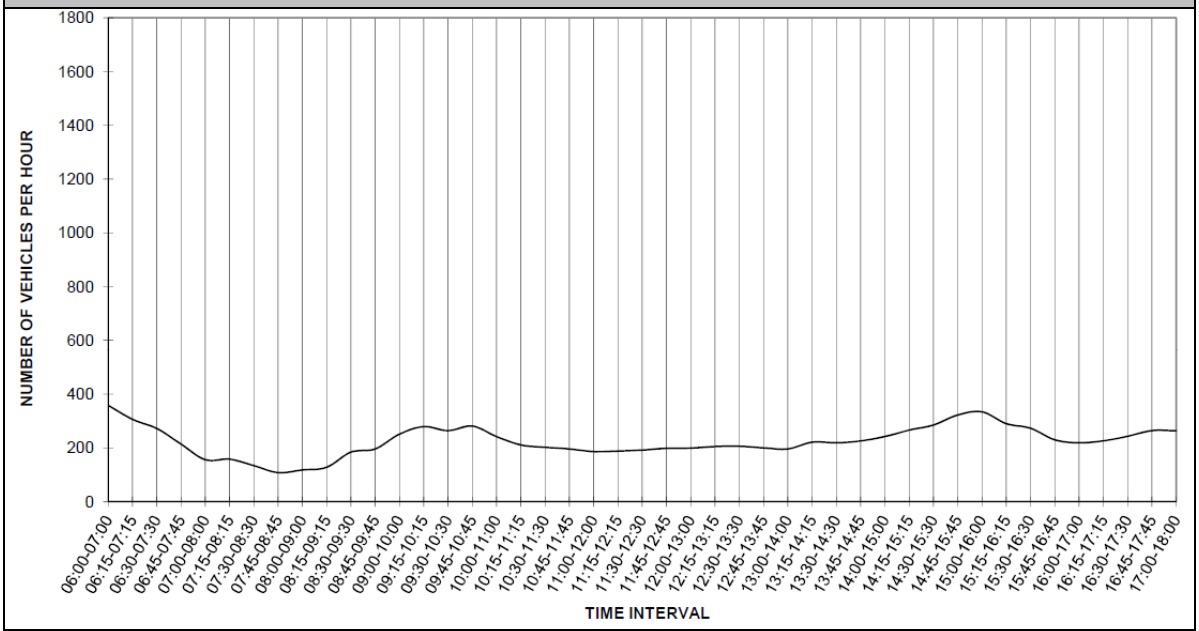
POINT	INTERSECTION	AM PEAK		PM PEAK	
		TIME INTERVAL	NUMBER OF VEHICLES	TIME INTERVAL	NUMBER OF VEHICLES
A	Road R510 and Road D869 (Brits Road)	06:15 – 07:15	810	15:00 – 16:00	1 694
C	Road D869 (Brits Road) and Swartklip Road	06:15 – 07:15	306	15:00 – 16:00	334

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 01 August 2014.



POINT A

ROAD R510 AND ROAD D869 (BRITS ROAD) (01 AUGUST 2014)



POINT C

ROAD D869 (BRITS ROAD) AND SWARTKLIP ROADS (01 AUGUST 2014)

FIGURE 2.2: HOURLY TRAFFIC PATTERN PER 15-MINUTE INTERVAL FOR ALL MODES OF VEHICLES (06:00 to 18:00) AT THE RELEVANT INTERSECTION

2.2 DETERMINATION OF FUTURE LAND USE AND ROAD CHARACTERISTICS

The following are relevant:

a) Land use information, including possible future developments in the area;
b) Information about the expected future modal distribution;
c) Determination of the vehicle trips expected to be generated by the proposed development; and
d) Determination of the vehicle trips to be generated by the proposed development at the relevant intersections.

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

2.2.1 LAND USE INFORMATION, INCLUDING POSSIBLE FUTURE DEVELOPMENTS IN THE AREA

The proposed developer intends to develop a Ferrochrome (FeCr) Smelting Plant on the relevant property. There were no known future latent developments in the direct vicinity of the proposed development that could have an impact on the relevant intersections under investigation at the time of conducting this study.

2.2.2 INFORMATION ABOUT THE EXPECTED FUTURE MODAL DISTRIBUTION

Figures B-3 and **B-4 (construction phase)** as well as **Figures B-8** to **B-10 (operational phase) of Appendix B** indicate, in percentages, the expected vehicle trips distribution, respectively, of raw material delivery and incoming ore haulage (heavy) vehicles and light vehicles for the AM and PM peak periods for the relevant scenarios and alternatives of the construction and operational phases.

2.2.3 DETERMINATION OF VEHICLE TRIPS EXPECTED TO BE GENERATED BY THE PROPOSED DEVELOPMENT

The following tables indicate the trip generation rates, the number of vehicle trips which are expected to be generated by the proposed development and the distribution of the vehicle trips to and from the respective areas of the proposed development respectively for the construction and operational Phases:

a) **Table 2.6**: Trip generation rates, expected number of vehicle trips to be generated by the proposed development and the distribution of vehicle trips (**construction phase AM and PM peaks**);
b) **Table 2.7**: Trip Generation Rates, expected number of vehicle trips to be generated by the proposed development and the distribution of vehicle trips in terms of road transport (**operational phase, alternative 1, AM peak**);

c) **Table 2.8**: Trip Generation Rates, expected number of vehicle trips to be generated by the proposed development and the distribution of vehicle trips in terms of road transport (**operational phase, alternative 1, PM peak**);

d) **Table 2.9**: Trip Generation Rates, expected number of vehicle trips to be generated by the proposed development and the distribution of vehicle trips in terms of rail transport (**operational phase, alternative 2, AM peak**); and

e) **Table 2.10**: Trip Generation Rates, expected number of vehicle trips to be generated by the proposed development and the distribution of vehicle trips in terms of rail transport (**operational phase, alternative 2, PM peak**).

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 BY THE PROPOSED DEVELOPMENT AND THE DISTRIBUTION OF VEHICLE TRIPS (CONSTRUCTION PHASE AM AND PM PEAKS)

Item	Component	Num Workers per Day	% Workers active during Peak Hour	Num Workers Active per Peak Hour	Num Truck Trips 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 (Making use of private transport - 20%)	140 (700x0.2)	50%	70				3,0	Trips per Worker (3 Persons per Vehicle)	1	23	0	0	23	**0,33**	100%	0%	23	0
2.	Construction workers (Making use of public transport (Taxis) - 80%)	560 (700x0.8)	50%	280				10,0	10 persons per taxi (Taxi delivers workers and leave site with staff from previous shift)	1	28	1	28	56	**0,20**	50%	50%	28	28
3.	Heavy vehicles delivering consumables and construction materials				35	20%	7	1,0	20% of delivery vehicles expected during peak periods	1	7	1	7	14	**2,00**	50%	50%	7	7
									TOTAL					**93**				**58**	**35**
PM Peak Hour																			
1.	Construction workers (Making use of private transport - 20%)	140 (700x0.2)	50%	70				3,0	Trips per Worker (3 Persons per Vehicle)	0	0	1	23	23	**0,33**	0%	100%	0	23
2.	Construction workers (Making use of public transport (Taxis) - 80%)	560 (700x0.8)	50%	280				10,0	10 persons per taxi (Taxi delivers workers and leave site with staff from previous shift)	1	28	1	28	56	**0,20**	50%	50%	28	28
3.	Heavy vehicles delivering consumables and construction materials				35	20%	7	1,0	20% of delivery vehicles expected during peak periods	1	7	1	7	14	**2,00**	50%	50%	7	7
									TOTAL					**93**				**35**	**58**

TABLE 2.7: TRIP GENERATION RATES, EXPECTED NUMBER OF VEHICLE TRIPS TO BE GENERATED BY THE PROPOSED DEVELOPMENT AND THE DISTRIBUTION OF VEHICLE TRIPS (OPERATIONAL PHASE, ALTERNATIVE 1, AM PEAK) (ROAD TRANSPORT)

Item	Component	Num Workers per Day	% Workers active during Peak Hour	Num Workers Active per Peak Hour	Num Truck Trips 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.	**NORMAL DAY PERSONEL** (Furnace 1 + 2) (Making use of private transport - 20%)	5 (27*0.2)	100%	5				3,0	Trips per Worker (3 Persons per Vehicle)	1	2	0	0	2	**0,33**	100%	0%	2	0
2.	**NORMALDAY PERSONEL** (Furnace 1 + 2) (Making use of public transport - 80%)	22 (27*0.8)	100%	22				10,0	10 persons per taxi (Taxi delivers workers and leave site empty)	1	2	1	2	4	**0,20**	50%	50%	2	2
3.	**SHIFT WORKERS** (3 SHIFTS PER DAY) (Furnace 1 + 2) (Making use of private transport - 20%)	26 (47x0.2)	33%	8				3,0	Trips per Worker (3 Persons per Vehicle) One shift IN, other shift OUT	1	3	1	3	6	**0,67**	50%	50%	3	3
4.	**SHIFT WORKERS** (3 SHIFTS PER DAY) (Furnace 1 + 2) (Making use of public transport - 80%)	102 (47x0.8)	33%	34				10,0	10 persons per taxi (Taxi delivers workers and leave site with staff from previous shift)	1	3	1	3	6	**0,21**	50%	50%	3	3
5.	Heavy vehicles delivering consumables				32	20%	6	1,0	20% of heavy vehicles expected during peak periods	1	6	1	6	12	**1,92**	50%	50%	6	6
6.	Heavy vehicles delivering unprocessed ore by road **(Furnace 1 + 2)**				75	20%	15	1,0	20% of heavy vehicles expected during peak periods	1	15	1	15	30	**2,00**	50%	50%	15	15
7.	Heavy vehicles exporting processed product by road **(Furnace 1 + 2)**				32	20%	6	1,0	20% of heavy vehicles expected during peak periods	1	6	1	6	12	**1,92**	50%	50%	6	6
													TOTAL	72				37	35

TABLE 2.8: TRIP GENERATION RATES, EXPECTED NUMBER OF VEHICLE TRIPS TO BE GENERATED BY THE PROPOSED DEVELOPMENT AND THE DISTRIBUTION OF VEHICLE TRIPS (OPERATIONAL PHASE, ALTERNATIVE 1, PM PEAK) (ROAD TRANSPORT)

Item	Component	Num Workers per Day	% Workers active during Peak Hour	Num Workers Active per Peak Hour	Num Truck Trips 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
PM Peak Hour																			
1.	**NORMAL DAY PERSONEL** (Furnace 1 + 2) (Making use of private transport - 20%)	5 (27*0.2)	100%	5				3,0	Trips per Worker (3 Persons per Vehicle)	0	0	1	2	2	**0,33**	0%	100%	0	2
2.	**NORMALDAY PERSONEL** (Furnace 1 + 2) (Making use of public transport - 80%)	22 (27*0.8)	100%	22				10,0	10 persons per taxi (Taxi delivers workers and leave site empty)	1	2	1	2	4	**0,20**	50%	50%	2	2
3.	**SHIFT WORKERS** (3 SHIFTS PER DAY) (Furnace 1 + 2) (Making use of private transport - 20%)	26 (47x0.2)	33%	8				3,0	Trips per Worker (3 Persons per Vehicle) One shift IN, other shift OUT	1	3	1	3	6	**0,67**	50%	50%	3	3
4.	**SHIFT WORKERS** (3 SHIFTS PER DAY) (Furnace 1 + 2) (Making use of public transport - 80%)	102 (47x0.8)	33%	34				10,0	10 persons per taxi (Taxi delivers workers and leave site with staff from previous shift)	1	3	1	3	6	**0,21**	50%	50%	3	3
5.	Heavy vehicles delivering consumables				32	20%	6	1,0	20% of heavy vehicles expected during peak periods	1	6	1	6	12	**1,92**	50%	50%	6	6
6.	Heavy vehicles delivering unprocessed ore by road **(Furnace 1 + 2)**				75	20%	15	1,0	20% of heavy vehicles expected during peak periods	1	15	1	15	30	**2,00**	50%	50%	15	15
7.	Heavy vehicles exporting processed product by road **(Furnace 1 + 2)**				32	20%	6	1,0	20% of heavy vehicles expected during peak periods	1	6	1	6	12	**1,92**	50%	50%	6	6
													TOTAL	72				35	37

TABLE 2.9: TRIP GENERATION RATES, EXPECTED NUMBER OF VEHICLE TRIPS TO BE GENERATED BY THE PROPOSED DEVELOPMENT AND THE DISTRIBUTION OF VEHICLE TRIPS (OPERATIONAL PHASE, ALTERNATIVE 2, AM PEAK) (RAIL TRANSPORT)

Item	Component	Num Workers per Day	% Workers active during Peak Hour	Num Workers Active per Peak Hour	Num Truck Trips 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.	**NORMAL DAY PERSONEL** (Furnace 1 + 2) (Making use of private transport - 20%)	5 (27*0.2)	100%	5				3,0	Trips per Worker (3 Persons per Vehicle)	1	2	0	0	2	**0,33**	100%	0%	2	0
2.	**NORMALDAY PERSONEL** (Furnace 1 + 2) (Making use of public transport - 80%)	22 (27*0.8)	100%	22				10,0	10 persons per taxi (Taxi delivers workers and leave site empty)	1	2	1	2	4	**0,20**	50%	50%	2	2
3.	**SHIFT WORKERS** (3 SHIFTS PER DAY) (Furnace 1 + 2) (Making use of private transport - 20%)	26 (47x0.2)	33%	8				3,0	Trips per Worker (3 Persons per Vehicle) One shift IN, other shift OUT	1	3	1	3	6	**0,67**	50%	50%	3	3
4.	**SHIFT WORKERS** (3 SHIFTS PER DAY) (Furnace 1 + 2) (Making use of public transport - 80%)	102 (47x0.8)	33%	34				10,0	10 persons per taxi (Taxi delivers workers and leave site with staff from previous shift)	1	3	1	3	6	**0,21**	50%	50%	3	3
5.	Heavy vehicles delivering consumables				32	20%	6	1,0	20% of heavy vehicles expected during peak periods	1	6	1	6	12	**1,92**	50%	50%	6	6
6.	Heavy vehicles delivering unprocessed ore by road **(Furnace 1 + 2)**				0	0%	0	1,0	All unprocessed material transported by rail	0	0	0	0	0	**0,00**	0%	0%	0	0
7.	Heavy vehicles exporting processed product by road **(Furnace 1 + 2)**				0	0%	0	1,0	All processed material transported by rail	0	0	0	0	0	**0,00**	0%	0%	0	0
													TOTAL	30				16	14

TABLE 2.10: TRIP GENERATION RATES, EXPECTED NUMBER OF VEHICLE TRIPS TO BE GENERATED BY THE PROPOSED DEVELOPMENT AND THE DISTRIBUTION OF VEHICLE TRIPS (OPERATIONAL PHASE, ALTERNATIVE 2, PM PEAK) (RAIL TRANSPORT)

Item	Component	Num Workers per Day	% Workers active during Peak Hour	Num Workers Active per Peak Hour	Num Truck Trips 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
PM Peak Hour																			
1.	**NORMAL DAY PERSONEL** (Furnace 1 + 2) (Making use of private transport - 20%)	5 (27*0.2)	100%	5				3,0	Trips per Worker (3 Persons per Vehicle)	0	0	1	2	2	**0,33**	0%	100%	0	2
2.	**NORMALDAY PERSONEL** (Furnace 1 + 2) (Making use of public transport - 80%)	22 (27*0.8)	100%	22				10,0	10 persons per taxi (Taxi delivers workers and leave site empty)	1	2	1	2	4	**0,20**	50%	50%	2	2
3.	**SHIFT WORKERS** (3 SHIFTS PER DAY) (Furnace 1 + 2) (Making use of private transport - 20%)	26 (47x0.2)	33%	8				3,0	Trips per Worker (3 Persons per Vehicle) One shift IN, other shift OUT	1	3	1	3	6	**0,67**	50%	50%	3	3
4.	**SHIFT WORKERS** (3 SHIFTS PER DAY) (Furnace 1 + 2) (Making use of public transport - 80%)	102 (47x0.8)	33%	34				10,0	10 persons per taxi (Taxi delivers workers and leave site with staff from previous shift)	1	3	1	3	7	**0,21**	50%	50%	3	3
5.	Heavy vehicles delivering consumables				32	20%	6	1,0	20% of heavy vehicles expected during peak periods	1	6	1	6	12	**1,92**	50%	50%	6	6
6.	Heavy vehicles delivering unprocessed ore by road **(Furnace 1 + 2)**				0	20%	0	1,0	All unprocessed material transported by rail	0	0	0	0	0	**0,00**	0%	0%	0	0
7.	Heavy vehicles exporting processed product by road **(Furnace 1 + 2)**				0	20%	0	1,0	All processed material transported by rail	0	0	0	0	0	**0,00**	0%	0%	0	0
													TOTAL	30				14	16

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 construction and operational phase. The following figures are relevant:

a) **Figure B-1:** Base year, 2014, peak hour traffic without the proposed development;
b) **Figure B-2:** Projected 2016 peak hour traffic without the proposed development (**scenario 1**);
c) **Figure B-3:** Projected vehicle trip distribution for the proposed development (**light vehicles, construction phase**);
d) **Figure B-4:** Projected vehicle trip distribution for the proposed development (**heavy vehicles, construction phase**);
e) **Figure B-5:** Projected vehicle trips generated by the proposed development (**construction phase**);
e) **Figure B-6:** Projected 2016 peak hour traffic with the proposed development (**construction phase**) (**scenario 2**);
f) **Figure B-7:** Projected 2018 peak hour traffic without the proposed development (**scenario 3**);
g) **Figure B-8:** Projected vehicle trip distribution for the proposed development (**light vehicles, operational phase**);
h) **Figure B-9:** Projected vehicle trips distribution for the proposed development (**heavy vehicles, operational phase, alternative 1, road transport**);
i) **Figure B-10:** Projected vehicle trip distribution for the proposed development (h**eavy vehicles, operational phase, alternative 2, rail transport**);
j) **Figure B-11:** Projected vehicle trip generated by the proposed development (**operational phase, alternative 1, road transport**);
k) **Figure B-12:** Projected vehicle trip generated by the proposed development (**operational phase, alternative 2, rail transport**);
l) **Figure B-13:** Projected 2018 peak hour traffic with the proposed development (**operational phase, alternative 1, road transport) (scenario 4)**;
m) **Figure B-14:** Projected 2018 peak hour traffic with the proposed development (**Operational Phase, Alternative 2, Rail Transport) (Scenario 5)**;
n) **Figure B-15:** Projected 2026 peak hour traffic without the proposed development **(scenario 6)**;
o) **Figure B-16:** Projected 2026 peak hour traffic with the proposed development (**operational phase, alternative 1, road transport) (scenario 7)**; and
p) **Figure B-17:** Projected 2026 peak hour traffic with the proposed development (**operational phase, alternative 2, rail transport) (scenario 8)**.

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 Road R510 and Road D869 (Brits Road);
b) **Point B:** Intersection of Road D869 (Brits Road) and the Proposed Access Road to the proposed development; and
c) **Point C:** Intersection of Road D869 (Brits Road) and Swartklip Road.

In Appendix C, Tables C-1 to C-8 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 2016, without the proposed development **(scenario 1)**;
b) **Table C-2:** Levels of service for various approaches for the year 2018, without the proposed development **(scenario 3)**;
c) **Table C-3:** Levels of service for various approaches for the year 2026, without the proposed development **(scenario 6)**;
d) **Table C-4:** Levels of service for various approaches for the year 2016, with the proposed development **(construction phase)(scenario 2)**;
e) **Table C-5:** Levels of service for various approaches for the year 2018, with the proposed development **(operational phase, alternative 1, road transport) (scenario 4)**;
f) **Table C-6:** Levels of service for various approaches for the year 2018, with the proposed development **(operational phase, alternative 2, rail transport) (scenario 5)**;
g) **Table C-7:** Levels of service for various approaches for the year 2026, with the proposed development **(operational phase, alternative 1, road transport) (scenario 7)**;
h) **Table C-8:** Levels of Service for various approaches for the year 2026, with the proposed development **(operational phase, alternative 2, rail transport) (scenario 8)**;

From **Tables C-1 to C-8** it is possible to note:

a) That additional infrastructure is required from an intersection performance point of view at the intersection of Road R510 and Road D869 (Brits Road) (**Point A**) **without** the proposed development;
b) That additional infrastructure is required from a traffic safety point of view at the intersection that will provide access to the proposed development (intersection of Road D869 (Brits Road) and the Proposed Access Road, **Point B**)
c) That all other relevant intersections under investigation will operate at acceptable levels of services for the relevant time frame for which the traffic impact assessment was prepared.

See Figure 3.3 for more detailed information concerning the specific Proposed Access Road Intersection (**Point A**) layout, which would be based on road safety and intersection functionality requirements.

Table 2.11 provides a summary of the available reserve capacity on the various sections of the road that have been investigated. The assumed free-flow capacity of individual lanes is relevant provided that the relevant intersections have reserve capacity available for the relevant lanes of the intersections.

TABLE 2.11: AVAILABLE RESERVE CAPACITY FOR RELEVANT ROAD SECTION																	
Point	Intersection	Direction of Road Section	Capacity per Lane	Number of lanes	Total Capacity	Actual Number of Vehicles						Reserve Capacity Available					
						2016 Construction		2018 Operational (ROAD)		2026 Operational (ROAD)		2016 Construction		2018 Operational (ROAD)		2026 Operational (ROAD)	
						AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
A	Intersection of Road R510 and Road D869 (Brits Road)	North (Road R510)	1100	1	1100	262	251	285	270	357	339	838	849	815	830	743	761
		East (Road D869 (Brits Road))	900	1	900	239	688	244	713	494	900	661	212	656	187	406	0
		South (Road R510)	1100	1	1100	162	364	173	388	215	484	938	736	927	712	885	616
		West (Road D869 (Brits Road))	900	1	900	237	560	235	536	291	671	663	340	665	364	609	229
B	Intersection of Road D869 (Brits Road) and the Proposed Access Road	East (Road D869 (Brits Road))	900	1	900	206	217	214	207	264	255	694	683	686	693	636	645
		South (Proposed Access Road)	Not relevant. Access Road														
		West (Road D869 (Brits Road))	900	1	900	100	163	101	165	128	208	800	737	799	735	772	692
C	Intersection of Road D869 (Brits Road) and Swartklip Road	East (Road D869 (Brits Road))	900	1	900	180	174	189	180	239	228	720	726	711	720	661	672
		South (Swartklip Road)	700	1	700	93	160	91	165	114	210	607	540	609	535	586	490
		West (Road D869 (Brits Road))	900	1	900	58	26	59	23	74	28	842	874	841	877	826	872

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

Sensitive road sections and Intersections related to existing conditions without the proposed development and future conditions with the proposed development 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.

From a traffic engineering point of view no road sections within the vicinity of the proposed development were identified that should be avoided by the proposed development related vehicular traffic. **Figures 2.3** and **2.4** provide a presentation of the sensitive road sections and Intersections indicating existing sensitive areas and Intersections without the proposed development (**Figure 2.3**) and the change in sensitive road sections and Intersections with the proposed development (**Figure 2.4**).

It can be concluded from **Figures 2.5** and **2.6** that the proposed development will have a manageable impact at the proposed access point from Road D869 (Brits Road) (**point B**). The impact at **Point B** will be neutralised due to the implementation of the Recommended Intersection Upgrades.

It is anticipated that the sensitivity for all other road sections and Intersections will not be affected by the proposed development related Vehicular Traffic.

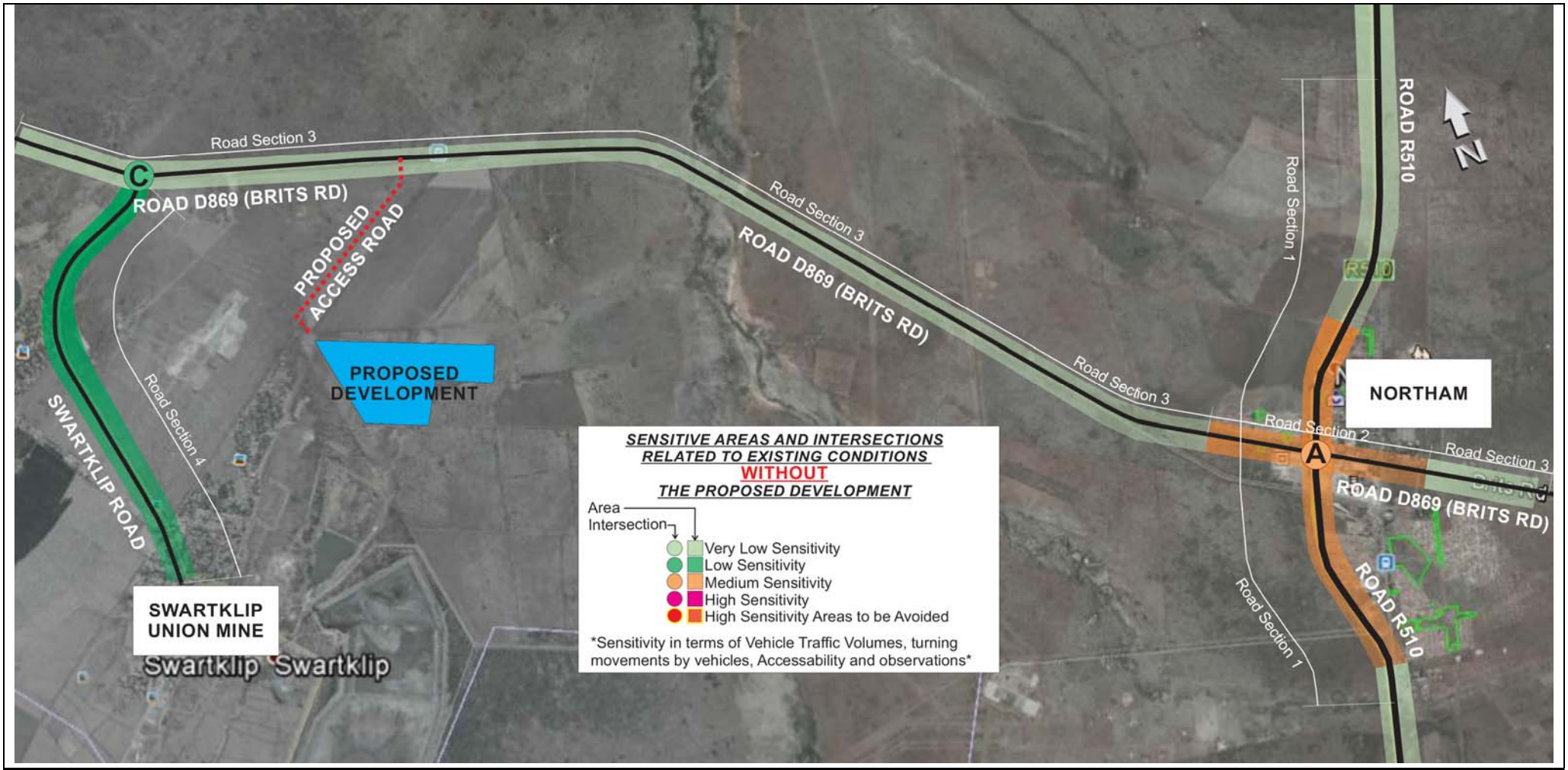


FIGURE 2.3: SENSITIVE ROAD SECTIONS AND INTERSECTIONS RELATED TO EXISTING CONDITIONS WITHOUT THE PROPOSED DEVELOPMENT

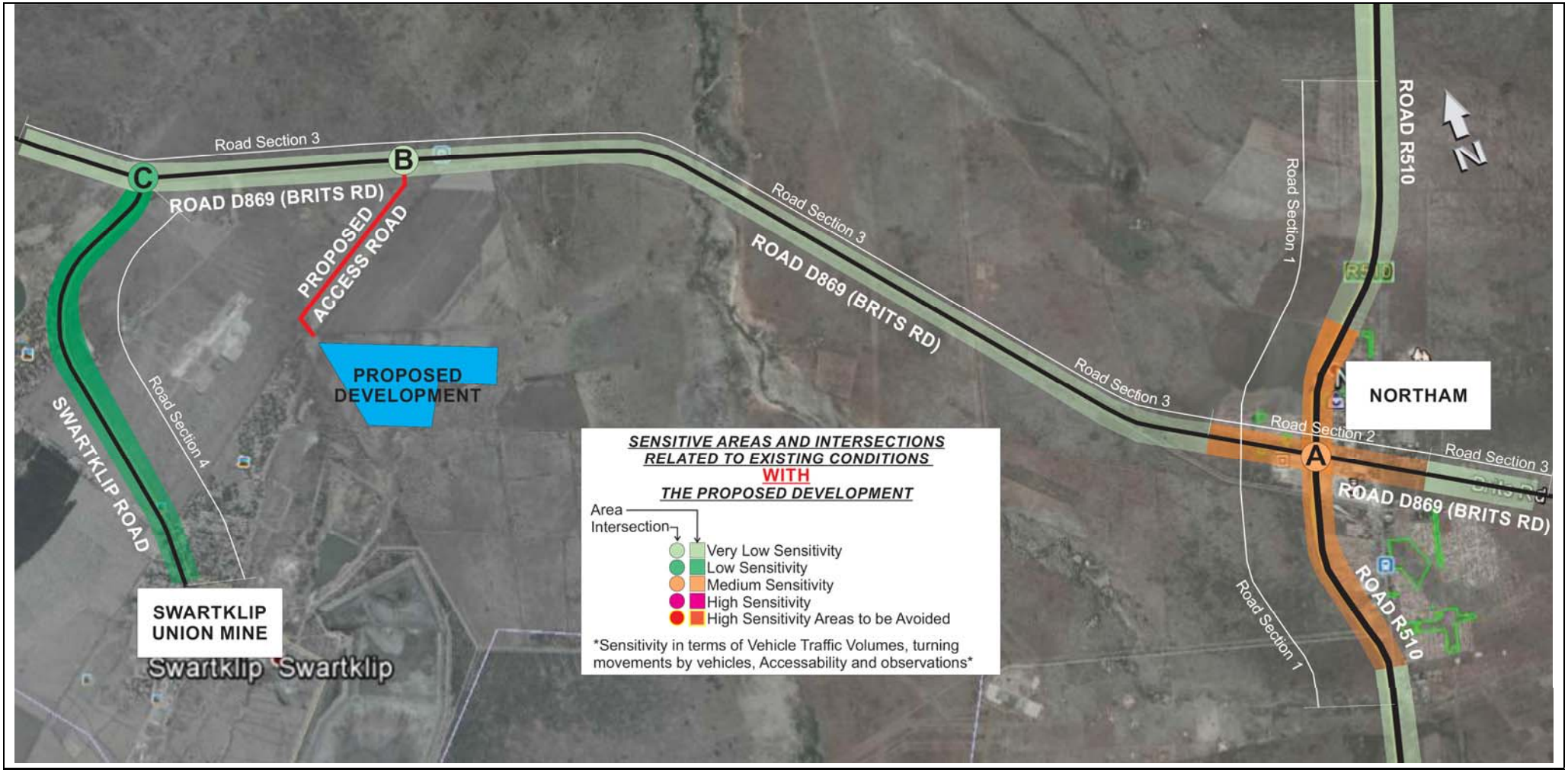


FIGURE 2.4: SENSITIVE ROAD SECTIONS AND INTERSECTIONS RELATED TO EXISTING CONDITIONS WITH THE PROPOSED DEVELOPMENT

2.5 INFORMATION REQUESTED BY RELEVANT ROAD AUTHORITY

As part of the environmental impact assessment process, the Department of Public Works, Roads and Transport was notified of the intention to develop the proposed development and was also invited to all scoping meetings and site visits. Copies of reports will be provided to DPWRT for review.

2.6 CONSULTATION WITH INTERESTED AND AFFECTED PARTIES (IAP)

Table 2.12 provides input related to Interested and affected parties (IAP) with regards to traffic impacts.

TABLE 2.12: COMMENTS BY IAP RELATED TO TRAFFIC IMPACT		
ISSUE RAISED	**BY WHOM AND WHEN**	**RESPONSE GIVEN BY PROJECT TEAM**
The intersection of the proposed access route with the main road from Northam is very dangerous. Cars drive very fast and this leads to a number of accidents which will only get worse if the Siyanda uses this intersection	Comment by Johan Young at focused meeting, on Johan Young's property (Kameelhoek ptn 9), 26 May 2016	The proposed intersection with Road D869 which will provide access to the proposed development will be designed in such a manner to ensure a safe intersection and promote road safety. Refer to **section 3** of this report.
We experienced issues with BCR whereby 28 trucks were queuing behind each other on the main road to gain access to the operation however there was some issues with congestion on the internal BCR roads and these trucks all had to reverse back along the main road, causing major problems	Comment by Marietjie Schoeman at focused meeting, on Johan Young's property (Kameelhoek ptn 9), 26 May 2016	The proposed intersection with Road D869 which will provide access to the proposed development will be designed in such a manner to ensure a safe intersection and promote road safety. The access road would also allow sufficient space for heavy vehicles to queue should an overspill take place. Refer to **section 3** of this report.
There are major safety issues with using this access road. When BCR used this access road their trucks would get stuck on the road on many occasions. The angle of the Transnet crossing is too steep for big trucks and as a result many trucks would get stuck on the tracks which caused major delays in Transnet rail as these trucks could remain on the crossing for two weeks and	Comments by Johan Young at focused meeting, on Johan Young's property (Kameelhoek ptn 9), 26 May 2016	Issue to be addressed as part of the detail design phase. Railway crossings should be constructed according to requirements.
The Northam road cannot take the additional traffic pressure.	Comments by Johan Young at focused meeting, on Johan Young's property (Kameelhoek ptn 9), 26 May 2016	Road capacity will be sufficient with the proposed development as long as mitigation measures are implemented. Refer to **section 3** of this report.

TABLE 2.12: COMMENTS BY IAP		
ISSUE RAISED	**BY WHOM AND WHEN**	**RESPONSE GIVEN BY PROJECT TEAM (as amended/incorporated for the purposes of the scoping report submission)**
Why does Siyanda not use the access road from Sefikile? There is already an existing truck stop, fuel bay, and shops. The capacity of the road is able to withstand the amount of trucks that they will need for their operations and it is also closer to their target employees from the surrounding communities. Using the road near Sefikile as an access road will also be keeping the traffic out of Northam	Comments by Johan Young at focused meeting, on Johan Young's property (Kameelhoek ptn 9), 26 May 2016	At present, three access road alternatives are being considered. All of these access roads originate from Road D869 (Brits Road) (between Northam and Swartklip mine). Siyanda gave preliminary consideration to an access road from the south however this was not explored further as a project alternative since it was deemed to be unviable for various reasons.
What happened to the original proposed route from the south of Union section mine?	Comments by Johan Young at focused meeting, on Johan Young's property (Kameelhoek ptn 9), 26 May 2016	
Please clarify which railway is intended for use as well as details with respect to power lines and designated routes for transportation of material.	Comment raised by Ingrid Morrison, via email, 20 July 2015	Transportation of materials will be via Road D869 (Brits Road) and Road R510.

TABLE 2.12: COMMENTS BY IAP		
ISSUE RAISED	**BY WHOM AND WHEN**	**RESPONSE GIVEN BY PROJECT TEAM (as amended/incorporated for the purposes of the scoping report submission)**
The access road adjacent to our property is registered as 3.5m servitude and not 9m servitude. We have proof of this and we will forward it to you. The only reason why it is currently 9m wide is because we had a service agreement with BCR mining who previously used this access road to get to their operation behind our property. They would compensate us for using the access road provided that we moved our fences back in order for the road to be wide enough for their trucks to turn etc. We are in the process of moving our fence back to the original position which would make the road 3.5m again.	Comment by Johan Young at focused meeting, on Johan Young's property (Kameelhoek ptn 9), 26 May 2016	PlanWize Town and Regional Planners have information which indicates that the registered servitude width is in fact 15.74 m wide. PlanWize will contact JH to confirm a mutual understanding (based on legal servitude registration documentation) of the servitude width.
This access route cannot be on the table for Siyanda due to the registered servitude width of 3.5m and our plans to move our fences back to the original position. The purpose of this road is for private access to our farms and this is what it's registered for.		

2.7 OTHER TRAFFIC-RELATED ISSUES

Table 2.13 provides a summary of the following:

a) Intersections Excluded from Investigations;
b) Access-related issues in terms of access to the proposed development which include:

    i) Sight distances;
    ii) Intersection spacing; and
    iii) Access to proposed development;

c) Road safety;
d) Non-motorised transport; and
e) Public transport.

TABLE 2.13: SUMMARY OF OTHER TRAFFIC-RELATED ISSUES				
Item	**Description of Element**	**General Comments**	**Specific Issues**	**Actions Required**
1.	**INTERSECTIONS EXCLUDED FROM INVESTIGATIONS**			
1.1	Intersection providing Access to Residential Area approximately 600m West of **Point A**	a) Intersection was excluded from investigations. An insignificant number of light vehicles are expected to enter the Residential area from the Proposed Development and the relevant intersection has Road Safety Measures in place.	a) None.	a) None.
1.2	Intersection providing Access to existing Shopping Centre West of **Point A**	a) Intersection was excluded from investigations. This was due to focus being placed on intersections where heavy vehicles are expected to make turning movements.	a) None.	a) None.
2.	**ACCESS RELATED ISSUES (POINT B)**			
2.1	**Sight distances**	a) Sight distances at the proposed intersection of Road D869 (Brits Road) and the Proposed Access Road (**Point B**) were assessed visually and were deemed acceptable.	a) It is a general occurrence for vehicles to maintain higher speeds at free-flow intersections.	a) At the time of conducting a site visit, there was no speed limit stated along the section of Road D869 (Brits Road). It is recommended that a speed reduction should be presented to the relevant road authority to reduce the speed limit to 60 km/h.
2.2	**Intersection spacing**	a) All other points are existing operational intersections and the intersection spacing's at the proposed location of the proposed Intersection **Point B** were deemed acceptable.	a) None	a) None
2.3	**Recommended intersection improvements in terms of Road Safety**	a) Improvements are recommended to ensure that the intersection operates in a safe and effective manner at all times.	a) Vehicles turning left from Road D869 (Brits Road) into the Proposed Development Access Road. b) Vehicles turning right out of the Proposed Development Access Road into Road D869 (Brits Road) with the need to join the main traffic flow. c) Vehicles turning right from Road D869 (Brits Road)) into the Proposed Development Access Road.	a) Provide a dedicated left-turn deceleration lane on Road D869 (Brits Road) (Eastern approach). b) Provide an acceleration lane towards the East on Road D869 (Brits Road). c) Provide a dedicated right-turn lane on Road D869 (Brits Road) (Western Approach). Refer to **Figure 3.3** for more detail concerning recommended geometric layout of **Point B.**
2.4	**Proposed Development Access Road Railway Line Crossing**	a) The proposed mine access road would require crossing the existing railway line. Refer to **Figure 1.1.**	a) A road level railway crossing could be a potential risk to road users and pedestrians.	a) Proper information signs should be provided at the proposed railway crossing. b) Road safety training is recommended for workers of the Proposed Development. d) Further collaboration would be required with the relevant railway authority in terms of the proposed road level crossing.

TABLE 2.13: SUMMARY OF OTHER TRAFFIC-RELATED ISSUES				
Item	**Description of Element**	**General Comments**	**Specific Issues**	**Actions Required**
3.	**ROAD SAFETY ISSUES**			
3.1	**General road safety**	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: 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.	a) Lack of reflective road studs at strategic points; b) Road markings are fading / lack thereof; and c) Lack of relevant road traffic signs.	In general the report was compiled so as to address the road safety issues as far as practically possible. a) Refer to **Tables 3.1, 3.2 and 3.3 as well as Figures 3.2, 3.3 and 3.4** for the required and recommended intersection improvements b) Collaborate with relevant road authority to set up a road maintenance plan to maintain the relevant road network on which heavy vehicle movement is anticipated; c) Provide proper reflective road studs at strategic points (LED if possible) to ensure the safe operation of the relevant intersections under investigation at night time at strategic points; d) Provide required road traffic signs for the relevant intersections; e) Provide relevant road markings at relevant intersections under investigation (highway paint recommended); f) Provide mine and contractor workers with training on road safety; and g) Road safety awareness campaigns should be run at the mine.
4.	**NON-MOTORISED TRANSPORT**			
4.1	**Non-motorised transport**	a) There is currently no non-motorised transport movement in the vicinity of the Proposed Development Access Road (**Point B**).	a) Workers and visitors could be expected to be loaded and off-loaded at the relevant intersection proposed to provide access to the Proposed Development; b) No pedestrian crossings or road warning signs informing motorists of the potential occurrence of pedestrians are currently provided along the relevant section of Road D869 (Brits Road).	a) Pedestrian crossings should be provided at **Point B** (Road markings and signs); b) Road traffic warning signs should be provided to warn motorists of the possibility of pedestrians; c) Reflective clothing can be provided to workers; and d) Strategic walkways should be provided.

TABLE 2.13: SUMMARY OF OTHER TRAFFIC RELATED ISSUES (Continued)				
Item	**Description of Element**	**General Comments**	**Specific Issues**	**Actions Required**
5.	**PUBLIC TRANSPORT**			
5.1	**Public Transport**	a) Three types of public transport commuters are relevant: i) Firstly, workers who will travel to and from the Proposed Development during all phases; ii) Secondly, visitors to the Proposed Development during all phases; and iii) Thirdly, residents of nearby villages. b) No loading and off-loading facilities are currently provided along Road D869 (Brits Road).	a) It is anticipated that the majority of workers will be transported via taxi and bus to and from the Proposed Development; and b) Visitors and workers could possibly be loaded and off-loaded along Road D869 (Brits Road) near **Point B**.	a) It is recommended that a dedicated loading and off-loading area should be provided for public transport close to the operational area of the Proposed Development where workers can be loaded and off-loaded in a safe environment as part of the all phases; and b) Loading and off-loading bays should be provided as close as possible to **Point B** along Road D869 (Brits Road) where workers and visitors can be loaded and off-loaded should public transport not enter the Proposed Development Access Road.

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 Impact Assessment guideline documents, the following findings and recommendations were made:

3.1 FINDINGS

The following are discussed in terms of the findings:

a) Traffic impact during the respective phases;
b) Traffic impact for the relevant project alternatives; and
c) Site accessibility.

3.1.1 TRAFFIC IMPACT DURING THE RESPECTIVE PHASES

The capacity calculations for the traffic impact assessment were conducted for the years 2016, 2018 and 2026 respectively. The last mentioned time frame is in line with traffic engineering guidelines and practice and determined by the expected number of vehicle trips that could potentially be generated during any specific peak hour by a specific development. However, the expected lifespan of the proposed development will be at least until the year 2048. It is therefore required that the proposed development should evaluate the relevant intersections and road sections on a regular basis as part of the risk and safety management process.

Furthermore, owing to the type and nature of the proposed activities, it is expected that the proposed activities will have a manageable impact on traffic during the construction, operational, decommissioning and closure phases, provided that road infrastructure improvements are implemented as indicated in **Tables 3.1, 3.2** and **3.3** as well as **Figures 3.1, 3.2** and **3.3** to mitigate the impact of the proposed land development area.

Table E-1 of **Appendix E** provides a summary of the impact ratings for the construction, operational, decommissioning and closure phases respectively before and after mitigating measures implemented. **Table E-1** of **Appendix E** was derived from **Table F-1 of Appendix F** of the report that provides the criteria used in terms of the assessments process. Based on **Table E-1** of **Appendix E** it is possible to note that the construction and operational Phases have the highest impact and therefore the decommissioning and closure phases were not assessed in detail as part of the study given that the latter mentioned phases are expected to have a lower impact than the construction and operational phases.

3.1.2 TRAFFIC IMPACT FOR THE RELEVANT PROJECT ALTERNATIVES

Two alternatives were investigated as part of this report in terms of the transportation of incoming ore and export product to and from the proposed development, namely:

a) **Alternative 1**: Transport via road only; and
b) **Alternative 2**: Transport via rail.

The following could be concluded from the relevant investigations as part of the traffic impact assessment:

a) That the potential vehicle trips to be generated by the proposed development will be higher for **alternative 1** when only road transport will be utilised (approximately 74 vehicle trips during the relevant traffic peak periods) than for **alternative 2** when utilising rail transport (approximately 31 vehicle trips during the relevant traffic peak periods).
b) That it could be concluded from the relevant calculations and intersection performance evaluations that the following is recommended in terms of road safety and functionality and would be applicable to **alternatives 1** and **2**:
    - The recommended intersection geometric upgrading;
    - The proposed geometric layout of the proposed intersection of Road D869 (Brits Road) and the Proposed Access Road (**Point B**);
    - The recommended provision and maintenance of road markings; and
    - Reflective road studs, road traffic signs and overhead lighting.

3.1.3 SITE ACCESSIBILITY

Vehicle access to and from the proposed development will be via an access road which will be constructed specifically for the purposes of the project. This access road will link Road D869 (Brits Road) to the smelter infrastructure area just to the south of Road D869. At the time of compiling this report, the exact location of the proposed access road from Road D869 was not fixed with several options being investigated. **Figure 1.2** provides a graphical presentation of the options for access to the proposed development of which **option 2** was the preferred option.

The proposed intersection of Road D869 (Brits Road) and the Proposed Access Road will need to have the necessary intersection sight distances which should be determined as part of the detail design phase once the final position is determined. Further collaboration with the Roads Agency Limpopo would be required as part of the detailed design phase in terms of the exact location and geometric layout of the proposed intersection. Refer to **Figure 3.1** and **Tables 3.2** and **3.3** for the recommended geometric layout of the proposed intersection.

3.2 RECOMMENDATIONS

The following are discussed in terms of the recommendations:

a) Summary of Intersections that require improvements with and without the proposed development;
b) Need for improvements without the proposed development (baseline mitigation measures); and
c) Need for improvements with the proposed development (development mitigation measures);
d) Institutional arrangements; and
e) Reasoned opinion for authorisation.

3.2.1 SUMMARY OF REQUIRED INTERSECTION IMPROVEMENTS WITH AND WITHOUT THE PROPOSED DEVELOPEMNT

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

TABLE 3.1: SUMMARY OF INTERSECTION IMPROVEMENTS REQUIRED IN TERMS OF ROAD / EARTH WORKS

Point	Intersection Description	**Without** proposed development		**With** proposed development	
		Intersection Performance Perspective	Road Safety Perspective	Intersection Performance Perspective	Road Safety Perspective
A	Road R510 and Road D869 (Brits Road)	Yes	No	No additional improvements required due to proposed development provided that improvements required without proposed development are Implemented	
B	Road D869 (Brits Road) and Proposed Access Road	No improvements required as intersection does not exist without the proposed development		No	Yes
C	Road D869 (Brits Road) and Swartklip Road	No	Yes	No additional improvements required due to proposed development provided that improvements required without proposed development are Implemented	

3.2.2 DETAILED SUMMARY OF NEED FOR IMPROVEMENTS WITHOUT AND WITH THE PROPOSED DEVELOPMENT

The following Figures and Tables provide information on the required intersection improvements without and with the proposed development:

a) **Figure 3.1**: Graphical presentation of the required intersection improvements **WITHOUT** the proposed development;
b) **Figure 3.2**: Graphical presentation of the required intersection improvements **WITH** the proposed development;
c) **Table 3.2**: Intersection improvements required **WITHOUT** the proposed development; and
d) **Table 3.3**: Intersection improvements required **WITH** the proposed development.

The expected lifespan of the proposed development will be at least until the year 2048. It is therefore required that the proposed development should evaluate the relevant intersections and road sections on a regular basis as part of a risk and safety management process.

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 pavement design specialist input.

Figure 3.3 provide a detailed geometric layout of the proposed upgrading for **Point B** that is related to the proposed development.

<u>The following is also relevant:</u>

a) In terms of workers and visitors, a dedicated loading and off-loading area needs to be provided on the property of the proposed development where workers and visitors can be loaded and off-loaded in a safe environment;
b) Public transport loading and off-loading bays should be provided as close as possible to **Point B** along Road D869 (Brits Road) to ensure a safe environment where workers can be loaded and off-loaded;
c) Pedestrian walkways should be provided at **Point B** to ensure a split between vehicle traffic and pedestrians moving around the proposed intersection; and
d) Road markings, reflective road studs (LED), road signs, overhead lights and proper pedestrian crossings should be provided and maintained at the proposed access intersection (**Points B**) to ensure visibility during night time, proper visibility of intersection lane geometry and sufficient information to road users.

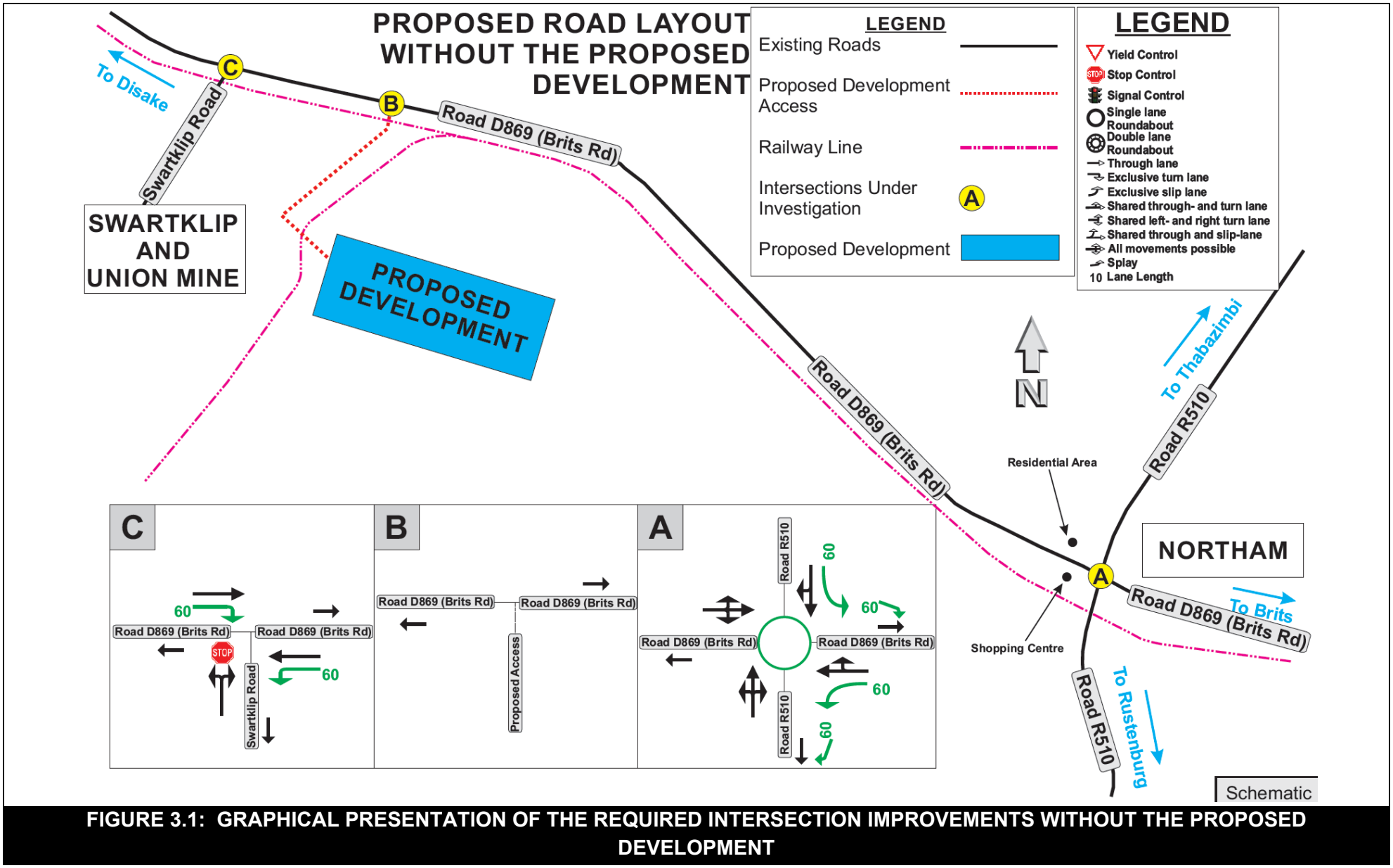


FIGURE 3.1: GRAPHICAL PRESENTATION OF THE REQUIRED INTERSECTION IMPROVEMENTS WITHOUT THE PROPOSED DEVELOPMENT

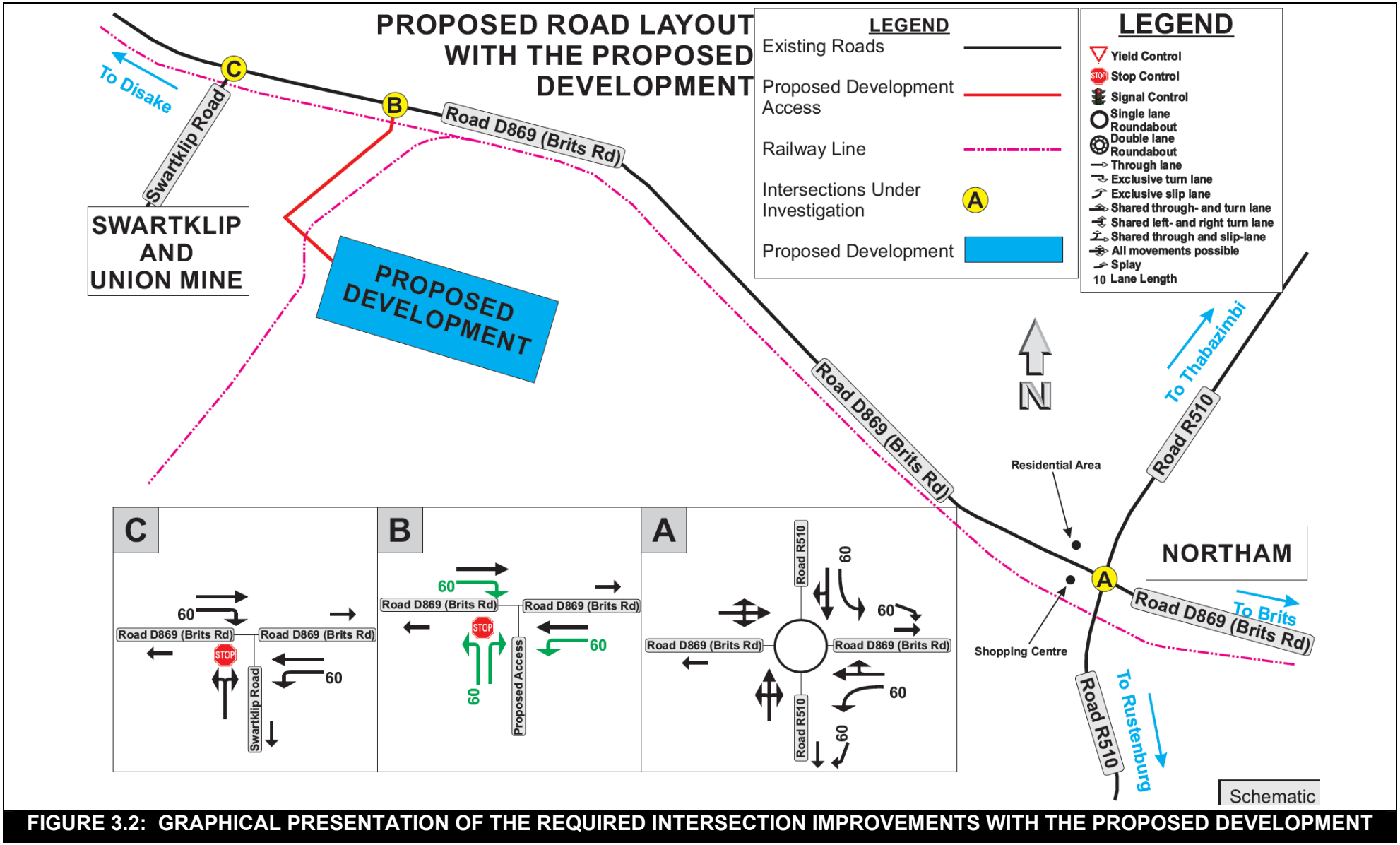


FIGURE 3.2: GRAPHICAL PRESENTATION OF THE REQUIRED INTERSECTION IMPROVEMENTS WITH THE PROPOSED DEVELOPMENT

TABLE 3.2: RECOMMENDED ROAD NETWORK IMPROVEMENTS WITHOUT THE PROPOSED DEVELOPMENT

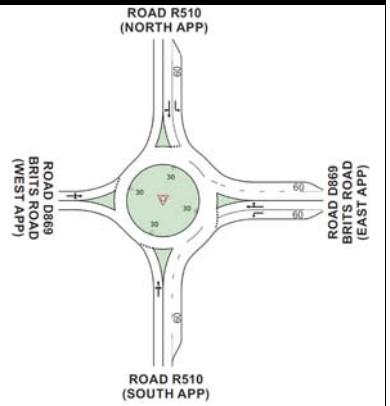
POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED																GEOMETRY DETERMINED BY MEANS OF SIDRA
			Approach Traffic Control				Extra Lanes Required (m)						Improvements required from a Road Safety or intersection performance Perspective	Reflective Road Studs required at Intersection	Road Markings Required	Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways	
			Free-Flow	Stop	40m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane	Number of Extra Through Lanes							
A	Road R510 and Road D869 (Brits Road)	*North (Road R510)*	-	-	Yes	-	-	Yes, 60m slip lane	-	-	-	-	Performance	Yes	Yes	Yes	-	Yes	
		East (Road D869 (Brits Road))	-	-	Yes	-	-	Yes, 60m slip lane	Yes, 60m	-	-	-	Performance		Yes	Yes	-	Yes	
		South (Road R510)	-	-	Yes	-	-	-	Yes, 60m	-	-	-	Performance		Yes	Yes	-	Yes	
		West (Road D869 (Brits Road))	-	-	Yes	-	-	-	-	-	-	-	Performance		Yes	Yes	-	Yes	
B	Road D869 (Brits Road) and the Proposed Access Road	*East (Road D869 (Brits Road))*	**Proposed Intersection as part of proposed development**																
		South (Proposed Access Road)																	
		West (Road D869 (Brits Road))																	
C	Road D869 (Brits Road) and Swartklip Road	*East (Road D869 (Brits Road))*	Yes	-	-	-	Yes, 60m	-	-	-	-	-	Safety	Yes	Yes	Yes	-	-	
		South (Swartklip Rd)	-	Yes	-	-	-	-	-	-	-	-	Safety		Yes	Yes	-	-	
		West (Road D869 (Brits Road))	Yes	-	-	-	-	-	-	-	Yes, 60m	-	Safety		Yes	Yes	-	-	

TABLE 3.3: RECOMMENDED ROAD NETWORK IMPROVEMENTS WITH THE PROPOSED DEVELOPMENT																			
POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED																GEOMETRY DETERMINED BY MEANS OF SIDRA
			Approach Traffic Control				Extra Lanes Required (m)												
			Free-Flow	Stop	40m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane	Number of Extra Through Lanes	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	
A	Road R510 and Road D869 (Brits Road)	*North (Road R510)*	**No additional improvements required provided that improvements required without proposed development are Implemented**																
		East (Road D869 (Brits Road))																	
		South (Road R510)																	
		West (Road D869 (Brits Road))																	
B	Road D869 (Brits Road) and the Proposed Access Road	*East (Road D869 (Brits Road))*	Yes	-	-	-	-	Yes, 60m	-	-	-	-	Safety and Performance	Yes	Yes	Yes	Yes	Yes	
		South (Proposed Access Road)	-	Yes	-	-	Yes, 60m	-	-	-	-	-	Safety and Performance		Yes	Yes	-	Yes	
		West (Road D869 (Brits Road))	Yes	-	-	-	-	-	-	-	Yes, 60m	-	Safety and Performance		Yes	Yes	Yes	Yes	
C	Road D869 (Brits Road) and Swartklip Road	*East (Road D869 (Brits Road))*	**No additional improvements required provided that improvements required without proposed development are Implemented**																
		South (Swartklip Rd)																	
		West (Road D869 (Brits Road))																	

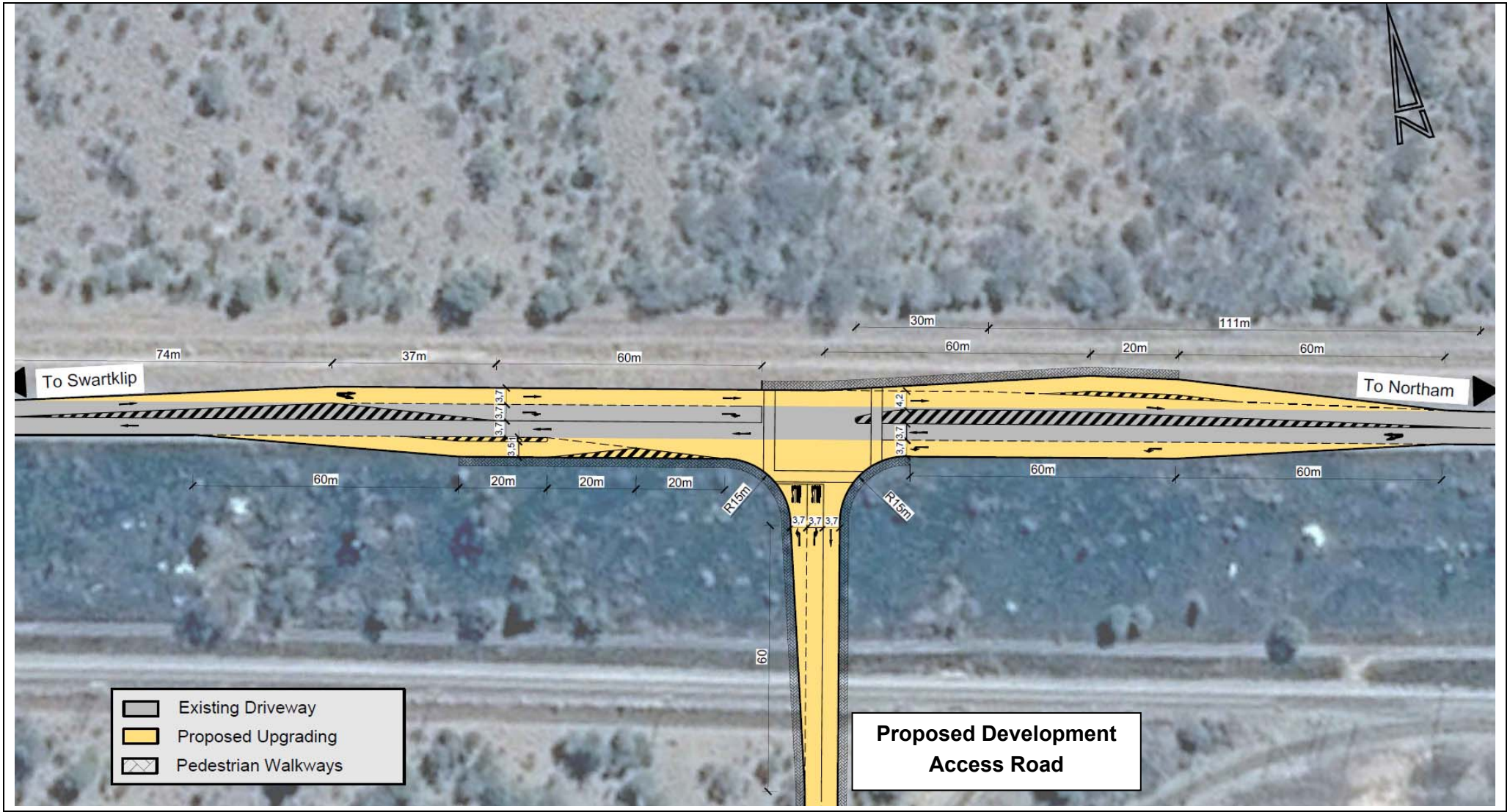


FIGURE 3.3: DETAILED GEOMETRIC LAYOUT OF THE PROPOSED UPGRADING FOR POINT B

3.2.3 INSTITUTIONAL ARRANGEMENTS

The following recommendations are made in terms of the detailed design phase of roads for the proposed project:

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

3.2.4 REASONED OPINION FOR AUTHORISATION

In conclusion of the findings as part of the investigations, Siyazi Limpopo (Pty) Ltd is of the opinion that the proposed development would have a manageable impact on the relevant roads network as long as the mitigating measures are implemented as recommended as part of **section 3** of this report and should thus be granted authorisation.

It is also recommended that the South African National Roads Agency Limited (SANRAL) and the Roads Agency Limpopo (RAL) should approve the TIA based on the recommendations of this report.

APPENDIX A

INFORMATION RELATED TO STATUS QUO

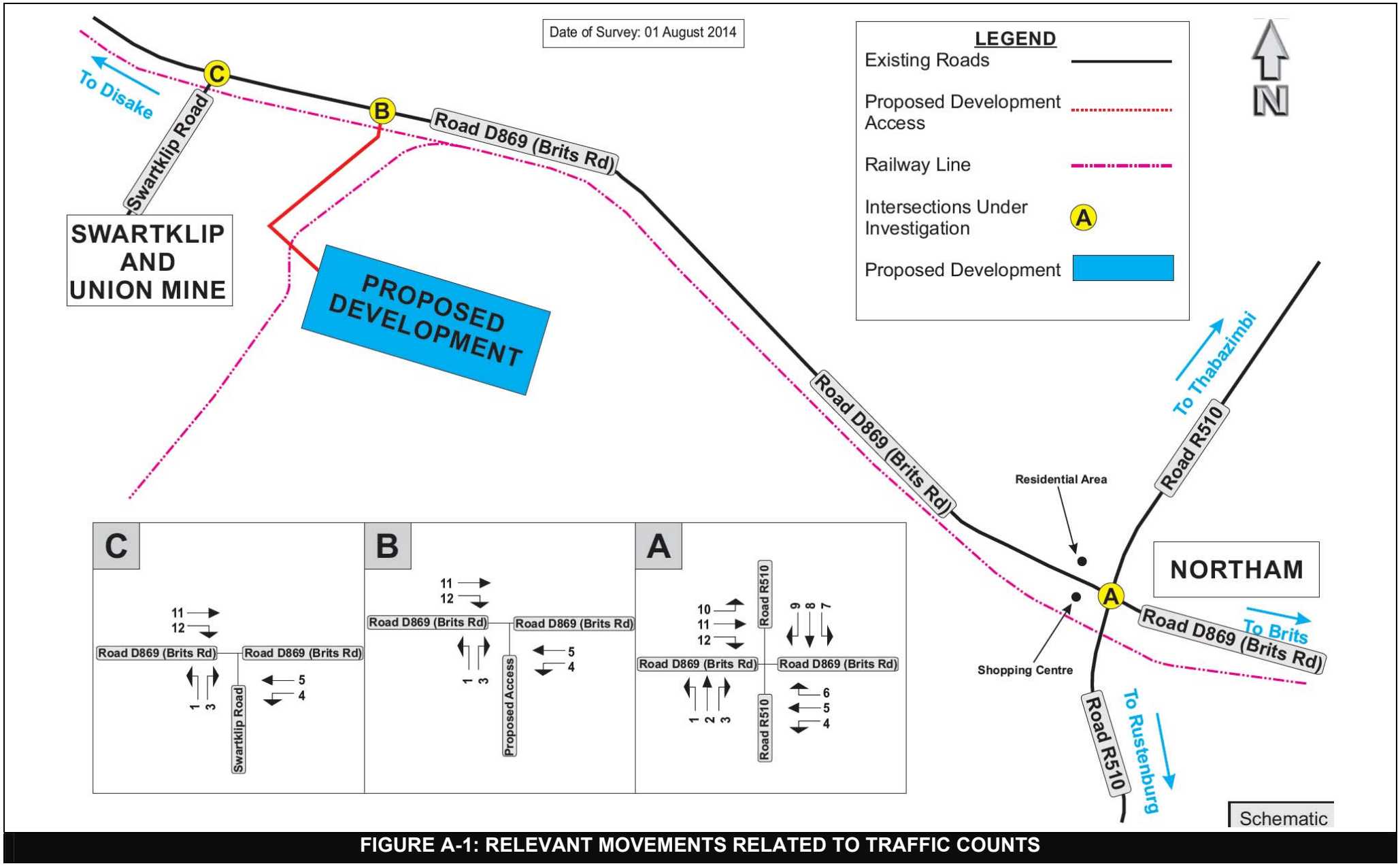


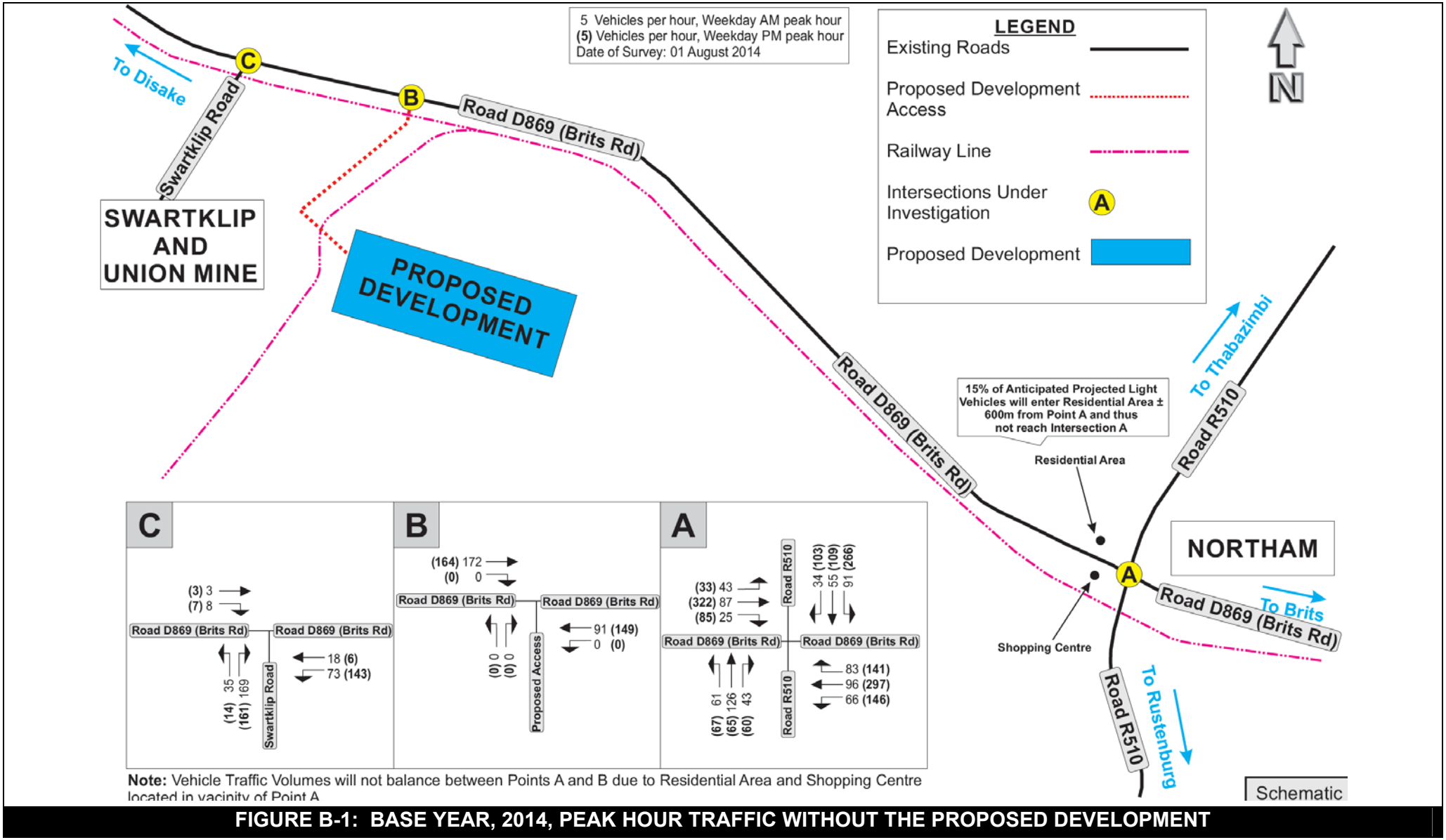
FIGURE A-1: RELEVANT MOVEMENTS RELATED TO TRAFFIC COUNTS

TABLE A-1: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF ROAD R510 AND ROAD D869 (ROAD D869 (BRITS ROAD)), POINT A (01st OF AUGUST 2014)													
TIME INTERVALS	MOVEMENTS												
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
06:00-07:00	51	112	29	51	84	93	69	54	32	45	63	18	**701**
06:15-07:15	61	126	43	66	96	83	91	55	34	43	87	25	**810**
06:30-07:30	65	103	49	78	102	82	95	53	34	35	100	26	**822**
06:45-07:45	76	92	63	74	120	93	112	55	43	21	110	24	**883**
07:00-08:00	74	77	77	79	113	85	110	55	39	23	142	33	**907**
07:15-08:15	60	58	66	68	116	82	103	64	42	27	129	27	**842**
07:30-08:30	64	64	66	54	87	74	98	63	44	26	141	26	**807**
07:45-08:45	56	63	67	41	94	57	73	56	41	30	149	27	**754**
08:00-09:00	62	61	57	34	123	61	67	49	49	27	150	27	**767**
08:15-09:15	63	58	62	43	104	63	65	51	54	30	182	33	**808**
08:30-09:30	66	60	57	49	125	56	74	49	58	35	183	26	**838**
08:45-09:45	62	50	53	49	122	57	81	52	62	43	201	33	**865**
09:00-10:00	58	45	56	57	137	59	81	56	52	45	192	34	**872**
09:15-10:15	68	50	57	53	152	54	90	44	47	42	183	34	**874**
09:30-10:30	77	41	54	51	153	60	93	42	54	42	200	46	**913**
09:45-10:45	80	38	47	95	228	73	100	53	58	33	209	36	**1050**
10:00-11:00	91	37	52	172	261	151	98	51	59	38	228	25	**1263**
10:15-11:15	87	44	52	176	270	169	103	62	61	39	237	31	**1331**
10:30-11:30	75	42	52	221	326	183	124	58	68	38	239	31	**1457**
10:45-11:45	79	45	52	266	284	206	104	45	55	38	237	33	**1444**
11:00-12:00	61	55	43	241	229	187	110	47	53	37	239	47	**1349**
11:15-12:15	65	50	44	248	238	202	108	47	54	38	240	52	**1386**
11:30-12:30	75	63	55	280	230	251	97	50	47	33	238	51	**1470**
11:45-12:45	69	70	59	219	246	229	126	64	67	36	233	53	**1471**
12:00-13:00	86	63	61	177	258	185	137	70	91	37	236	47	**1448**
12:15-13:15	81	65	67	186	249	168	153	75	94	44	237	42	**1461**
12:30-13:30	95	65	84	120	203	101	164	82	98	55	249	54	**1370**
12:45-13:45	88	53	78	140	174	108	164	71	89	54	266	58	**1343**
13:00-14:00	81	54	80	226	289	143	180	79	80	47	263	65	**1587**
13:15-14:15	78	48	72	205	278	134	174	78	93	37	273	70	**1540**
13:30-14:30	53	45	52	207	290	136	230	102	104	36	275	69	**1599**
13:45-14:45	58	56	69	181	264	114	241	99	109	41	276	77	**1585**
14:00-15:00	52	64	72	80	161	55	261	97	129	43	289	69	**1372**
14:15-15:15	54	72	82	99	183	63	292	100	126	46	300	66	**1483**
14:30-15:30	61	69	77	100	198	69	272	95	131	35	310	67	**1484**
14:45-15:45	63	77	66	118	255	103	280	108	125	29	329	69	**1622**
15:00-16:00	67	65	60	146	297	141	266	109	103	33	322	85	**1694**
15:15-16:15	64	69	54	145	295	143	241	102	105	26	318	82	**1644**
15:30-16:30	57	78	72	152	301	152	209	96	87	37	313	84	**1638**
15:45-16:45	57	62	80	118	268	121	201	86	89	38	279	79	**1478**
16:00-17:00	62	70	86	107	237	86	175	73	76	40	317	65	**1394**
16:15-17:15	70	68	87	100	244	81	159	65	58	52	318	69	**1371**
16:30-17:30	77	69	77	120	299	101	133	42	44	49	322	59	**1392**
16:45-17:45	82	74	76	149	314	145	118	48	39	52	327	67	**1491**
17:00-18:00	85	64	65	195	324	195	117	63	41	53	287	71	**1560**

TABLE A-2: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF BRITS AND SWARTKLIP ROADS, POINT C (01st OF AUGUST 2014)							
TIME INTERVALS	MOVEMENTS						
	1	3	4	5	11	12	TOTAL
06:00-07:00	55	179	82	22	3	17	358
06:15-07:15	35	169	73	18	3	8	306
06:30-07:30	27	143	75	15	3	9	272
06:45-07:45	12	105	81	8	2	6	214
07:00-08:00	7	65	76	3	1	4	156
07:15-08:15	7	67	79	1	1	3	158
07:30-08:30	5	58	66	1	2	2	134
07:45-08:45	4	51	52	0	1	0	108
08:00-09:00	4	61	50	1	1	1	118
08:15-09:15	5	53	67	1	1	1	128
08:30-09:30	9	72	101	1	0	1	184
08:45-09:45	11	77	102	3	2	1	196
09:00-10:00	11	91	145	2	2	0	251
09:15-10:15	13	98	155	2	2	9	279
09:30-10:30	14	86	146	5	2	11	264
09:45-10:45	18	84	158	3	3	15	281
10:00-11:00	21	67	129	3	4	18	242
10:15-11:15	20	57	117	3	4	10	211
10:30-11:30	15	65	108	0	6	8	202
10:45-11:45	13	64	111	1	3	4	196
11:00-12:00	15	58	105	1	2	5	186
11:15-12:15	16	56	100	1	3	12	188
11:30-12:30	16	55	105	3	1	12	192
11:45-12:45	15	58	107	2	1	15	198
12:00-13:00	8	65	111	2	2	11	199
12:15-13:15	6	83	109	2	1	4	205
12:30-13:30	10	85	104	0	1	6	206
12:45-13:45	8	96	89	1	3	3	200
13:00-14:00	8	98	84	1	2	3	196
13:15-14:15	13	113	85	1	2	7	221
13:30-14:30	9	122	78	3	2	5	219
13:45-14:45	12	130	74	3	0	7	226
14:00-15:00	13	144	73	4	1	7	242
14:15-15:15	10	153	89	5	3	6	266
14:30-15:30	11	161	100	3	3	7	285
14:45-15:45	13	166	129	5	4	5	322
15:00-16:00	14	161	143	6	3	7	334
15:15-16:15	14	136	128	8	1	3	290
15:30-16:30	20	112	125	12	1	3	273
15:45-16:45	16	92	103	15	1	3	230
16:00-17:00	17	84	98	18	1	1	219
16:15-17:15	14	80	107	22	1	2	226
16:30-17:30	11	87	113	27	3	2	243
16:45-17:45	13	83	137	26	2	3	264
17:00-18:00	11	89	134	25	2	3	264

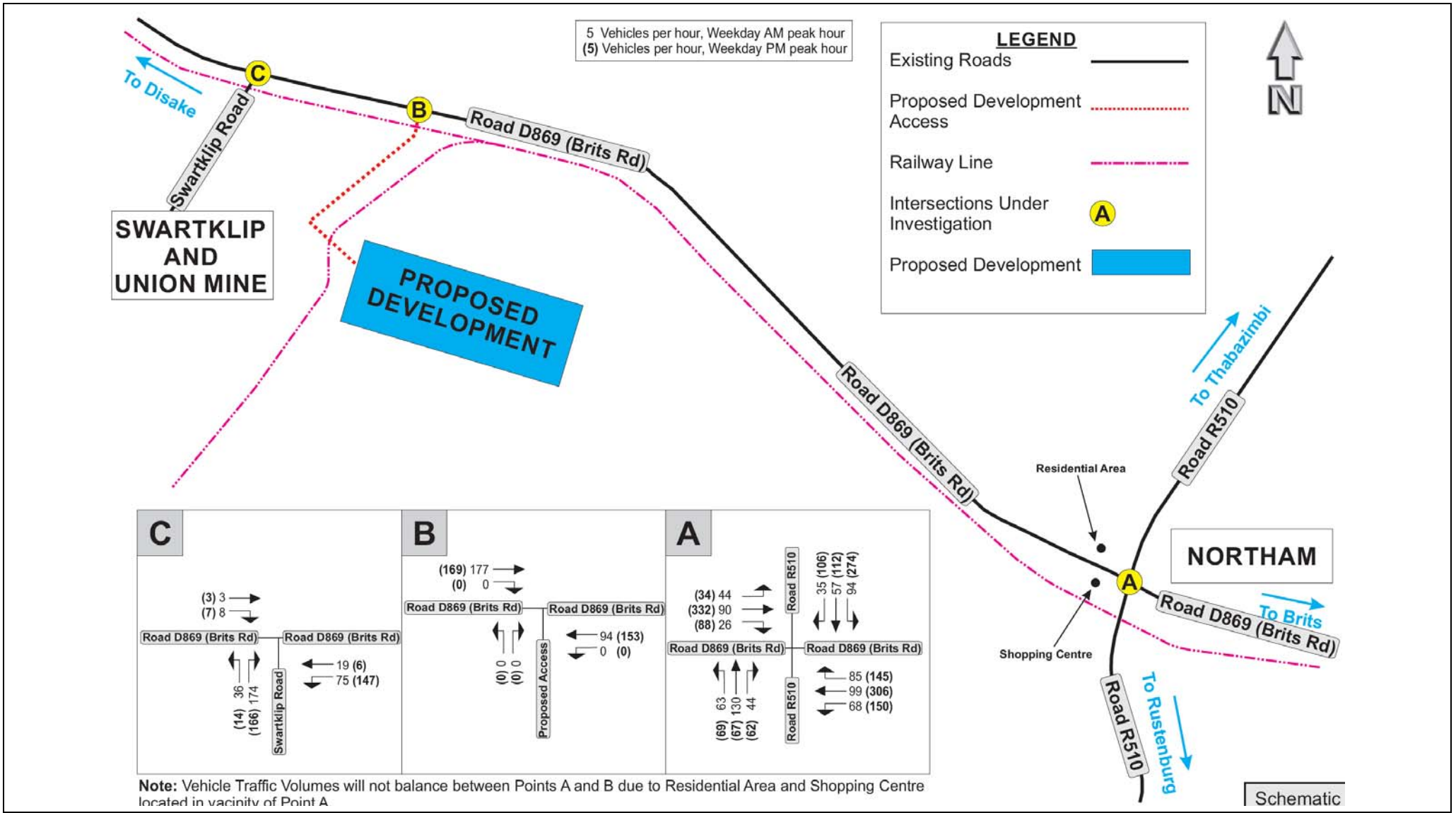
APPENDIX B

TRIP INFORMATION RELATED TO THE PROPOSED DEVELOPMENT



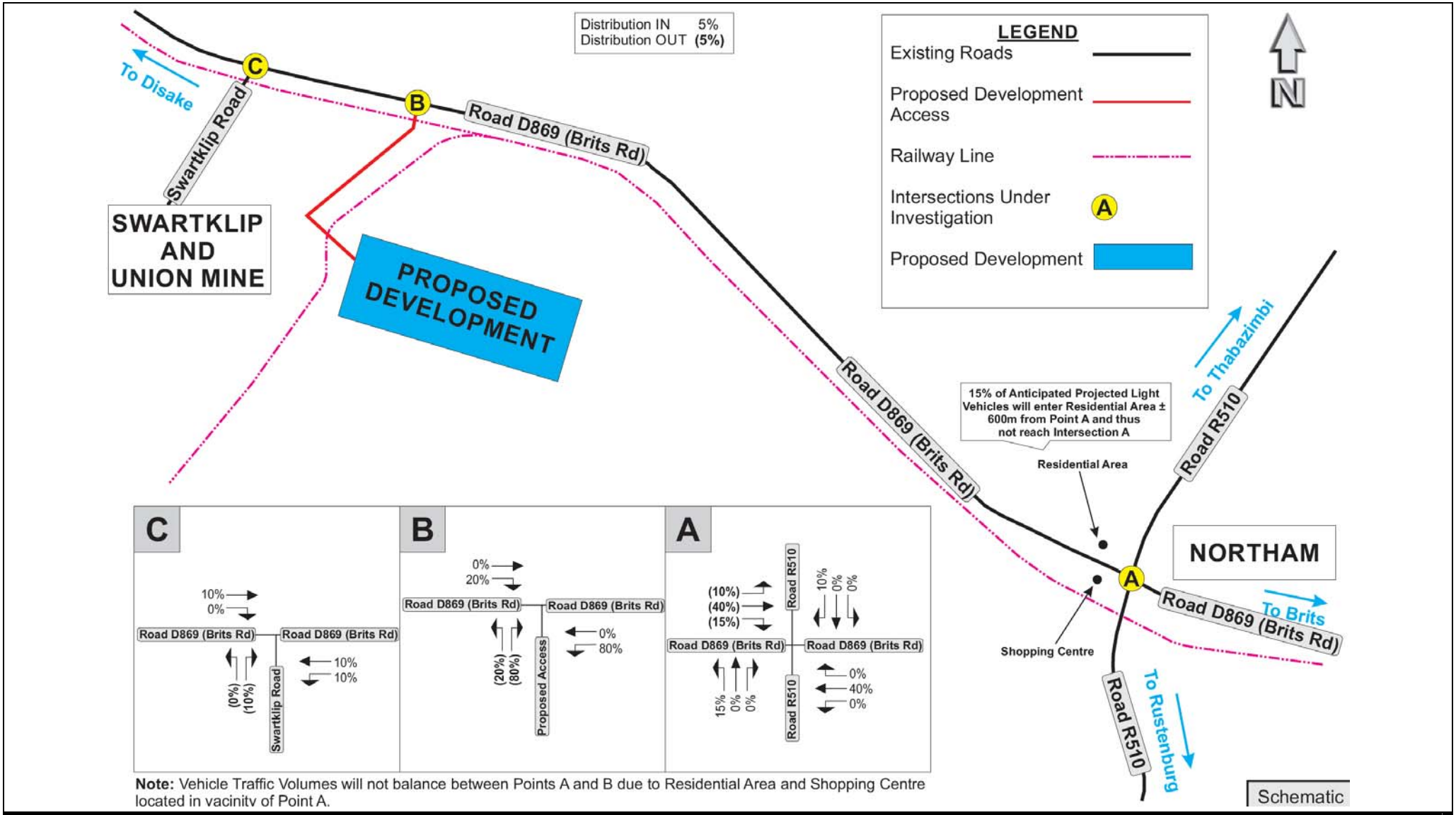
Note: Vehicle Traffic Volumes will not balance between Points A and B due to Residential Area and Shopping Centre located in vacinity of Point A

FIGURE B-1: BASE YEAR, 2014, PEAK HOUR TRAFFIC WITHOUT THE PROPOSED DEVELOPMENT



Note: Vehicle Traffic Volumes will not balance between Points A and B due to Residential Area and Shopping Centre located in vacinity of Point A

FIGURE B-2: PROJECTED 2016 PEAK HOUR TRAFFIC WITHOUT THE PROPOSED DEVELOPMENT (SCENARIO 1)



Note: Vehicle Traffic Volumes will not balance between Points A and B due to Residential Area and Shopping Centre located in vacinity of Point A.

FIGURE B-3: PROJECTED VEHICLE TRIP DISTRIBUTION FOR THE PROPOSED DEVELOPMENT (LIGHT VEHICLES, CONSTRUCTION PHASE)

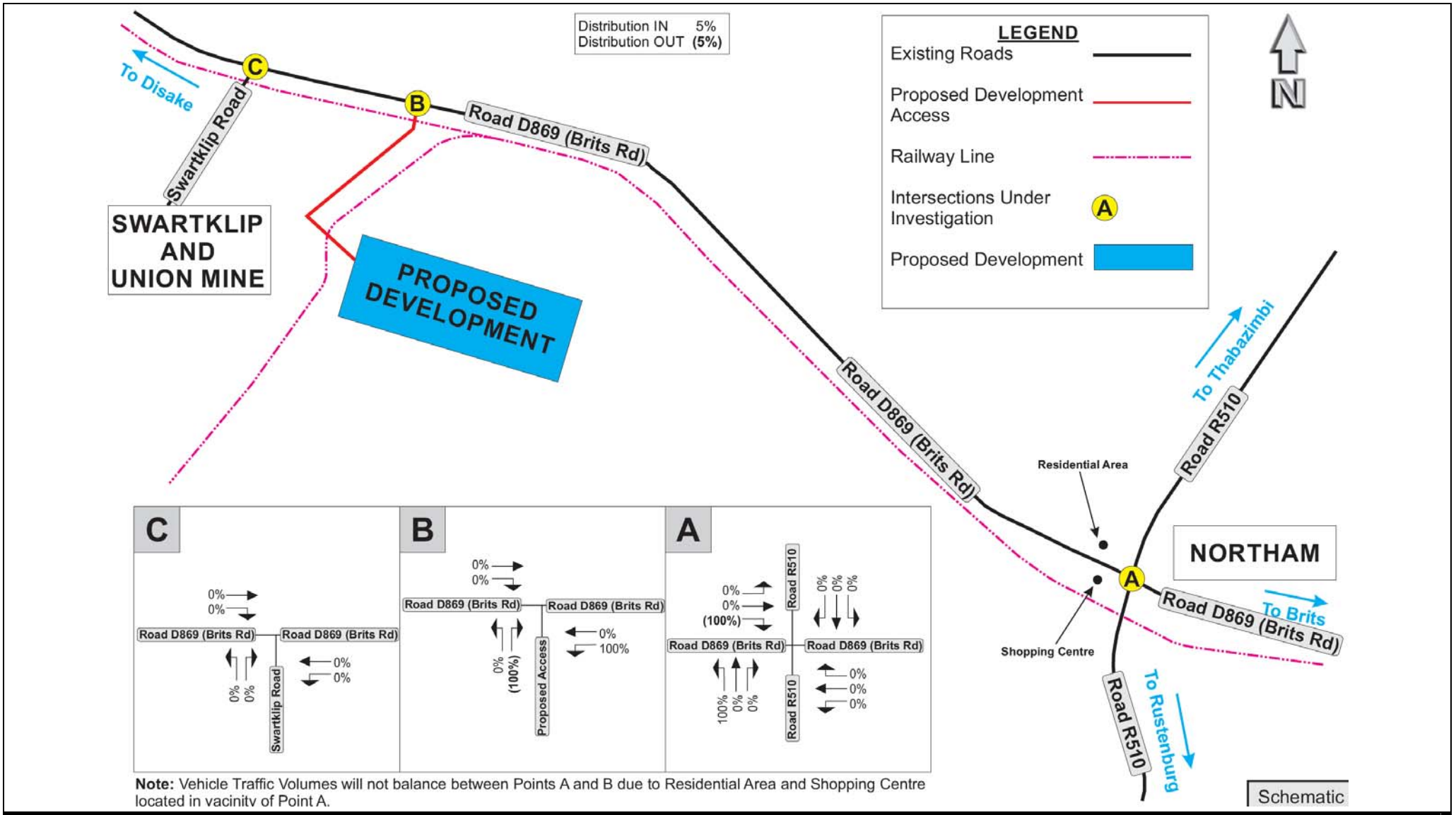


FIGURE B-4: PROJECTED VEHICLE TRIP DISTRIBUTION FOR THE PROPOSED DEVELOPMENT (HEAVY VEHICLES, CONSTRUCTION PHASE)

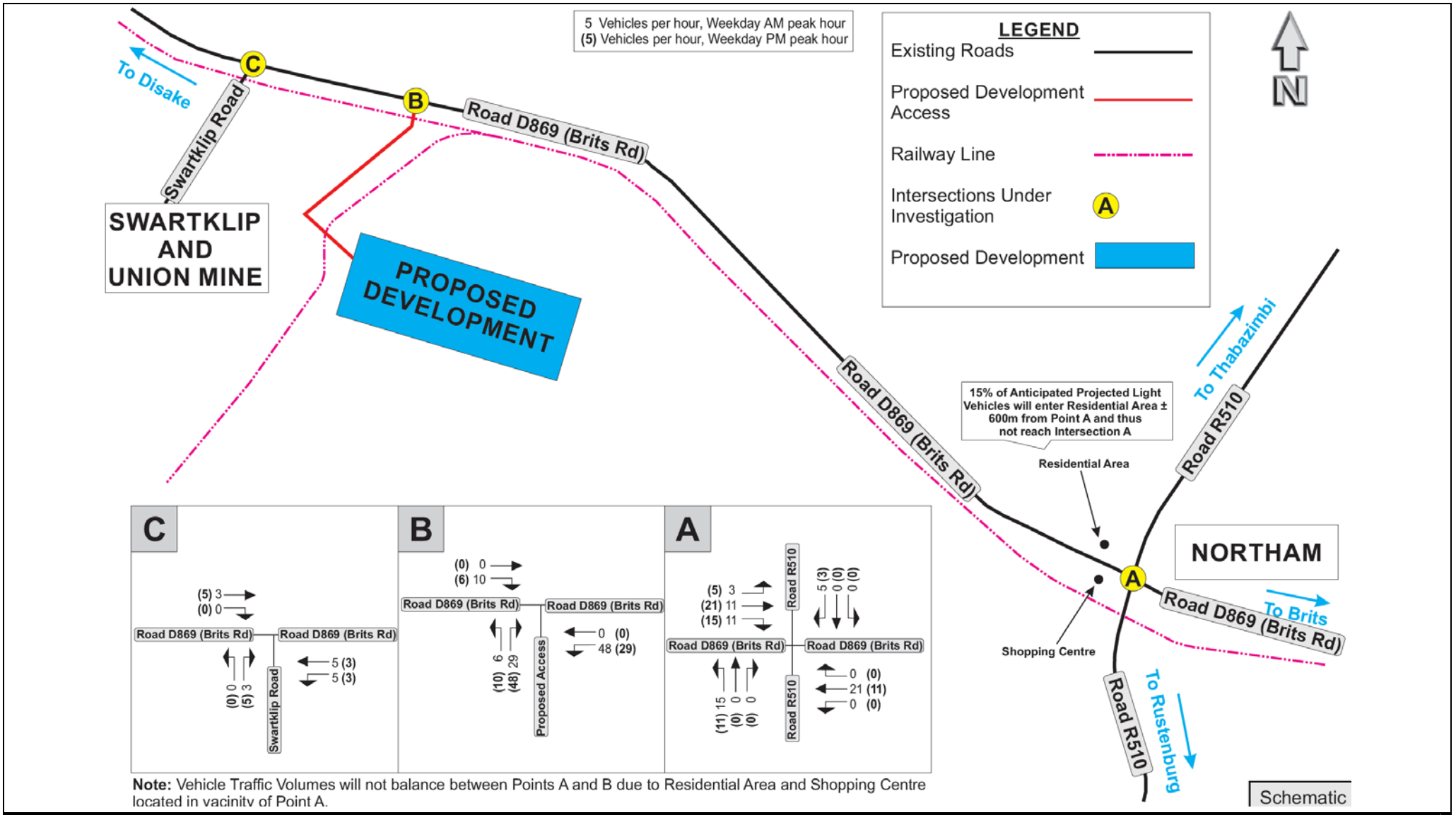
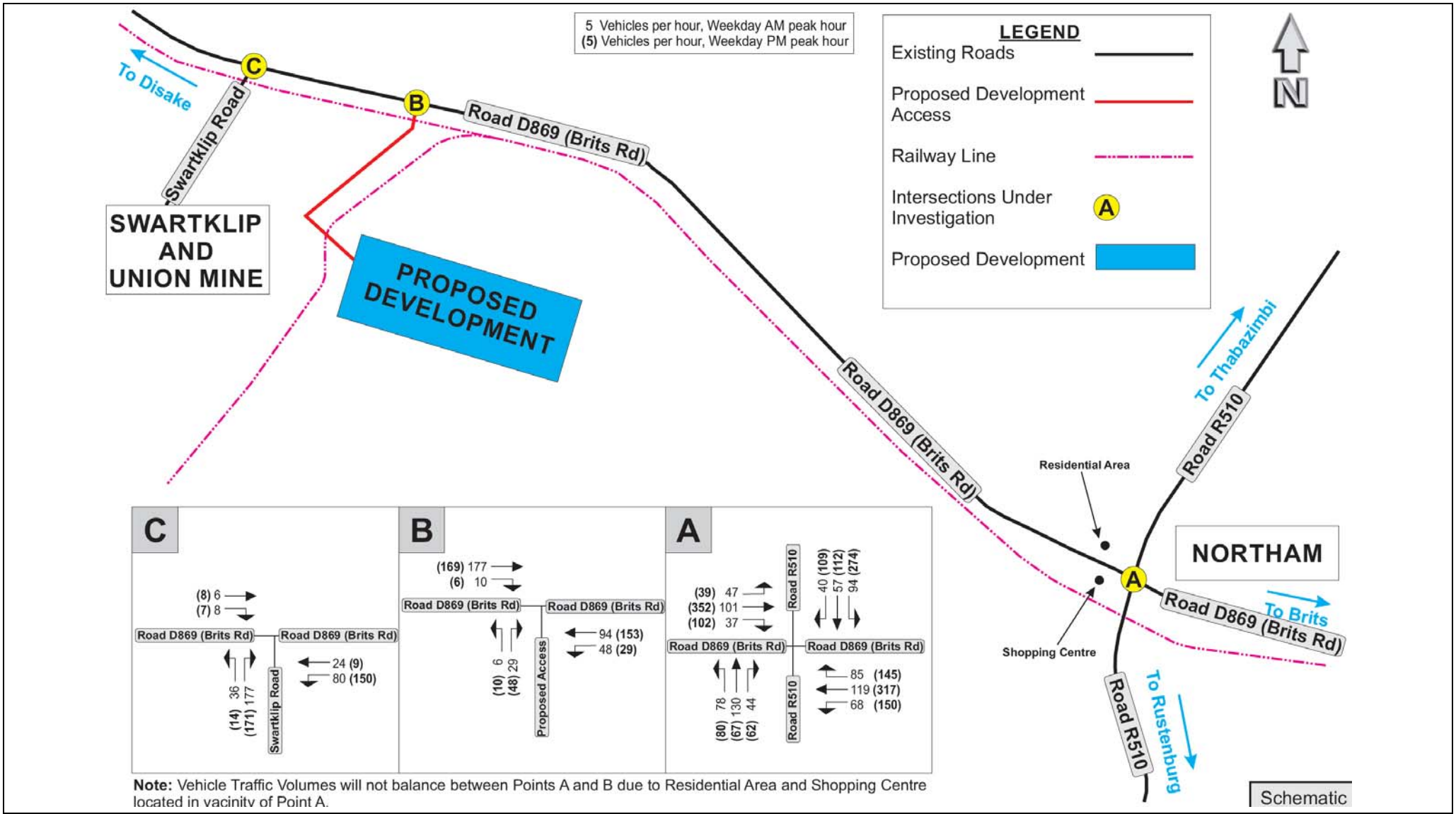
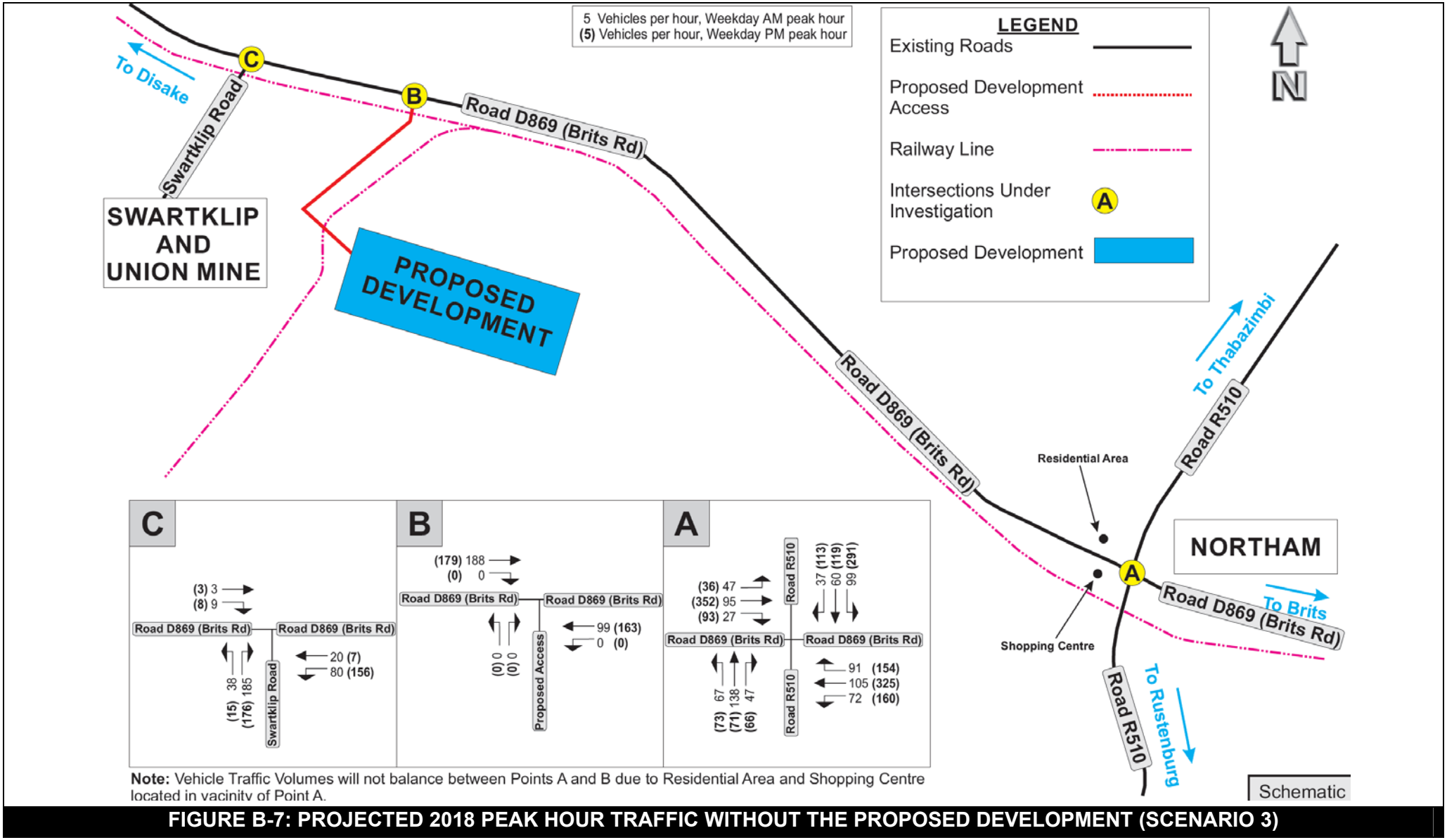


FIGURE B-5: PROJECTED VEHICLE TRIPS GENERATED BY THE PROPOSED DEVELOPMENT (CONSTRUCTION PHASE)



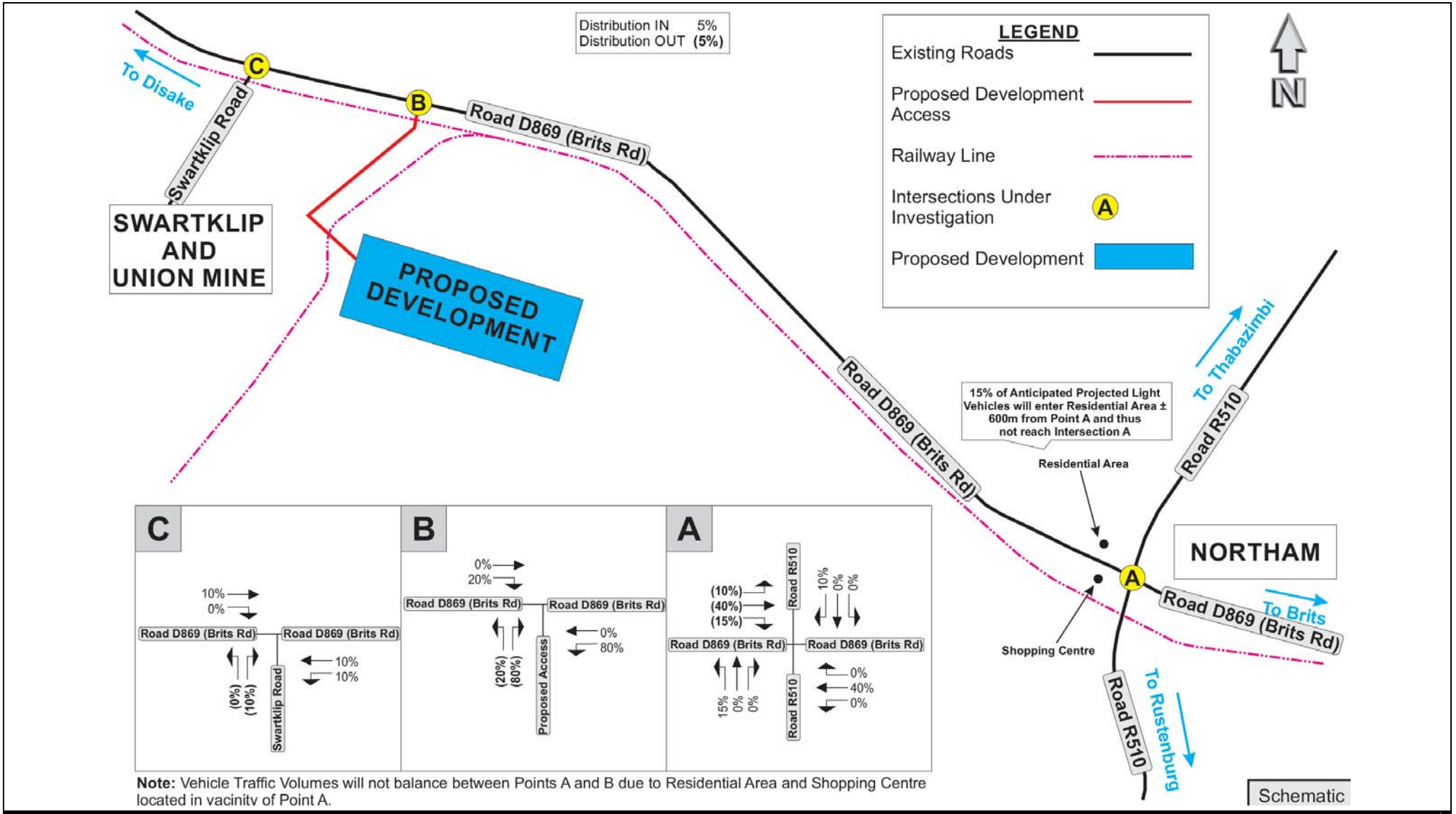
Note: Vehicle Traffic Volumes will not balance between Points A and B due to Residential Area and Shopping Centre located in vacinity of Point A.

FIGURE B-6: PROJECTED 2016 PEAK HOUR TRAFFIC WITH THE PROPOSED DEVELOPMENT (CONSTRUCTION PHASE) (SCENARIO 2)



Note: Vehicle Traffic Volumes will not balance between Points A and B due to Residential Area and Shopping Centre located in vacinity of Point A.

FIGURE B-7: PROJECTED 2018 PEAK HOUR TRAFFIC WITHOUT THE PROPOSED DEVELOPMENT (SCENARIO 3)



Note: Vehicle Traffic Volumes will not balance between Points A and B due to Residential Area and Shopping Centre located in vacinity of Point A.

FIGURE B-8: PROJECTED VEHICLE TRIP DISTRIBUTION FOR THE PROPOSED DEVELOPMENT (LIGHT VEHICLES, OPERATIONAL PHASE)

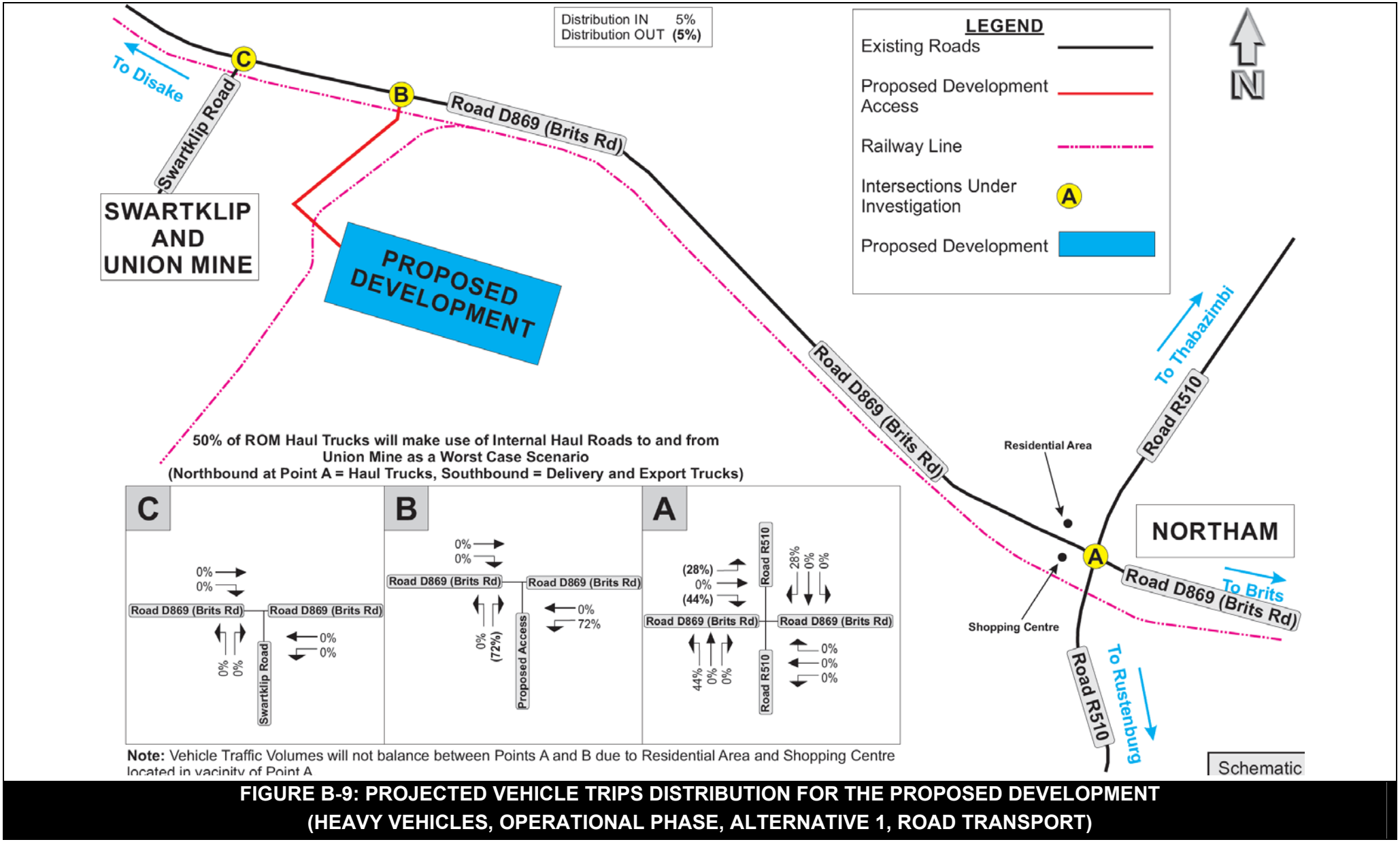
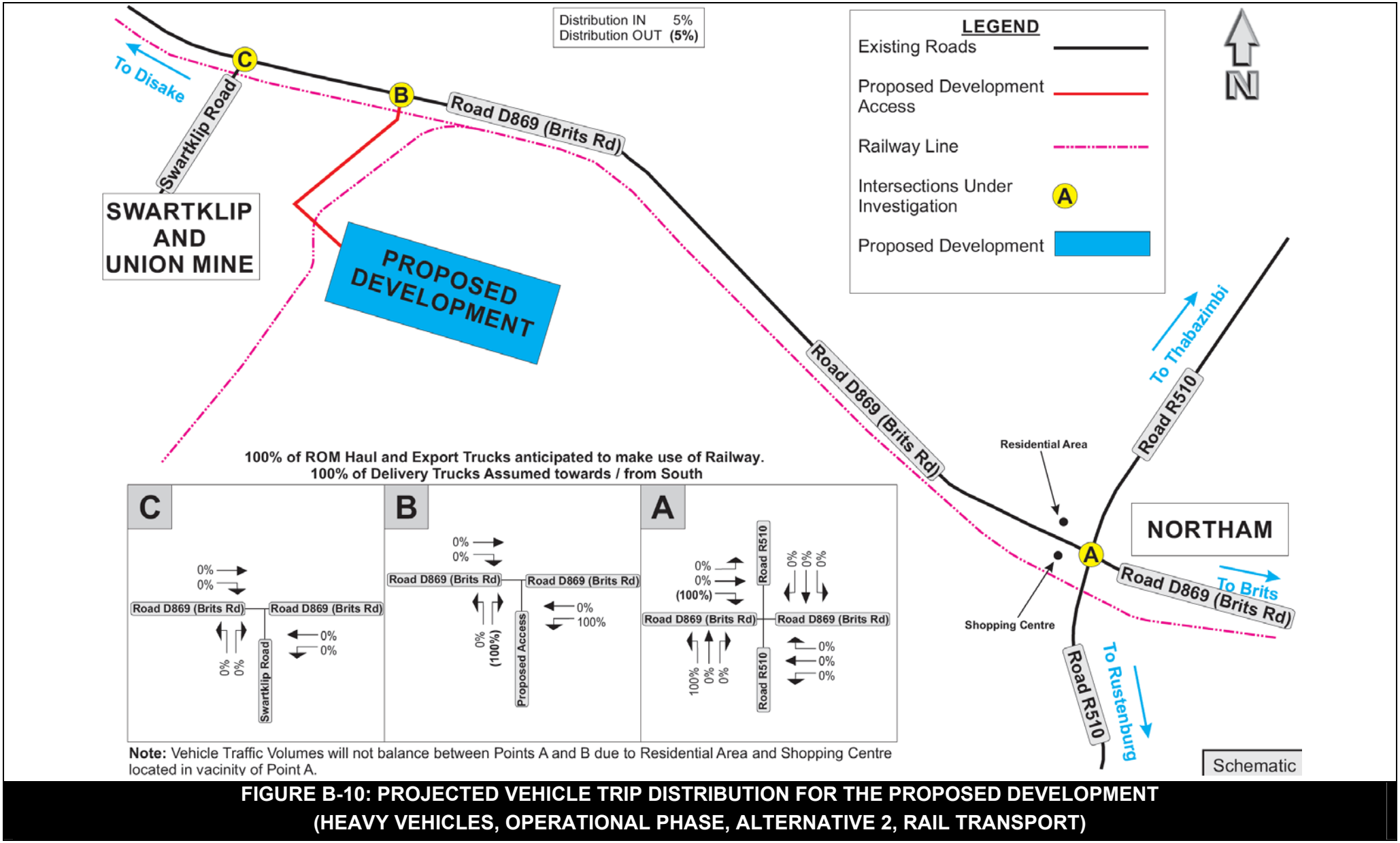


FIGURE B-9: PROJECTED VEHICLE TRIPS DISTRIBUTION FOR THE PROPOSED DEVELOPMENT (HEAVY VEHICLES, OPERATIONAL PHASE, ALTERNATIVE 1, ROAD TRANSPORT)



Note: Vehicle Traffic Volumes will not balance between Points A and B due to Residential Area and Shopping Centre located in vacinity of Point A.

FIGURE B-10: PROJECTED VEHICLE TRIP DISTRIBUTION FOR THE PROPOSED DEVELOPMENT (HEAVY VEHICLES, OPERATIONAL PHASE, ALTERNATIVE 2, RAIL TRANSPORT)

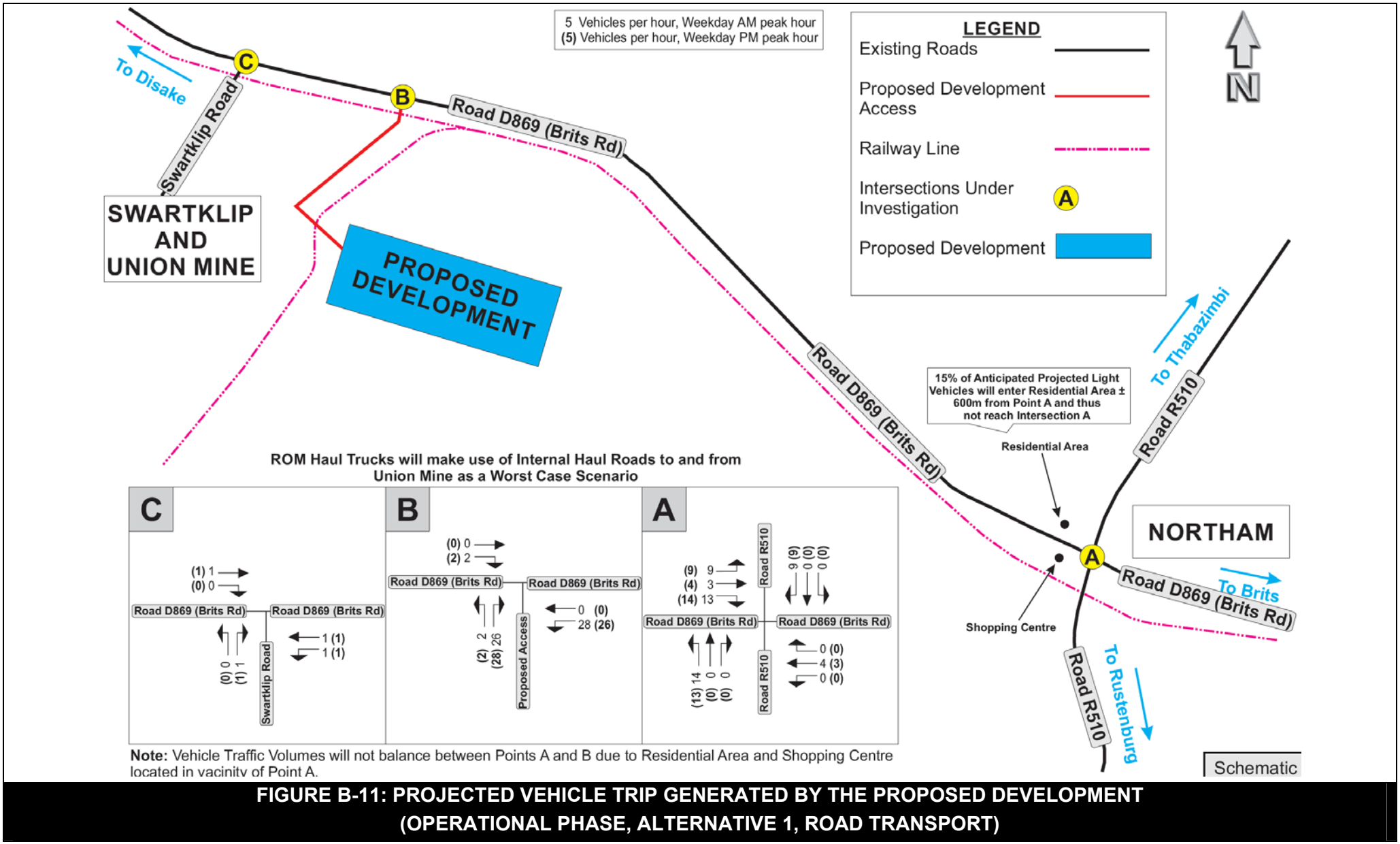
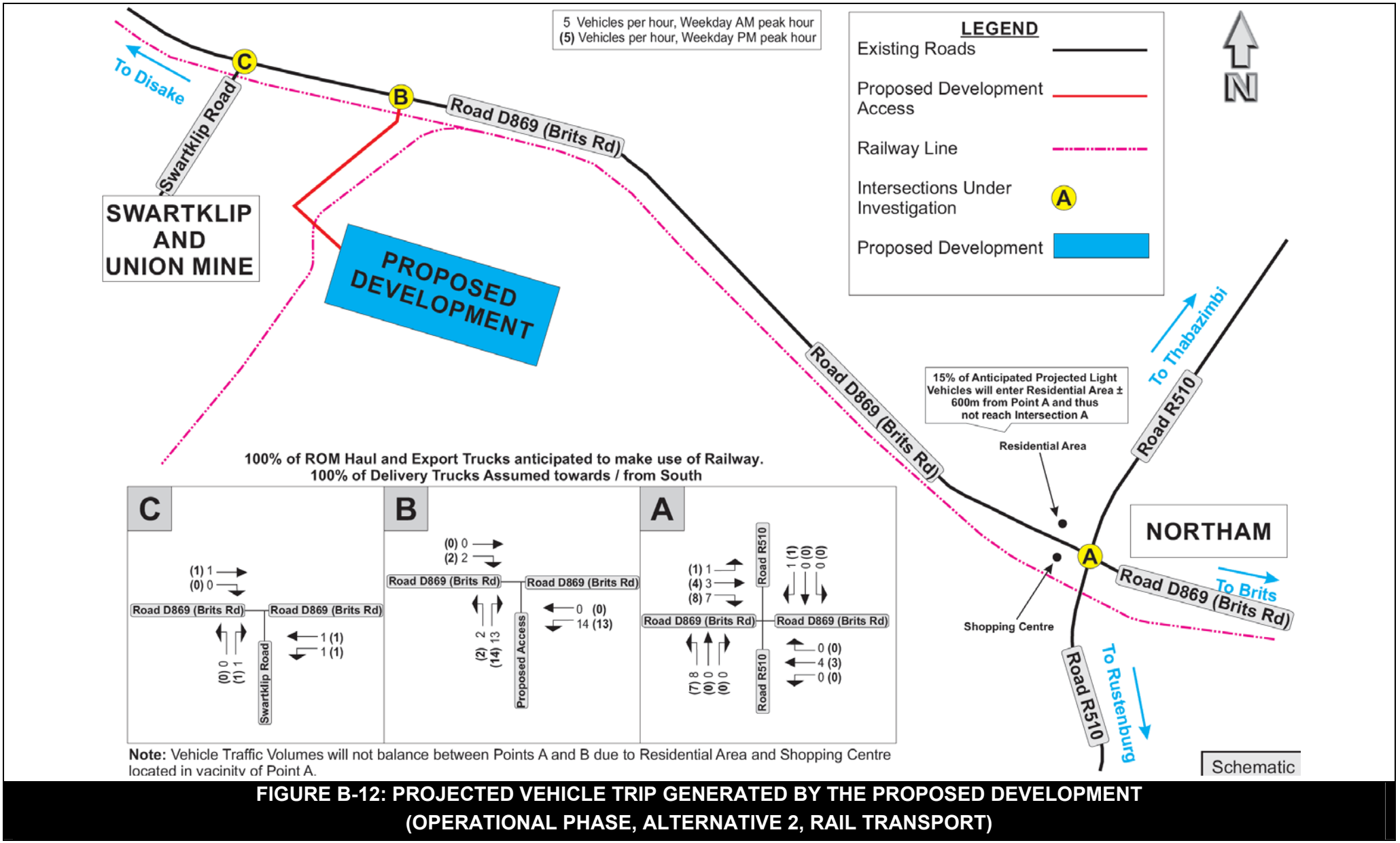


FIGURE B-11: PROJECTED VEHICLE TRIP GENERATED BY THE PROPOSED DEVELOPMENT (OPERATIONAL PHASE, ALTERNATIVE 1, ROAD TRANSPORT)



Note: Vehicle Traffic Volumes will not balance between Points A and B due to Residential Area and Shopping Centre located in vacinity of Point A.

FIGURE B-12: PROJECTED VEHICLE TRIP GENERATED BY THE PROPOSED DEVELOPMENT (OPERATIONAL PHASE, ALTERNATIVE 2, RAIL TRANSPORT)

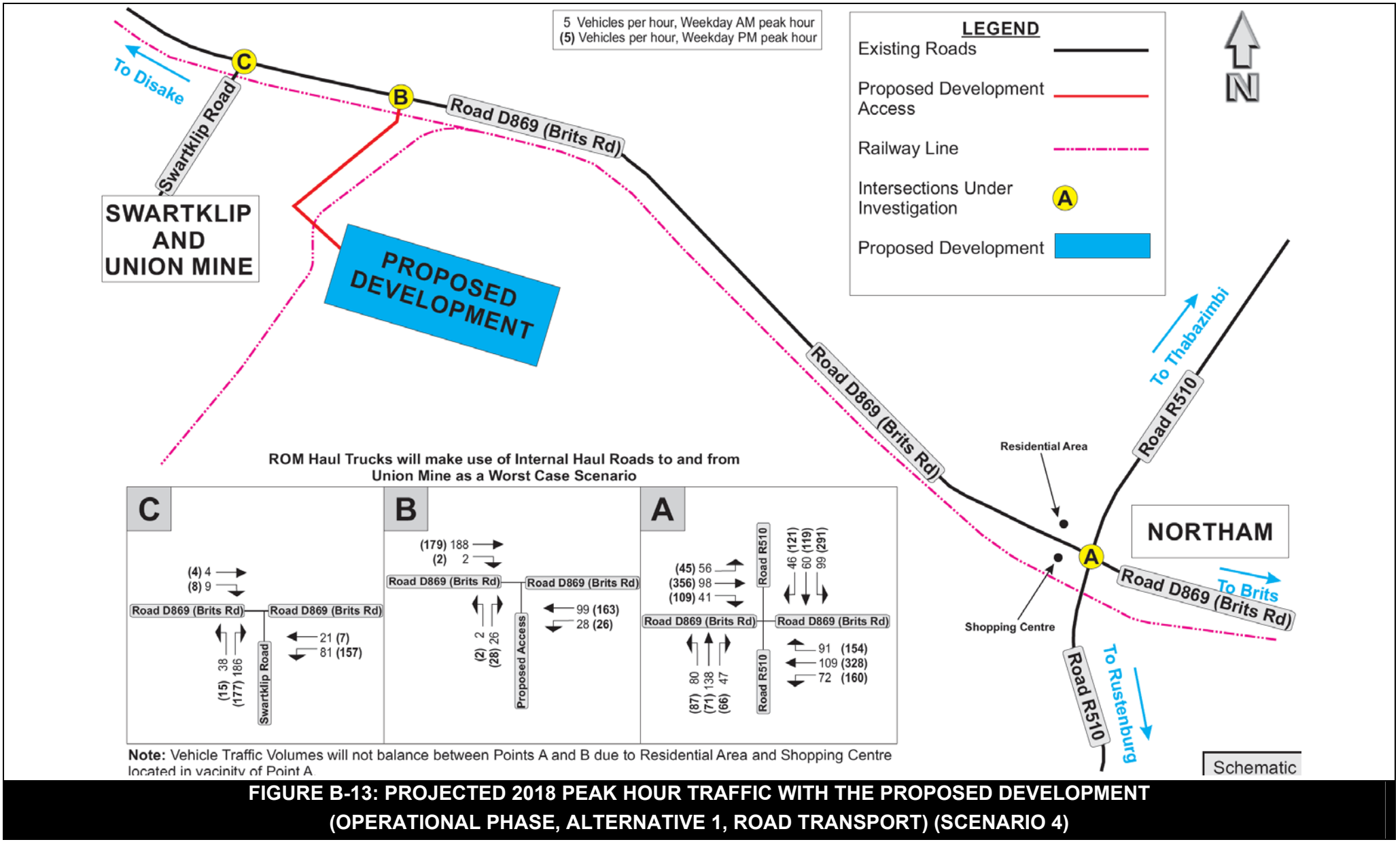


FIGURE B-13: PROJECTED 2018 PEAK HOUR TRAFFIC WITH THE PROPOSED DEVELOPMENT (OPERATIONAL PHASE, ALTERNATIVE 1, ROAD TRANSPORT) (SCENARIO 4)

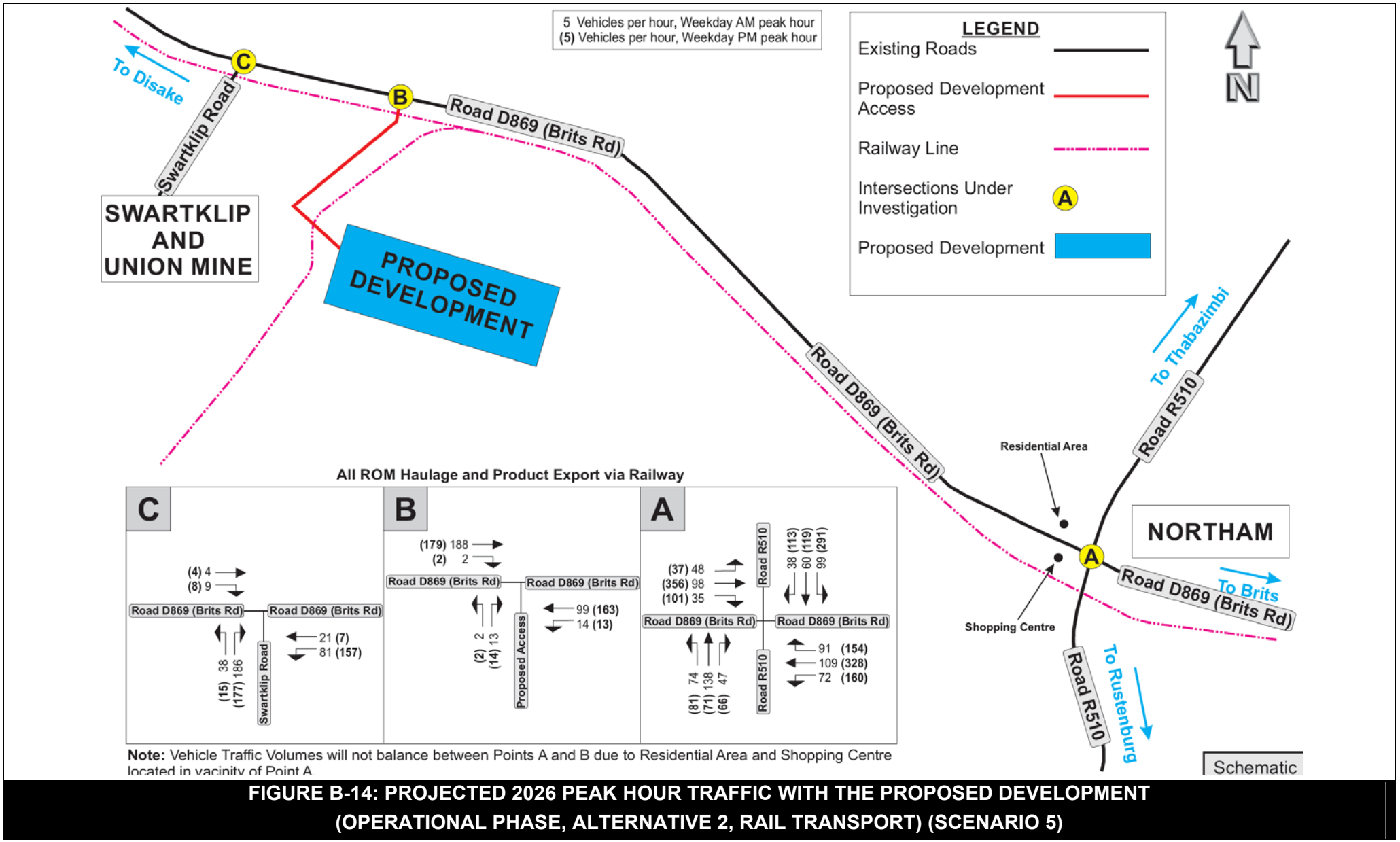
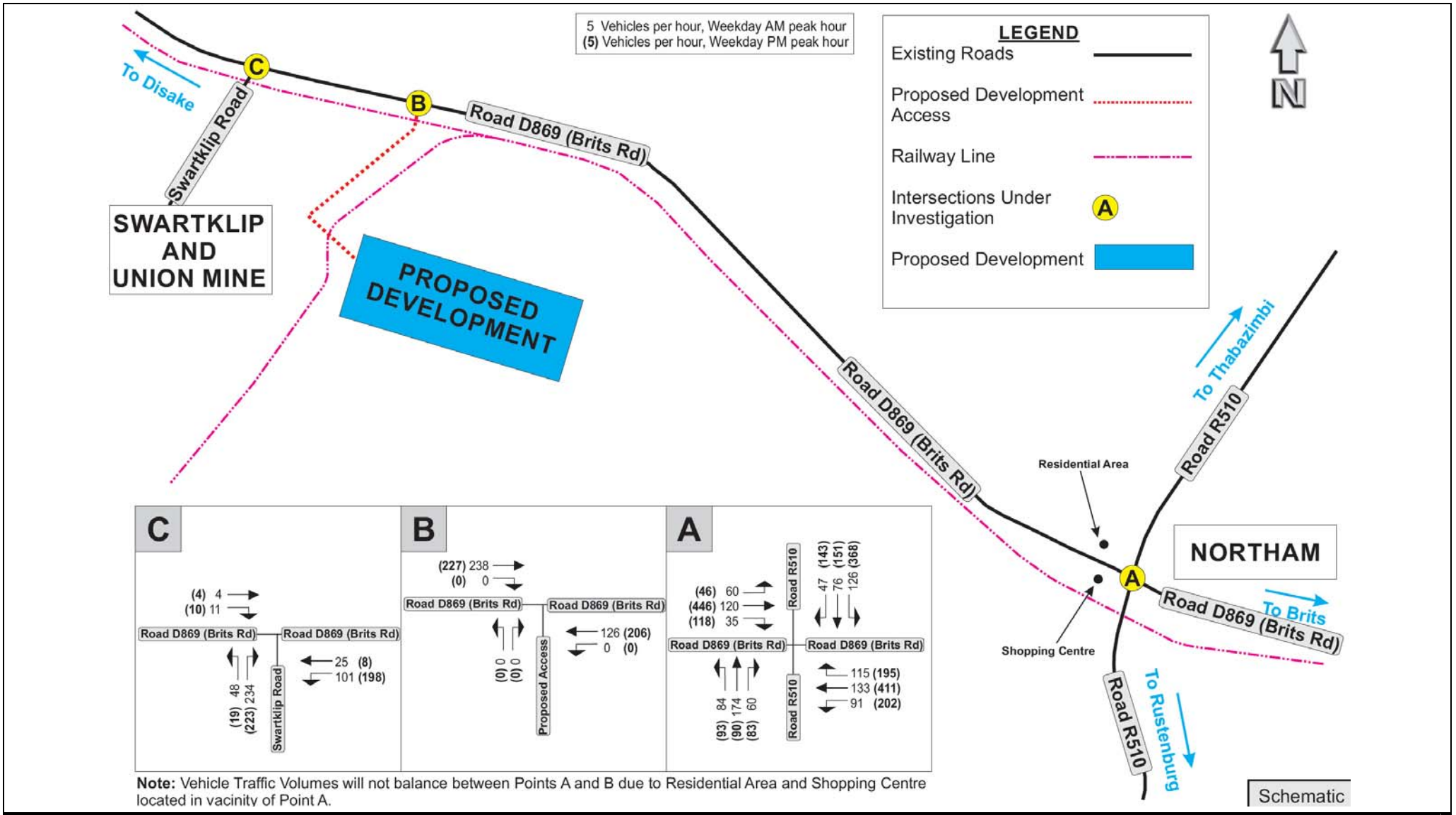


FIGURE B-14: PROJECTED 2026 PEAK HOUR TRAFFIC WITH THE PROPOSED DEVELOPMENT (OPERATIONAL PHASE, ALTERNATIVE 2, RAIL TRANSPORT) (SCENARIO 5)



Note: Vehicle Traffic Volumes will not balance between Points A and B due to Residential Area and Shopping Centre located in vacinity of Point A.

FIGURE B-15: PROJECTED 2026 PEAK HOUR TRAFFIC WITHOUT THE PROPOSED DEVELOPMENT (SCENARIO 6)

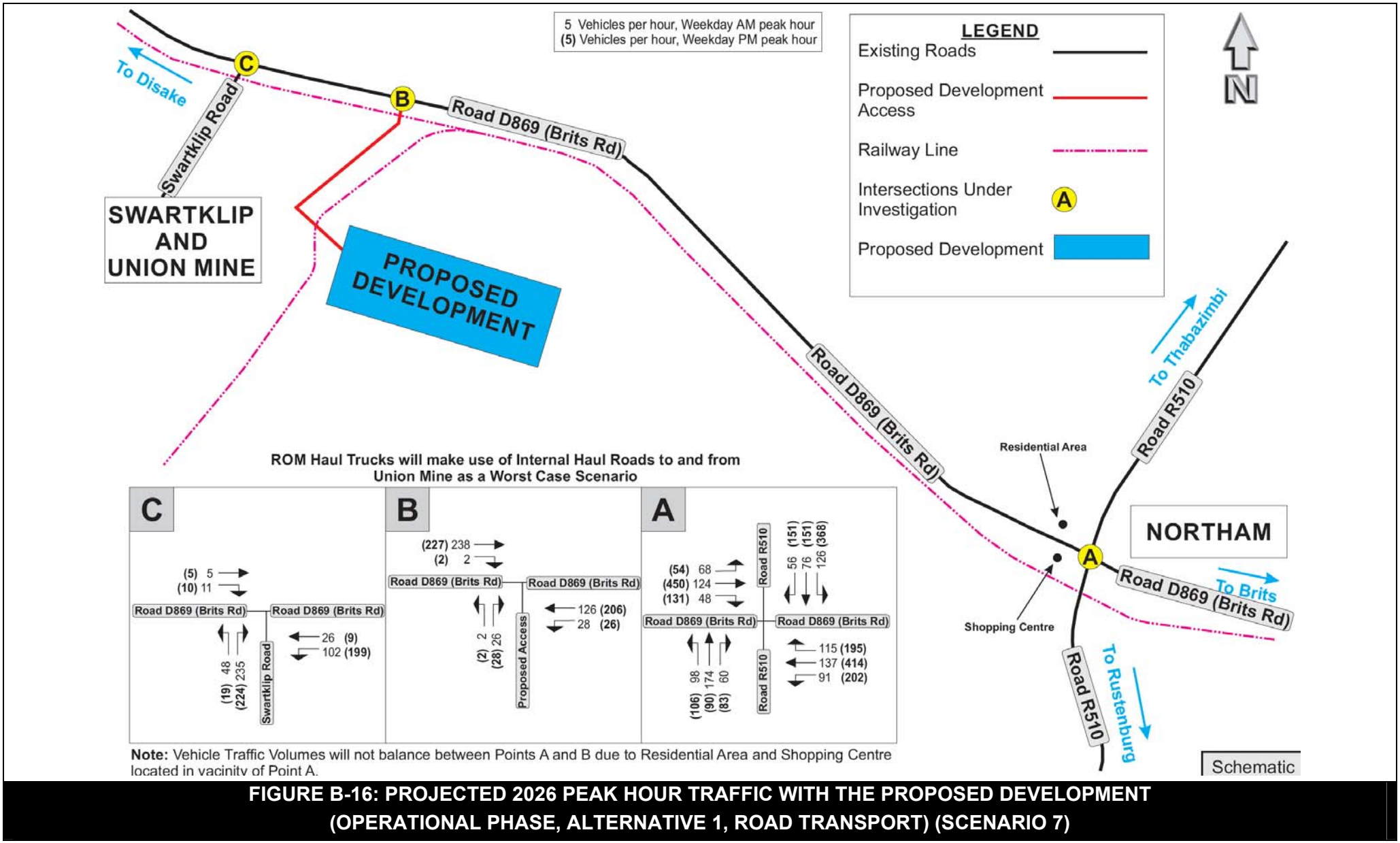


FIGURE B-16: PROJECTED 2026 PEAK HOUR TRAFFIC WITH THE PROPOSED DEVELOPMENT (OPERATIONAL PHASE, ALTERNATIVE 1, ROAD TRANSPORT) (SCENARIO 7)

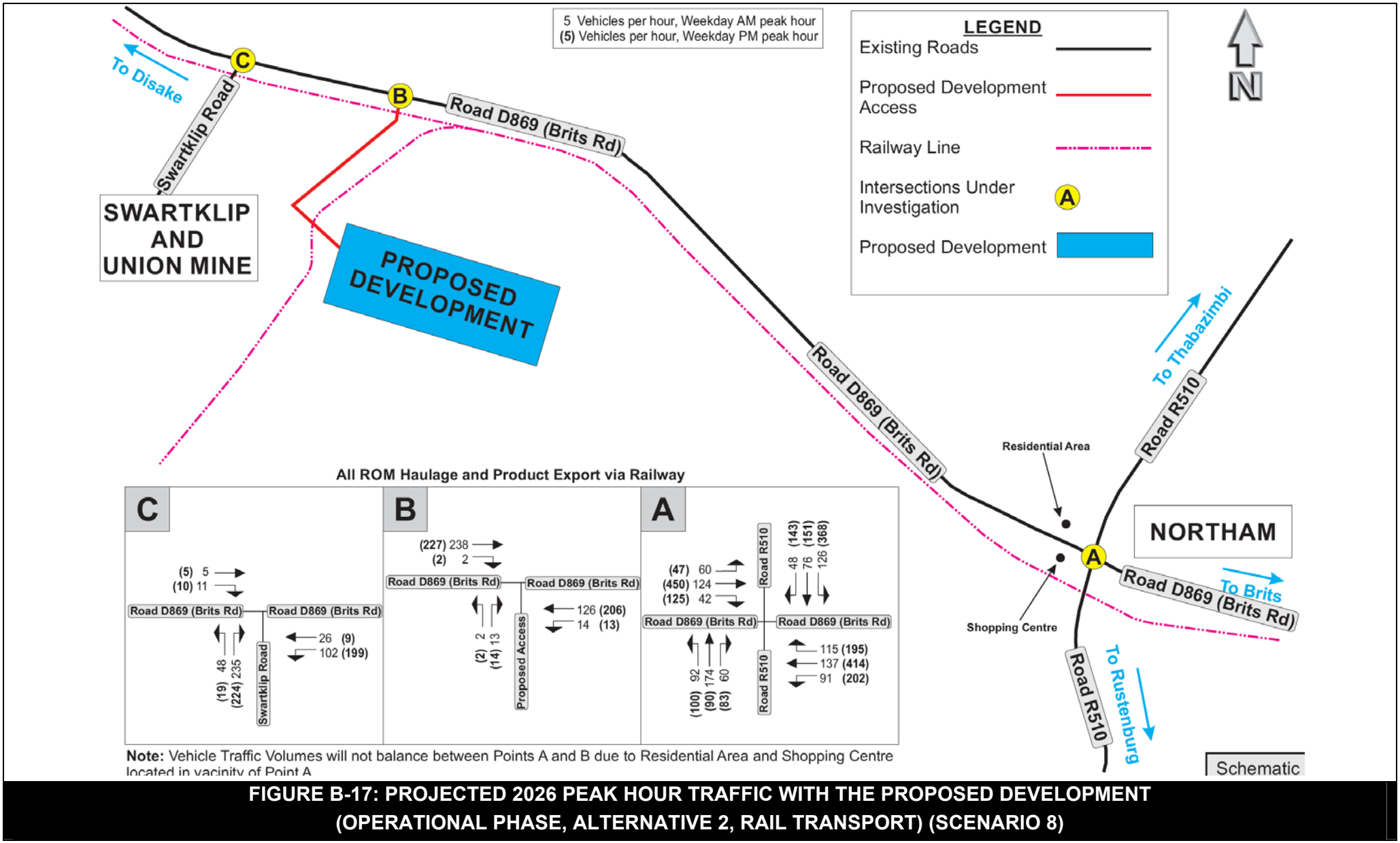


FIGURE B-17: PROJECTED 2026 PEAK HOUR TRAFFIC WITH THE PROPOSED DEVELOPMENT (OPERATIONAL PHASE, ALTERNATIVE 2, RAIL TRANSPORT) (SCENARIO 8)

APPENDIX C

SIDRA CALCULATION RESULTS

TABLE C-1: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2016, WITHOUT THE PROPOSED DEVELOPMENT (SCENARIO 1)

Point A: INTERSECTION OF ROAD R510 AND ROAD D869 (ROAD D869 (BRITS ROAD))

Type of intersection control: Stop Controlled on all Approaches

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road R510)	10.4	B	0.162	33.4	D	0.931
East (Brits Rd	12.7	B	0.362	108.9	F	1.076
South (Road R510)	11.1	B	0.275	26.3	D	0.615
West (Brits Rd)	11.2	B	0.225	31.8	D	0.888
Intersection	**11.5**	**B**	**0.362**	**58.2**	**F**	**1.076**

Point A: INTERSECTION OF ROAD R510 AND ROAD D869 (ROAD D869 (BRITS ROAD))

FOUR-WAY STOP CONTROL LEVEL OF SERVICE NOT ACCEPTABLE

Type of intersection control: Roundabout

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road R510)	7.1	A	0.084	8.3	A	0.273
East (Brits Rd	8.0	A	0.139	8.2	A	0.371
South (Road R510)	8.0	A	0.233	11.5	B	0.271
West (Brits Rd)	5.9	A	0.168	6.5	A	0.446
Intersection	**7.4**	**A**	**0.233**	**8.2**	**A**	**0.446**

Point B: INTERSECTION OF ROAD D869 (ROAD D869 (BRITS ROAD)) AND THE PROPOSED ACCESS ROAD

Type of intersection control: Free-flow on Road D869 (Road D869 (Brits Road))

Intersection does not exist for Scenario 1

Point C: INTERSECTION OF ROAD BRITS AND SWARTKLIP ROADS

Type of intersection control: Free-flow on Road D869 (Road D869 (Brits Road))

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Brits Rd)	4.4	A	0.071	5.5	A	0.105
South (Swartklip Rd)	8.5	A	0.281	8.3	A	0.208
West (Brits Rd)	4.7	A	0.011	5.0	A	0.009
Intersection	**7.1**	**A**	**0.281**	**7.0**	**A**	**0.208**

TABLE C-2: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2018, WITHOUT THE PROPOSED DEVELOPMENT (SCENARIO 3)						
Point A: INTERSECTION OF ROAD R510 AND ROAD D869 (ROAD D869 (BRITS ROAD))						
Type of intersection control: Roundabout						
APPROACH	**FRIDAY (AM)**			**FRIDAY (PM)**		
	Delay	**Level of Service**	**Degree of Saturation**	**Delay**	**Level of Service**	**Degree of Saturation**
North (Road R510)	7.2	A	0.090	8.5	A	0.301
East (Brits Rd	8.0	A	0.149	8.3	A	0.402
South (Road R510)	8.2	A	0.251	11.9	B	0.300
West (Brits Rd)	6.0	A	0.181	6.8	A	0.481
Intersection	**7.5**	**A**	**0.251**	**8.4**	**A**	**0.481**
Point B: INTERSECTION OF ROAD D869 (ROAD D869 (BRITS ROAD)) AND THE PROPOSED ACCESS ROAD						
Type of intersection control: Free-flow on Road D869 (Brits Road)						
Intersection does not exist for Scenario 3						
Point C: INTERSECTION OF ROAD BRITS AND SWARTKLIP ROADS						
Type of intersection control: Free-flow on Road D869 (Brits Road)						
APPROACH	**FRIDAY (AM)**			**FRIDAY (PM)**		
	Delay	**Level of Service**	**Degree of Saturation**	**Delay**	**Level of Service**	**Degree of Saturation**
East (Brits Rd)	4.5	A	0.075	5.4	A	0.112
South (Swartklip Rd)	8.5	A	0.300	8.4	A	0.223
West (Brits Rd)	4.8	A	0.012	5.2	A	0.011
Intersection	**7.2**	**A**	**0.300**	**7.0**	**A**	**0.223**

TABLE C-3: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2018, WITHOUT THE PROPOSED DEVELOPMENT (SCENARIO 6)

Point A: INTERSECTION OF ROAD R510 AND ROAD D869 (BRITS ROAD)

Type of intersection control: Roundabout

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road R510)	7.3	A	0.120	9.8	A	0.417
East (Brits Rd	8.1	A	0.194	9.3	A	0.555
South (Road R510)	8.8	A	0.337	15.8	B	0.476
West (Brits Rd)	6.7	A	0.248	9.9	A	0.659
Intersection	**7.9**	**A**	**0.337**	**10.3**	**B**	**0.659**

Point B: INTERSECTION OF ROAD D869 (BRITS ROAD) AND THE PROPOSED ACCESS ROAD

Type of intersection control: Free-flow on Road D869 (Brits Road)

Intersection does not exist for Scenario 6

Point C: INTERSECTION OF ROAD BRITS AND SWARTKLIP ROADS

Type of intersection control: Free-flow on Road D869 (Brits Road)

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Brits Rd)	4.5	A	0.095	5.5	A	0.141
South (Swartklip Rd)	8.8	A	0.389	8.6	A	0.291
West (Brits Rd)	4.9	A	0.015	5.5	A	0.014
Intersection	**7.4**	**A**	**0.389**	**7.1**	**A**	**0.291**

TABLE C-4: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2016, WITH THE PROPOSED DEVELOPMENT (CONSTRUCTION PHASE)(SCENARIO 2)

Point A: INTERSECTION OF ROAD R510 AND ROAD D869 (BRITS ROAD)

Type of intersection control: Roundabout

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road R510)	7.2	A	0.079	8.5	A	0.288
East (Brits Rd	7.9	A	0.156	8.3	A	0.386
South (Road R510)	8.2	A	0.254	11.6	B	0.292
West (Brits Rd)	6.2	A	0.195	6.7	A	0.483
Intersection	**7.5**	**A**	**0.254**	**8.3**	**A**	**0.483**

Point B: INTERSECTION OF ROAD D869 (BRITS ROAD) AND THE PROPOSED ACCESS ROAD

Type of intersection control: Free-flow on Road D869 (Brits Road)

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Brits Rd)	1.9	A	0.101	0.9	A	0.118
South (Access)	8.5	A	0.067	8.2	A	0.092
West (Brits Rd)	0.4	A	0.133	0.3	A	0.107
Intersection	**1.8**	**A**	**0.133**	**1.7**	**A**	**0.118**

Point C: INTERSECTION OF ROAD BRITS AND SWARTKLIP ROADS

Type of intersection control: Free-flow on Road D869 (Brits Road)

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Brits Rd)	4.5	A	0.074	5.5	A	0.107
South (Swartklip Rd)	8.6	A	0.291	8.4	A	0.221
West (Brits Rd)	5.2	A	0.016	5.5	A	0.012
Intersection	**7.2**	**A**	**0.291**	**7.0**	**A**	**0.221**

TABLE C-5: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2018, WITH THE PROPOSED DEVELOPMENT (OPERATIONAL PHASE, ALTERNATIVE 1, ROAD TRANSPORT) (SCENARIO 4)

Point A: INTERSECTION OF ROAD R510 AND ROAD D869 (BRITS ROAD)

Type of intersection control: Roundabout

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road R510)	7.4	A	0.090	8.7	A	0.320
East (Brits Rd	8.0	A	0.154	8.4	A	0.410
South (Road R510)	8.3	A	0.257	12.1	B	0.307
West (Brits Rd)	11.2	B	0.203	6.8	A	0.500
Intersection	**7.6**	**A**	**0.257**	**8.5**	**A**	**0.500**

Point B: INTERSECTION OF ROAD D869 (BRITS ROAD) AND THE PROPOSED ACCESS ROAD

Type of intersection control: Free-flow on Road D869 (Brits Road)

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Brits Rd)	1.2	A	0.090	0.7	A	0.122
South (Access)	11.1	B	0.057	11.4	B	0.057
West (Brits Rd)	0.1	A	0.133	0.1	A	0.110
Intersection	**1.2**	**A**	**0.133**	**1.1**	**A**	**0.122**

Point C: INTERSECTION OF ROAD BRITS AND SWARTKLIP ROADS

Type of intersection control: Free-flow on Road D869 (Brits Road)

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Brits Rd)	4.5	A	0.076	5.4	A	0.112
South (Swartklip Rd)	8.6	A	0.304	8.4	A	0.225
West (Brits Rd)	5.0	A	0.013	5.3	A	0.011
Intersection	**7.2**	**A**	**0.304**	**7.0**	**A**	**0.225**

TABLE C-6: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2018, WITH THE PROPOSED DEVELOPMENT (OPERATIONAL PHASE, ALTERNATIVE 2, RAIL TRANSPORT) (SCENARIO 5)

Point A: INTERSECTION OF ROAD R510 AND ROAD D869 (BRITS ROAD)

Type of intersection control: Roundabout

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road R510)	7.2	A	0.092	8.5	A	0.306
East (Brits Rd	8.0	A	0.153	8.4	A	0.407
South (Road R510)	8.2	A	0.260	11.9	B	0.313
West (Brits Rd)	6.3	A	0.194	6.9	A	0.493
Intersection	**7.5**	**A**	**0.260**	**8.4**	**A**	**0.493**

Point B: INTERSECTION OF ROAD D869 (BRITS ROAD) AND THE PROPOSED ACCESS ROAD

Type of intersection control: Free-flow on Road D869 (Brits Road)

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Brits Rd)	0.7	A	0.079	0.5	A	0.114
South (Access)	9.5	A	0.033	8.8	A	0.029
West (Brits Rd)	0.1	A	0.133	0.1	A	0.110
Intersection	**0.8**	**A**	**0.133**	**0.6**	**A**	**0.114**

Point C: INTERSECTION OF ROAD BRITS AND SWARTKLIP ROADS

Type of intersection control: Free-flow on Road D869 (Brits Road)

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Brits Rd)	4.5	A	0.076	5.4	A	0.112
South (Swartklip Rd)	8.6	A	0.304	8.4	A	0.225
West (Brits Rd)	5.0	A	0.013	5.3	A	0.011
Intersection	**7.2**	**A**	**0.304**	**7.0**	**A**	**0.225**

TABLE C-7: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2026, WITH THE PROPOSED DEVELOPMENT (OPERATIONAL PHASE, ALTERNATIVE 1, ROAD TRANSPORT) (SCENARIO 7)

Point A: INTERSECTION OF ROAD R510 AND ROAD D869 (BRITS ROAD)

Type of intersection control: Roundabout

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road R510)	7.5	A	0.116	10.2	B	0.497
East (Brits Rd	8.2	A	0.200	9.5	A	0.567
South (Road R510)	8.9	A	0.345	16.4	B	0.490
West (Brits Rd)	6.7	A	0.271	10.3	B	0.680
Intersection	**7.9**	**A**	**0.345**	**10.7**	**B**	**0.680**

Point B: INTERSECTION OF ROAD D869 (BRITS ROAD) AND THE PROPOSED ACCESS ROAD

Type of intersection control: Free-flow on Road D869 (Brits Road)

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Brits Rd)	1.0	A	0.108	0.6	A	0.149
South (Access)	12.6	B	0.068	13.1	B	0.068
West (Brits Rd)	0.1	A	0.168	0.1	A	0.139
Intersection	**1.1**	**A**	**0.168**	**1.0**	**A**	**0.149**

Point C: INTERSECTION OF ROAD BRITS AND SWARTKLIP ROADS

Type of intersection control: Free-flow on Road D869 (Brits Road)

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Brits Rd)	4.5	A	0.095	5.5	A	0.142
South (Swartklip Rd)	8.8	A	0.393	8.7	A	0.294
West (Brits Rd)	5.0	A	0.016	5.6	A	0.015
Intersection	**7.4**	**A**	**0.393**	**7.1**	**A**	**0.294**

TABLE C-8: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2026, WITH THE PROPOSED DEVELOPMENT (OPERATIONAL PHASE, ALTERNATIVE 2, RAIL TRANSPORT) (SCENARIO 8)

Point A: INTERSECTION OF ROAD R510 AND ROAD D869 (BRITS ROAD)

Type of intersection control: Roundabout

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Road R510)	7.4	A	0.123	9.9	A	0.480
East (Brits Rd	8.5	A	0.199	10.3	B	0.562
South (Road R510)	8.8	A	0.347	16.2	B	0.492
West (Brits Rd)	6.9	A	0.261	10.2	B	0.672
Intersection	**8.0**	**A**	**0.347**	**10.8**	**B**	**0.672**

Point B: INTERSECTION OF ROAD D869 (BRITS ROAD) AND THE PROPOSED ACCESS ROAD

Type of intersection control: Free-flow on Road D869 (Brits Road)

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Brits Rd)	0.6	A	0.097	0.4	A	0.141
South (Access)	10.7	B	0.038	9.9	A	0.033
West (Brits Rd)	0.1	A	0.168	0.1	A	0.139
Intersection	**0.7**	**A**	**0.168**	**0.6**	**A**	**0.141**

Point C: INTERSECTION OF ROAD BRITS AND SWARTKLIP ROADS

Type of intersection control: Free-flow on Road D869 (Brits Road)

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Brits Rd)	4.5	A	0.095	5.5	A	0.142
South (Swartklip Rd)	8.8	A	0.393	8.7	A	0.294
West (Brits Rd)	5.0	A	0.016	5.6	A	0.015
Intersection	**7.4**	**A**	**0.393**	**7.1**	**A**	**0.294**

APPENDIX D

LEVEL OF SERVICE CRITERIA

TABLE D-1: LEVEL OF SERVICE CRITERIA 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 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 FOR THE RESPECTIVE PHASES																	
CONSTRUCTION PHASE																	
RECEPTOR	ACTIVITY		IMPACT	BEFORE MITIGATION						AFTER MITIGATION						Comments and Mitigation Measures
				Intensity	Duration	Spatial Scale	Consequence	Probability	Significance	Intensity	Duration	Spatial Scale	Consequence	Probability	Significance	
Road and Traffic	Construction of infrastructure	Road Capacity	1. Relevant road sections (reconstructing/repairing of roads)	*M*	*H*	*M*	*High*	*M*	*High*	*M+*	*H*	*M*	*High*	*M*	*High*	See **Section 2.7** of the report, **Table 2.13, point 3** *(Road maintenance plan recommended)*
			2. Relevant intersections (need for additional lanes)	*L*	*H*	*M*	*Med*	*M*	*Med*	*No mitigation required from a capacity point of view due to proposed development*						See **Section 2.3** of the report and **Appendix C** of the report. (Intersection upgrades required without the proposed development and thus this rating assumes that upgrades has been implemented)
		Road Safety Issues	3. Intersection (access) spacing (Proposed Access Road)	*L*	*H*	*M*	*Med*	*L*	*Med*	*L*	*H*	*M*	*Med*	*L*	*Med*	*See **Section 2.7** of the report and **Table 2.13, point 2.2.** Intersection spacing is deemed to be acceptable. Final spacing to be reviewed as part of detail design phase.*
			4. Vertical road alignment	*L*	*H*	*M*	*Med*	*L*	*Med*	*L*	*H*	*M*	*Med*	*L*	*Med*	*Proposed access intersection proposed on a straight flat section of Road D869.*
			5. Available sight distance at intersection	*L*	*H*	*M*	*Med*	*L*	*Med*	*L*	*H*	*M*	*Med*	*L*	*Med*	*Proposed access intersection proposed on a straight flat section of Road D869. Should be determined as part of detail design phase.*
			6. Speed limit at proposed Access Point B	*M*	*H*	*M*	*High*	*M*	*High*	*M+*	*H*	*M*	*High*	*H*	*High*	*See **Item 2.1** of Table **2.13.** Speed limit should be reduced to at least 60km/h at access intersections.*
			7. Relevant intersections (need for dedicated left- and right-turn lanes, **Point B**)	*VH*	*H*	*M*	*High*	*H*	*High*	*H+*	*H*	*M*	*High*	*H*	*High*	*See **Item 2.3** of **Table 2.13**, **Table 3.2** and **Figures 3.1, 3.2 and 3.3.** Dedicated right-turn lanes are highly recommended in terms of road safety.*
			8. Pedestrian movements (with reference to access roads and access intersections)	*H*	*H*	*M*	*High*	*M*	*High*	*M+*	*H*	*M*	*High*	*M*	*High*	*See **Items 4** of **Table 2.13.** Pedestrian crossings and walkways should be provided at proposed access intersection to create a safe space for pedestrians to cross the roadway.*
			9. Public transport loading and off-loading	*H*	*H*	*M*	*High*	*M*	*High*	*M+*	*H*	*M*	*High*	*M*	*High*	*See **Item 5** of **Table 2.13.** Lack of proper public transport loading and off-loading bays will result in public transport stopping in roadways that could lead to fatal accidents.*

TABLE E-1: IMPACT RATING FOR THE RESPECTIVE PHASES

OPERATIONAL PHASE

RECEPTOR	ACTIVITY		IMPACT	BEFORE MITIGATION						AFTER MITIGATION						Comments and Mitigation Measures
				Intensity	Duration	Spatial Scale	Consequence	Probability	Significance	Intensity	Duration	Spatial Scale	Consequence	Probability	Significance	
Road and Traffic	Mining Activities	Road Capacity	1. Relevant road sections (reconstructing/repairing of roads)	*M*	*H*	*M*	*High*	*M*	*High*	*M+*	*H*	*M*	*High*	*M*	*High*	See **Section 2.7** of the report, **Table 2.13, point 3** *(Road maintenance plan recommended)*
			2. Relevant intersections (need for additional lanes)	*L*	*H*	*M*	*Med*	*M*	*Med*	*No mitigation required from a capacity point of view due to proposed development*						See **Section 2.3** of the report and **Appendix C** of the report. (Intersection upgrades required without the proposed development and thus this rating assumes that upgrades has been implemented)
		Road Safety Issues	3. Intersection (access) spacing (Proposed Access Road)	*L*	*H*	*M*	*Med*	*L*	*Med*	*L*	*H*	*M*	*Med*	*L*	*Med*	*See **Section 2.7** of the report and **Table 2.13, point 2.2.** Intersection spacing is deemed to be acceptable. Final spacing to be reviewed as part of detail design phase.*
			4. Vertical road alignment	*L*	*H*	*M*	*Med*	*L*	*Med*	*L*	*H*	*M*	*Med*	*L*	*Med*	*Proposed access intersection proposed on a straight flat section of Road D869.*
			5. Available sight distance at intersection	*L*	*H*	*M*	*Med*	*L*	*Med*	*L*	*H*	*M*	*Med*	*L*	*Med*	*Proposed access intersection proposed on a straight flat section of Road D869. Should be determined as part of detail design phase.*
			6. Speed limit at proposed Access Point B	*M*	*H*	*M*	*High*	*M*	*High*	*M+*	*H*	*M*	*High*	*H*	*High*	*See **Item 2.1** of Table **2.13.** Speed limit should be reduced to at least 60km/h at access intersections.*
			7. Relevant intersections (need for dedicated left- and right-turn lanes, **Point B**)	*VH*	*H*	*M*	*High*	*H*	*High*	*H+*	*H*	*M*	*High*	*H*	*High*	*See **Item 2.3** of **Table 2.13**, **Table 3.2** and **Figures 3.1, 3.2 and 3.3.** Dedicated right-turn lanes are highly recommended in terms of road safety.*
			8. Pedestrian movements (with reference to access roads and access intersections)	*H*	*H*	*M*	*High*	*M*	*High*	*M+*	*H*	*M*	*High*	*M*	*High*	*See **Items 4** of **Table 2.13.** Pedestrian crossings and walkways should be provided at proposed access intersection to create a safe space for pedestrians to cross the roadway.*
			9. Public transport loading and off-loading	*H*	*H*	*M*	*High*	*M*	*High*	*M+*	*H*	*M*	*High*	*M*	*High*	*See **Item 5** of **Table 2.13.** Lack of proper public transport loading and off-loading bays will result in public transport stopping in roadways that could lead to fatal accidents.*

TABLE E-1: IMPACT RATING FOR THE RESPECTIVE PHASES																
DECOMMISSIONING PHASE																
RECEPTOR	**ACTIVITY**		**IMPACT**	**BEFORE MITIGATION**						**AFTER MITIGATION**						**Comments and Mitigation Measures**
				Intensity	**Duration**	**Spatial Scale**	**Consequence**	**Probability**	**Significance**	**Intensity**	**Duration**	**Spatial Scale**	**Consequence**	**Probability**	**Significance**	
Road and Traffic	**Demolition and removal of all infrastructure and rehabilitate mining site**	**Road Capacity**	1. Relevant road sections (reconstructing/repairing of roads)	*M*	*H*	*M*	*High*	*M*	*High*	*M+*	*H*	*M*	*High*	*M*	*High*	See **Section 2.7** of the report, **Table 2.13, point 3** *(Road maintenance plan recommended)*
			2. Relevant intersections (need for additional lanes)	*L*	*H*	*M*	*Med*	*M*	*Med*	*No mitigation required from a capacity point of view due to proposed development*						See **Section 2.3** of the report and **Appendix C** of the report. (Intersection upgrades required without the proposed development and thus this rating assumes that upgrades has been implemented)
		Road Safety Issues	3. Intersection (access) spacing (Proposed Access Road)	*L*	*H*	*M*	*Med*	*L*	*Med*	*L*	*H*	*M*	*Med*	*L*	*Med*	*See **Section 2.7** of the report and **Table 2.13, point 2.2.** Intersection spacing is deemed to be acceptable. Final spacing to be reviewed as part of detail design phase.*
			4. Vertical road alignment	*L*	*H*	*M*	*Med*	*L*	*Med*	*L*	*H*	*M*	*Med*	*L*	*Med*	*Proposed access intersection proposed on a straight flat section of Road D869.*
			5. Available sight distance at intersection	*L*	*H*	*M*	*Med*	*L*	*Med*	*L*	*H*	*M*	*Med*	*L*	*Med*	*Proposed access intersection proposed on a straight flat section of Road D869. Should be determined as part of detail design phase.*
			6. Speed limit at proposed Access Point B	*M*	*H*	*M*	*High*	*M*	*High*	*M+*	*H*	*M*	*High*	*H*	*High*	*See **Item 2.1** of Table **2.13.** Speed limit should be reduced to at least 60km/h at access intersections.*
			7. Relevant intersections (need for dedicated left- and right-turn lanes, Point B)	*VH*	*H*	*M*	*High*	*H*	*High*	*H+*	*H*	*M*	*High*	*H*	*High*	*See **Item 2.3** of **Table 2.13**, **Table 3.2** and **Figures 3.1, 3.2 and 3.3.** Dedicated right-turn lanes are highly recommended in terms of road safety.*
			8. Pedestrian movements (with reference to access roads and intersections)	*H*	*H*	*M*	*High*	*M*	*High*	*M+*	*H*	*M*	*High*	*M*	*High*	*See **Items 4** of **Table 2.13.** Pedestrian crossings and walkways should be provided at proposed access intersection to create a safe space for pedestrians to cross the roadway.*
			9. Public transport loading and off-loading	*H*	*H*	*M*	*High*	*M*	*High*	*M+*	*H*	*M*	*High*	*M*	*High*	*See **Item 5** of **Table 2.13.** Lack of proper public transport loading and off-loading bays will result in public transport stopping in roadways that could lead to fatal accidents.*

TABLE E-1: IMPACT RATING FOR THE RESPECTIVE PHASES																
CLOSURE PHASE																
RECEPTOR	ACTIVITY		IMPACT	BEFORE MITIGATION						AFTER MITIGATION						Comments and Mitigation Measures
				Intensity	Duration	Spatial Scale	Consequence	Probability	Significance	Intensity	Duration	Spatial Scale	Consequence	Probability	Significance	
Road and Traffic	Leave the mining site completely	Road Capacity	1. Relevant road sections (reconstructing/repairing of roads)	*L*	*H*	*M*	*Med*	*H*	*Med*	*L*	*H*	*M*	*Med*	*H*	*Med*	See **Section 2.7** of the report, **Table 2.13, point 3** *(Road maintenance plan recommended)*
			2. Relevant intersections (need for additional lanes)	*L*	*H*	*M*	*Med*	*H*	*Med*	*L*	*H*	*M*	*Med*	*H*	*Med*	See **Section 2.3** of the report and **Appendix C** of the report. (Intersection upgrades required without the proposed development and thus this rating assumes that upgrades has been implemented)
		Road Safety Issues	3. Intersection (access) spacing (Proposed Access Road)	*L*	*H*	*M*	*Med*	*H*	*Med*	*L*	*H*	*M*	*Med*	*H*	*Med*	*See **Section 2.7** of the report and **Table 2.13, point 2.2.** Intersection spacing is deemed to be acceptable. Final spacing to be reviewed as part of detail design phase.*
			4. Vertical road alignment	*L*	*H*	*M*	*Med*	*H*	*Med*	*L*	*H*	*M*	*Med*	*H*	*Med*	*Proposed access intersection proposed on a straight flat section of Road D869.*
			5. Available sight distance at intersection	*L*	*H*	*M*	*Med*	*H*	*Med*	*L*	*H*	*M*	*Med*	*H*	*Med*	*Proposed access intersection proposed on a straight flat section of Road D869. Should be determined as part of detail design phase.*
			6. Speed limit at proposed Access Point B	*L*	*H*	*M*	*Med*	*H*	*Med*	*L*	*H*	*M*	*Med*	*H*	*Med*	*See **Item 2.1** of Table **2.13.** Speed limit should be reduced to at least 60km/h at access intersections.*
			7. Relevant intersections (need for dedicated left- and right-turn lanes, Point B)	*L*	*H*	*M*	*Med*	*H*	*Med*	*L*	*H*	*M*	*Med*	*H*	*Med*	*See **Item 2.3** of **Table 2.13**, **Table 3.2** and **Figures 3.1, 3.2 and 3.3.** Dedicated right-turn lanes are highly recommended in terms of road safety.*
			8. Pedestrian movements (with reference to access roads and intersections)	*L*	*H*	*M*	*Med*	*H*	*Med*	*L*	*H*	*M*	*Med*	*H*	*Med*	*See **Items 4** of **Table 2.13.** Pedestrian crossings and walkways should be provided at proposed access intersection to create a safe space for pedestrians to cross the roadway.*
			9. Public transport loading and off-loading	*L*	*H*	*M*	*Med*	*H*	*Med*	*L*	*H*	*M*	*Med*	*H*	*Med*	*See **Item 5** of **Table 2.13.** Lack of proper public transport loading and off-loading bays will result in public transport stopping in roadways that could lead to fatal accidents.*

APPENDIX F

IMPACT RATINGS CRITERIA

TABLE F-1: CRITERIA USED IN THE ASSESSMENT OF IMPACTS		
PART A: DEFINITION 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.
	L	Short-term, occurs for more than 1 but less than 5 years.
	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 portion of the site.
	L	Whole site.
	M	Beyond the site boundary, affecting immediate neighbours
	H	Local area, extending far beyond site boundary.
	VH	Regional/National

***VH = very high, H = high, M= medium, L= low and VL= very low and + denotes a positive impact.**

TABLE F-1: CRITERIA USED IN THE ASSESSMENT OF IMPACTS							
PART B: DETERMINING CONSEQUENCE							
SEVERITY = VL							
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	Very low	Low	Low	Medium	Medium
	Very short	VL	Very low	Low	Low	Low	Medium
SEVERITY = L							
DURATION	Very long	VH	Medium	Medium	High	High	High
	Long term	H	Medium	Medium	Medium	High	High
	Medium term	M	Low	Medium	Medium	Medium	High
	Short term	L	Low	Low	Medium	Medium	Medium
	Very short	VL	Very low	Low	Low	Medium	Medium
SEVERITY = M							
DURATION	Very long	VH	Medium	High	High	High	Very High
	Long term	H	Medium	Medium	High	High	High
	Medium term	M	Medium	Medium	Medium	High	High
	Short term	L	Low	Medium	Medium	Medium	High
	Very short	VL	Very low	Low	Medium	Medium	Medium
SEVERITY = 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
SEVERITY = 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 portion of the site	Whole site	Beyond the site boundary, affecting immediate neighbours	Local area, extending far beyond site boundary.	Regional/ National
			EXTENT				

***VH = very high, H = high, M= medium, L= low and VL= very low and + denotes a positive impact.**

TABLE F-1: CRITERIA USED IN THE ASSESSMENT OF IMPACTS							
PART C: DETERMINING SIGNIFICANCE							
PROBABILITY (of exposure to impacts)	Definite/ Continuous	VH	Medium	High	High	Very High	Very High
	Probable	H	Medium	Medium	High	High	Very High
	Possible/ frequent	M	Low	Medium	Medium	High	High
	Conceivable	L	Low	Low	Medium	Medium	High
	Unlikely/ improbable	VL	Very low	Low	Low	Medium	Medium
			VL	L	M	H	VH
			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

***VH = very high, H = high, M= medium, L= low and VL= very low and + denotes a positive impact.**

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 Ingenieursweseprofessie van Suid-Afrika 1990 (Wet 114 van 1990)

Datum *14 November 1996*

Registrasienommer *960547*

President

Registrateur

DE JONG 92

Die Suid-Afrikaanse Instituut van Siviele Ingenieurswese

Hiermee word gesertifiseer dat

Leon Roets

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 resolusie van die Raad

President

Uitvoerende Direkteur

SARF
better roads

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: SARF14/0003/17 (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 Hernic'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 m^2 to 60 000 m^2
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	CPTR	OLS	RATPlan	PTP	ITP	LITP	DITP	Business Plans	Liaison	Public Transport Intermodal 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
Sekhukhune District Municipality		Y	Y	Y	Y	Y										2006
Taxi Recapitalisation for Limpopo Department of Roads & Transport									Y							2005-2004
Limpopo Department or 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						Y										2000
Polokwane, N1 Eastern bypass															Y	2000
Pietersburg-Polokwane Public Transport Strategy					Y											1997