MEMORANDUM

TRAFFIC IMPACT ASSESSMENT

PROPOSED WEST WITS MINING OPERATION TO BE SITUATED OVER SEVERAL PROPERTIES WITHIN THE VICINITY OF ROODEPOORT, FLORIDA AND MEADOWLANDS WEST IN THE CITY OF JOHANNESBURG METROPOLITAN MUNICIPALITY, GAUTENG PROVINCE

APRIL 2019

Prepared for:
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NEMA Regulations (2014) (as amended) - Appendix 6	Relevant section in report
Details of the specialist who prepared the report	Refer to page IV and attached curriculum vitae.
The expertise of that person to compile a specialist report including a curriculum vitae	
A declaration that the person is independent in a form as may be specified by the competent authority	Refer to page III.
An indication of the scope of, and the purpose for which, the report was prepared	Section 1, Page 1.
An indication of the quality and age of base data used for the specialist report	Section 2.1. Traffic count data.
A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 3.
The duration date and season of the site investigation and the relevance of the season to the outcome of the assessment	Not relevant to traffic data.
A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 2.1. Traffic count data.
Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure inclusive of a site plan identifying site alternatives	Section 2.4, Page 48
An identification of any areas to be avoided, including buffers	Section 2.4, Page 49
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 2.4, Page 49
A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2.1.1, Page 10
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities	Section 3
Any mitigation measures for inclusion in the EMPr	Section 3
Any conditions for inclusion in the environmental authorisation	Section 3
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	None
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised and regarding the acceptability of the proposed activity or activities	Section 3
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 3
A description of any consultation process that was undertaken during the course of preparing the specialist report	Not relevant
A summary and copies of any comments received during any consultation process and where applicable all responses thereto	Appendix E
Any other information requested by the competent authority.	Not relevant

Declaration of Independence

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

Consultant name: Leon Roets

Signature: 

Date: 17 April 2019

VERIFICATION PAGE

PROJECT NAME:	PROPOSED WEST WITS MINING OPERATION TO BE SITUATED OVER SEVERAL PROPERTIES WITHIN THE VICINITY OF ROODEPOORT, FLORIDA AND MEADOWLANDS WEST IN THE CITY OF JOHANNESBURG METROPOLITAN MUNICIPALITY, GAUTENG PROVINCE	
Project No:	**Date:**	**Report Status:**
18002A	April 2019	Draft F1-0
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Declaration by registered professional:

The undersigned has been appointed as the registered professional for this Traffic Impact Statement and has applied due diligence to the content of this report and endeavoured to ensure that the TIS is free of technical errors and takes full responsibility for its contents.

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Section 1

INTRODUCTION

Siyazi Gauteng Consulting Services (Pty) Ltd. was appointed by SLR Consulting (South Africa) (Pty) Ltd. to conduct a Traffic Impact Assessment (TIA) for the proposed West Wits mining operation (hereafter referred to as the proposed mining development) to be situated over several properties within the vicinity of Roodepoort, Florida and Meadowlands West in the City of Johannesburg Metropolitan Municipality.

The proposed mining development would consist of a combination of short term opencast mining and also refurbishing of existing underground shafts and infrastructure to conduct longer term underground mining operations.

Opencast mining activities would include conventional open pit mining operations of load and haul while underground mining methods during the later phases would include conventional as well as where appropriate mechanized underground stoping methods.

It is planned that opencast activities would take place in a phased approach and in this regard, once an opencast area has been mined and rehabilitated, the next opencast area would be targeted with some overlapping of mining and rehabilitating of one pit with another. The opencast reserves would be mined first while underground reserves would be phased in once the opencast reserves are depleted.

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

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

Table 1.1 provides a summary of information of the proposed mining development in terms of the anticipated production rates and timelines while **Tables 1.2.1** and **1.2.2** provides a graphical presentation of the relevant timeframes and overlapping of phases where applicable. It is important to take note that the anticipated timeline as depicted by the last mentioned tables provides an estimated timeline in terms of months and or years that mining of each phase is planned for and does not depict the exact month and or year that mining is planned.

Table 1.3 provides information on the relevant intersections under investigation as part of the proposed mining development and to which phases they are applicable as part of this study.

Figures 1.1 and **1.2** provides a graphical presentation of the areas proposed for opencast and underground mining while **Figure 1.3** provides a graphical presentation of the relevant intersections under investigation as part of the proposed mining development.

TABLE 1.1: MINING AREAS, PRODUCTION RATES AND TIMELINES							
MINING PHASE	MINING AREA	METHOD OF MINING	ANTICIPATED TOTAL ORE TO BE MINED (TONNES)	MINING RATE PER MONTH (TONNES)	TIMELINE (YEARS AND MONTHS)		
					CONSTRUCTION	OPERATIONAL	DECOMISIONING AND CLOSURE
Phase 1	Rugby Club Main Reef	Opencast	±30 212	5 036	No construction	6 months	After mining is completed
Phase 2	Roodepoort	Opencast	±179 290	29 882	No construction	6 months	After mining is completed
Phase 3 (Overlapping with Phase 2)	11 Shaft	Opencast	±117 631	19 605	No construction	6 months	After mining is completed
Phase 4 (Overlapping with Phase 3)	Mona Lisa	Opencast	±34 351	11 450	No construction	3 months	After mining is completed
Phase 5 (Overlapping with Phase 4)	Kimberley Reef East	Opencast	±62 917	12 583	No construction	5 months	After mining is completed
Phase 6	Bird Reef Shaft	Underground	±1 800 000	15 000	36 months	10 years	After mining is completed
	Kimberley Reef East Shaft	Underground	±3 600 000	15 000	36 months	20 years	After mining is completed

TABLE 1.2.1: PROPOSED MINING TIMELINE FOR OPENCAST (PIT) MINING																		
	Mar 19	Apr 19	May 19	Jun 19	Jul 19	Aug 19	Sep 19	Oct 19	Nov 19	Dec 19	Jan 20	Feb 20	Mar 20	Apr 20	May 20	Jun 20	Jul 20	Aug 20
YEAR	1												2					
MONTH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
RUGBY CLUB PIT																		
ROODEPOORT PIT																		
11 SHAFT PIT																		
MONA LISA PIT																		
KIMBERLEY EAST PIT																		

TABLE 1.2.2: PROPOSED MINING TIMELINE FOR UNDERGROUND MINING					
	March 2021 to Feb 2022	March 2022 to Feb 2023	March 2023 to Feb 2024	March 2024 to Feb 2034	March 2035 to Feb 2054
YEAR	3	4	5	6 to 16	17 to 26
BIRD REEF UNDERGROUND CONSTRUCTION					
BIRD REEF UNDERGROUND MINING					
KIMBERLEY REEF UNDERGROUND CONSTRUCTION					
KIMBERLEY REEF UNDERGROUND MINING					

TABLE 1.3: RELEVANT INTERSECTIONS UNDER INVESTIGATION					
POINT	INTERSECTION STATUS	INTERSECTION	GPS CO-ORDINATES		INTERSECTION RELEVANT TO MINING PHASE
			LATITUDE	LONGITUDE	
D	Existing	Randfontein Road (Road R41) and Corlette Avenue	26°10'8.08"S	27°49'50.77"E	Phase 4
E	Existing	Randfontein Road (Road R41) and Mathews Goniwe Drive	26°10'11.93"S	27°50'31.75"E	Phase 4
F	Existing	Randfontein Road (Road R41), Iridium Street and Nick Toomey Boulevard	26°10'4.71"S	27°50'57.86"E	Phases 2 & 4
G	Existing	Randfontein Road (Road R41) and Gustaf Street	26° 9'57.09"S	27°51'45.23"E	Phase 2
H	Existing	Randfontein Road (Road R41), Miles Stoker Road, Main Reef Road and Cemetery Road	26°10'19.81"S	27°52'27.11"E	Phase 6
I	Existing	Main Reef Road (Road R41) and Reid Road	26°10'59.62"S	27°53'49.37"E	Phases 1, 3, 5 & 6
J	Existing	Main Reef Road (Road R41) and Westlake Road	26°11'2.37"S	27°53'58.34"E	Phases 1, 3, 5 & 6
K	Existing	Main Reef Road (Road R41) and Mine Road	26°11'4.90"S	27°54'3.85"E	Phases 1, 3, 5 & 6

Table 1.4 contains a summary of the extent of the proposed mining development for all project phases.

The following scenarios were investigated as part of the TIA:

a) **Scenario 1:** 2019 peak hour traffic with background traffic growth, without the proposed mining development (status quo);
b) **Scenario 2:** 2019 peak hour traffic without background traffic growth, with the proposed mining development (**Mining Phase 1**);
c) **Scenario 3:** 2019 peak hour traffic without background traffic growth, with the proposed mining development (**Mining Phases 2 & 3**);
d) **Scenario 4:** 2020 peak hour traffic with background traffic growth, without the proposed mining development;
e) **Scenario 5:** 2020 peak hour traffic with background traffic growth, with the proposed mining development (**Mining Phases 3 & 4**);
f) **Scenario 6:** 2020 peak hour traffic with background traffic growth, with the proposed mining development (**Mining Phases 4 & 5**);
g) **Scenario 7:** 2021 peak hour traffic with background traffic growth, without the proposed mining development;
h) **Scenario 8:** 2021 peak hour traffic with background traffic growth, with the proposed mining development (**Mining Phase 6**);
i) **Scenario 9:** 2029 peak hour traffic with background traffic growth, without the proposed mining development; and
j) **Scenario 10:** 2029 peak hour traffic with background traffic growth, with the proposed mining development (**Mining Phase 6**).

The following sections of the report elaborate on the:

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

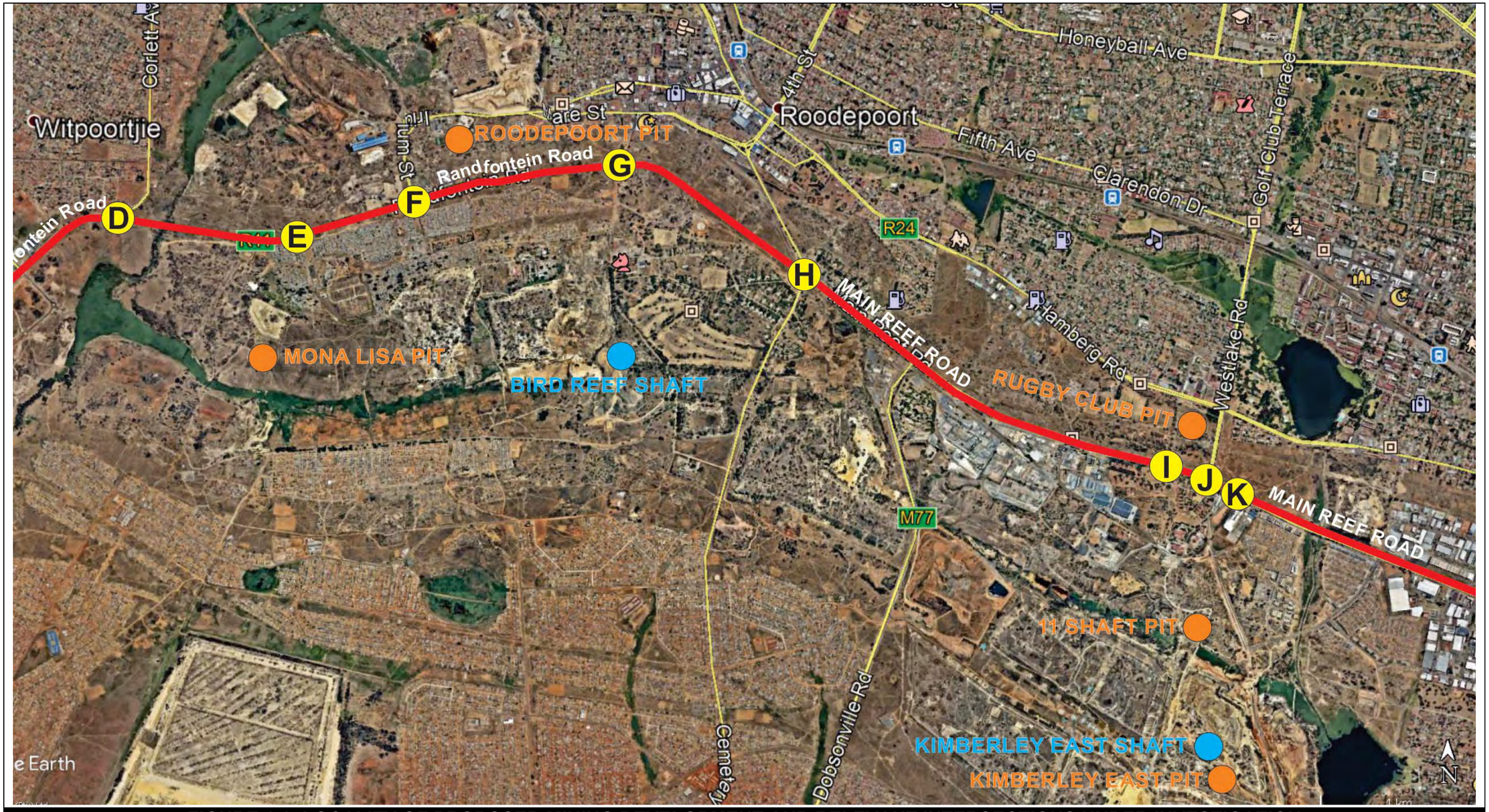


FIGURE 1.1: LOCALITY OF PROPOSED MINING DEVELOPMENT AND RELEVANT INTERSECTIONS UNDER INVESTIGATION

TABLE 1.4: SUMMARY OF THE EXTENT OF THE PROPOSED MINING DEVELOPMENT							
ITEM	**RUGBY CLUB (OPEN PIT)**	**ROODEPOORT MAIN REEF (OPEN PIT)**	**11 SHAFT MAIN REEF (OPEN PIT)**	**MONA LISA BIRD REEF (OPEN PIT)**	**KIMBERLEY EAST (OPEN PIT)**	**BIRD REEF CENTRAL (UNDERGROUND)**	**KIMBERLEY REEF EAST (UNDERGROUND)**
ACTIVITIES	Open pit mining	Open pit mining	Open pit mining	Open pit mining	Open pit mining	Underground mining	Underground mining
MINING DURATION	6 months	6 months	6 months	3 months	5 months	10 years	20 years
CONSTRUCTION TIMELINE	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	March 21 to Feb 24	March 21 to Feb 24
TIMELINE	Mar to Aug 2019	Sep 2019 to Feb 2020	Oct 2019 Mar 2020	Mar to May 2020	Apr to Aug 2020	Mar 2024 to Feb 2034	Mar 2024 to Feb 2044
VOLUME OF ORE TO BE EXCAVATED AND TRANSPORTED TO PLANT (TONNES)	Total = 30 212 Per month = 5 036	Total = 179 290 Per month = 29 882	Total = 117 631 Per month = 19 605	Total = 34 351 Per month = 11 450	Total = 62 917 Per month = 12 583	Per month = 15 000	Per month = 15 000
DESTINATION OF PLANT FOR PROCESSING	Driekop Gold Mine or Sibanye Gold Mine	Driekop Gold Mine or Sibanye Gold Mine	Driekop Gold Mine or Sibanye Gold Mine	Driekop Gold Mine or Sibanye Gold Mine	Driekop Gold Mine or Sibanye Gold Mine	Driekop Gold Mine or Sibanye Gold Mine	Driekop Gold Mine or Sibanye Gold Mine
MODE OF TRANSPORT OF ORE	34 ton trucks	34 ton trucks	34 ton trucks	34 ton trucks	34 ton trucks	34 ton trucks	34 ton trucks
NUMBER OF WORKERS PER SHIFT							
Management / supervision staff	9	9	9	9	9	16	16
Semi-skilled staff	38	38	38	38	38	169	169
TOTAL PER SHIFT	47	47	47	47	47	184	184
NUMBER OF SHIFTS AND SHIFT TIMES							
Management / supervision staff	1 shift (06:00 to 18:00)	1 shift (06:00 to 18:00)	1 shift (06:00 to 18:00)	1 shift (06:00 to 18:00)	1 shift (06:00 to 18:00)	3 shifts (07:00 - 15:00) (15:00 - 23:00) (23:00 - 07:00)	3 shifts (07:00 - 15:00) (15:00 - 23:00) (23:00 - 07:00)
Semi-skilled staff	1 shift (06:00 to 18:00)	1 shift (06:00 to 18:00)	1 shift (06:00 to 18:00)	1 shift (06:00 to 18:00)	1 shift (06:00 to 18:00)	3 shifts (07:00 - 15:00) (15:00 - 23:00) (23:00 - 07:00)	3 shifts (07:00 - 15:00) (15:00 - 23:00) (23:00 - 07:00)
MODE OF TRANSPORT FOR WORKERS	Own / Public transport / walk	Own / Public transport / walk	Own / Public transport / walk	Own / Public transport / walk	Own / Public transport / walk	Own / Public transport / walk	Own / Public transport / walk
TRUCKS PER DAY TRANSPORTING ORE OFF-SITE (5 DAYS PITS, 7 DAYS UNDERGROUND)	7	42	27	16	18	14	14
% ORE TRANSPORTING TRUCKS DURING TRAFFIC PEAK (Based on Traffic Engineering Assumptions)	20%	20%	20%	20%	20%	20%	20%
TOTAL ORE TRANSPORTING TRUCKS DURING TRAFFIC PEAK (ROUNDED OFF)	2	8	6	3	4	3	3
HEAVY VEHICLES DELIVERING CONSUMABLES PER DAY	5	5	5	5	5	10	10

Section 2

DETAILED INFORMATION RELATED TO DATA COLLECTED AND INVESTIGATIONS

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

a) The *status quo* of the land use and road network characteristics of roads relevant to the proposed mining development which consists of the following information;
   i. Existing land use information;
   ii. Existing road characteristics and modal distribution; and
   iii. Traffic counts as basis for making traffic-engineering calculations.

b) The future land use and road network characteristics relevant to the proposed mining development which consists of the following information;
   i. Land use information, including existing and proposed approved future developments in the area other than the proposed mining development;
   ii. Future planned roads in the vicinity of the proposed mining development;
   iii. Determination of vehicle trips expected to be generated due to the proposed mining development; and
   iv. Access options for consideration to and from the proposed mining development.

c) The current and future levels of service at the relevant intersections under investigation; and

d) Other traffic-related issues.

The following subsection elaborates on the above mentioned.

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

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

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

2.1.1 EXISTING LAND USE INFORMATION

Land uses associated with the relevant properties of the proposed mining development include a combination of informal settlements, low-cost and high-cost residential areas, community and municipal facilities, agricultural areas, recreational areas, industrial areas, manufacturing and distribution facilities, commercial businesses, historical mine housing and historical mine infrastructure (slimes dams, shafts, derelict/abandoned buildings and water dams), illegal informal mining activities, mining activities, open land, substations and powerlines, gas and petrol pipelines, service and road infrastructure. For the purpose of this traffic impact assessment, it is assumed that

a) The vehicle traffic absorption rate (rate at which existing developments attract vehicular traffic) by all other types of completed developments will maintain the same status for the next ten years; and
b) That the average rate of growth of vehicle traffic in the area under investigation that is not relevant to the proposed mining development (background traffic) between the 2018 manual traffic counts and the 2019 to 2029 scenarios was anticipated at 3% per annum.

2.1.2 EXISTING ROAD CHARACTERISTICS AND MODAL DISTRIBUTION

The following are relevant as part of this section:

a) **Table 2.1** contains information related to the existing intersections under investigation.
b) **Figure 2.1** provides the existing road network layout for the area under investigation.
c) **Table 2.2** provides information concerning the relevant road sections under investigation and includes the following:

    i) Relevant road section;
    ii) Picture of road section;
    iii) Existing class of road;
    iv) Proposed class of road;
    v) Road reserve widths;
    vi) Lane widths; and
    vii) Median widths.

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

TABLE 2.1: SUMMARY OF INTERSECTION CONTROL AT EXISTING INTERSECTIONS UNDER INVESTIGATION				
POINT	**DESCRIPTION**	**INTERSECTION CONTROL**	**PEDESTRIAN ACTIVITIES**	**INTERSECTION PHOTO**
D	Randfontein Rd (Road R41) and Corlette Ave	Traffic Light Signal Controlled	Pedestrian activity observed during surveys	
E	Randfontein Rd (Road R41) and Mathews Goniwe Drive	Free-flow on Randfontein Rd	Pedestrian activity observed during surveys	
F	Randfontein Rd (Road R41), Iridium Str and Nick Toomey Blvd	Traffic Light Signal Controlled	Pedestrian activity observed during surveys	
G	Randfontein Rd (Road R41) and Gustaf Str	Traffic Light Signal Controlled	Pedestrian activity observed during surveys	
H	Randfontein Rd (Road R41), Miles Stoker Road, Main Reef Road (Road R41) and Cemetery Road	Free-flow and give-way (Roundabout)	Pedestrian activity observed during surveys	
I	Main Reef Rd (Road R41) and Reid Rd	Free-flow on Main Reef Rd	Pedestrian activity observed during surveys	
J	Main Reef Rd (Road R41) and Westlake Rd	Traffic Light Signal Controlled	Pedestrian activity observed during surveys	
K	Main Reef Rd (Road R41) and Mine Road	Free-flow on Main Reef Rd	Pedestrian activity observed during surveys	

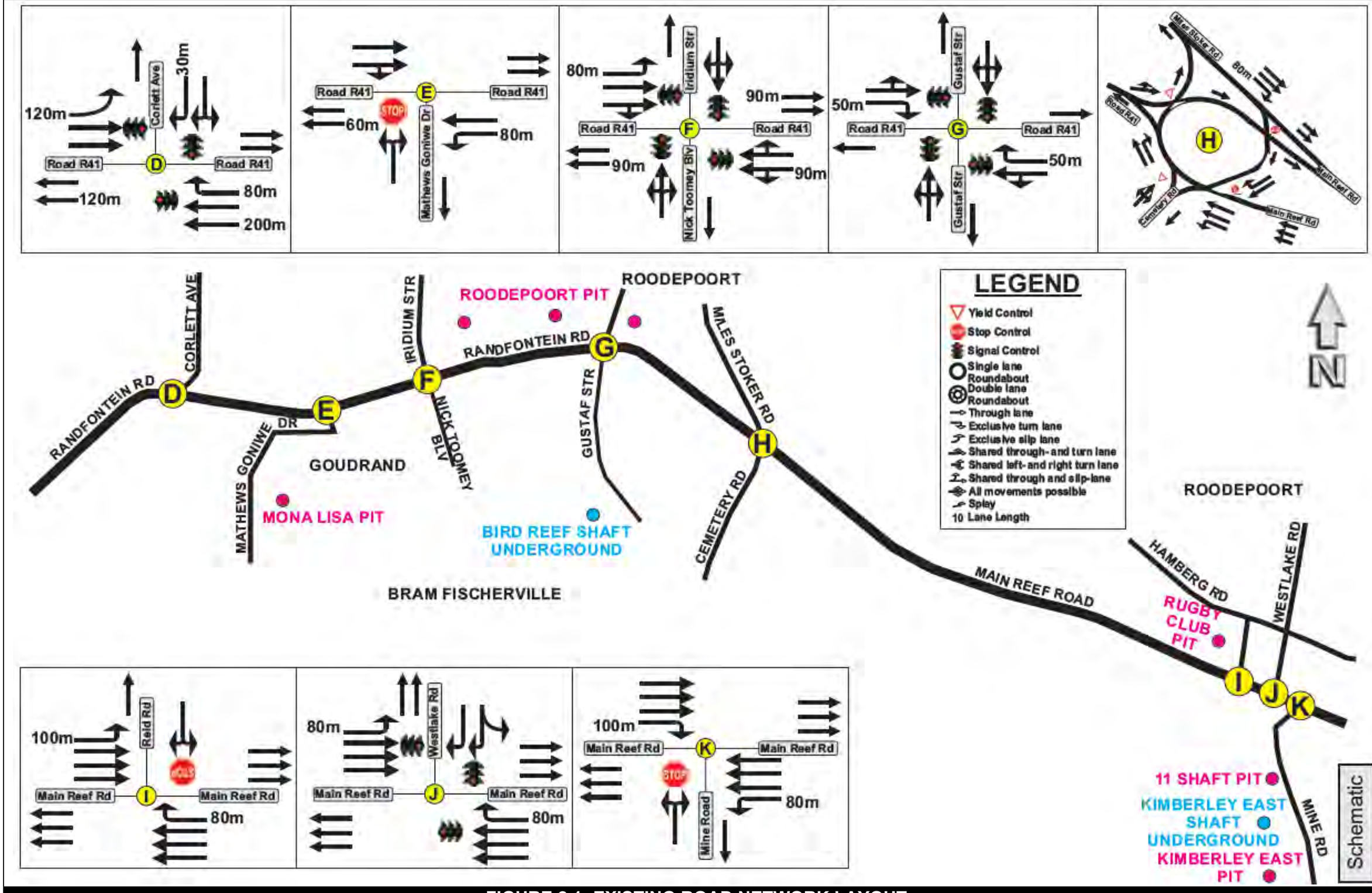


FIGURE 2.1: EXISTING ROAD NETWORK LAYOUT

TABLE 2.2: SUMMARY OF ROAD CHARACTERISTICS

RELEVANT ROAD SECTION	PICTURE OF ROAD SECTION	EXISTING CLASS OF ROAD	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 5 Years	Speed Limit
Road Section 1 **Randfontein Rd (Road R41)** Road between Johannesburg CBD and Randfontein		**Primary Function:** Mobility **Class:** Major Arterial; **Class No.:** U2; **Route No.:** R **Description:** Highway **Spacing between Intersections:** 800m (±15%)	**Proposed Function:** Mobility **Class:** Major Arterial; **Class No.:** U2; **Route No.:** R **Description:** Highway **Spacing between Intersections:** 800m (±15%)	Gauteng Department of Roads and Transport	±40m	One lane per direction	3.7m wide	Asphalt	None.	3%	60-80 km/h
Road Section 2 **Corlett Ave** Link between Roads R41 and R24		**Primary Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	**Proposed Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	Johannesburg Roads Agency	±25m	One lane per direction	3.0m wide	Asphalt	None.	3%	60 km/h

TABLE 2.2: SUMMARY OF ROAD CHARACTERISTICS (Continue)

RELEVANT ROAD SECTION	PICTURE OF ROAD SECTION	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 **Mathews Goniwe Drive** Providing access to Goudrand from and to Road R41		**Primary Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	**Proposed Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	Johannesburg Road Agency	±20m	One lane per direction	3.5m wide	Asphalt	None.	3%	60 km/h for relevant section
Road Section 4 **Irridium Str** Providing access to Davidsonville from and to Road R41		**Primary Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	**Proposed Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	Johannesburg Road Agency	±20m	One lane per direction	3.5m wide	Asphalt	None.	3%	60 km/h for relevant section

TABLE 2.2: SUMMARY OF ROAD CHARACTERISTICS (Continue)

RELEVANT ROAD SECTION	PICTURE OF ROAD SECTION	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 5 **Nick Toomey Blvd** Providing access to Matholesville from and to Road R41		**Primary Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	**Proposed Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	Johannesburg Road Agency	±20m	One lane per direction	3.5m wide	Asphalt	None.	3%	60 km/h for relevant section
Road Section 6 **Gustaf Str** Providing access to Roodepoort West from and to Road R41		**Primary Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	**Proposed Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	Johannesburg Road Agency	±20m	One lane per direction	3.7m wide	Asphalt	None.	3%	60 km/h for relevant section

TABLE 2.2: SUMMARY OF ROAD CHARACTERISTICS (Continue)

RELEVANT ROAD SECTION	PICTURE OF ROAD SECTION	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 7 **Miles Stoker Road** Providing access to Roodepoort from Road R41		**Primary Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	**Proposed Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	Johannesburg Road Agency	±30m	One lane south to north, two lanes north to south	3.7m wide	Asphalt	None.	3%	60 km/h
Road Section 8 **Main Reef Road (Road R41)** Road between Johannesburg CBD and Randfontein		**Primary Function:** Mobility **Class:** Major Arterial; **Class No.:** U2; **Route No.:** R **Description:** Highway **Spacing between Intersections:** 800m (±15%)	**Primary Function:** Mobility **Class:** Major Arterial; **Class No.:** U2; **Route No.:** R **Description:** Highway **Spacing between Intersections:** 800m (±15%)	Johannesburg Road Agency	±60m	Three lanes per direction	3.7m wide	Asphalt	14m	3%	80 km/h

TABLE 2.2: SUMMARY OF ROAD CHARACTERISTICS (Continue)

RELEVANT ROAD SECTION	PICTURE OF ROAD SECTION	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 9 **Cemetery Road** Providing access to Bram Fischerville from Road R41		**Primary Function:** Access / Activity Class: Collector Street; Class No.: U4a; Route No.: N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	**Proposed Function:** Access / Activity Class: Collector Street; Class No.: U4a; Route No.: N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	Johannesburg Road Agency	±20m	One lane per direction	3.7m wide	Asphalt	None.	3%	60 km/h for relevant section
Road Section 10 **Reid Road** Providing access to Florida Lake from Road R41		**Primary Function:** Access / Activity Class: Collector Street; Class No.: U4a; Route No.: N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	**Proposed Function:** Access / Activity Class: Collector Street; Class No.: U4a; Route No.: N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	Johannesburg Road Agency	±20m	One lane per direction	3.7m wide	Asphalt	None.	3%	60 km/h for relevant section

TABLE 2.2: SUMMARY OF ROAD CHARACTERISTICS (Continue)

RELEVANT ROAD SECTION	PICTURE OF ROAD SECTION	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 11 **Westlake Road** Providing access to Florida Lake / Park from Road R41		**Primary Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	**Proposed Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	Johannesburg Road Agency	±40m	Two lanes per direction	3.7m wide	Asphalt	5m	3%	60 km/h for relevant section
Road Section 12 **Mine Road** Providing access to Meadowlands West from Road R41		**Primary Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	**Proposed Function:** Access / Activity **Class:** Collector Street; **Class No.:** U4a; **Route No.:** N/a **Description:** Major Collector **Spacing between Intersections:** > 150m	Johannesburg Road Agency	±20m	One lane per direction	3.7m wide	Asphalt	None.	3%	60 km/h for relevant section

TABLE 2.3: URBAN FUNCTIONAL ROAD CLASIFICATION

(COTO TRH26 - SOUTH AFRICAN ROAD CLASSIFICATION AND ACCESS MANAGEMENT MANUAL VERSION 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 CLASSIFICATION AND ACCESS MANAGEMENT MANUAL VERSION 1.0 AUGUST 2012)

BASIC FUNCTION	DESCRIPTION		REQUIREMENTS					TYPICAL FEATURES (Use appropriate context sensitive standards for design)								
	CLASS NO (U_)	CLASS NAME	DESIGN TOPOLOGY	ROUTE NO,	INTERSECTION SPACING	ACCESS TO PROPERTY	PARKING	SPEED km/h	INTERSECTION CONTROL	TYPICAL CROSS SECTION	ROADWAY / LANE WIDTH	ROAD RESERVE WIDTH	PUBLIC TRANSPORT AND PEDESTRIAN CROSSINGS	PEDESTRIAN FOOTWAYS (CONSTRUCTED)	CYCLE LANES	TRAFFIC CALMING
Mobility	U1	Principal arterial	Expressway	Yes (M/R/N)	2,4km (1.6km - 3.6km)	Not allowed */**	No	100 - 120	Interchange	4/6/8 lane freeway	3.3 - 3.7m lanes	60 - 120m (60m)	No	No	No	No
	U2	Major arterial	Highway	Yes (M/R)	800m (±15%)	Not allowed */**	No	80	Co-ordinated traffic signal, interchange	4/6 lane divided. Kerbed	3.3 - 3.6m lanes	38 - 62m (40m)	Yes at intersections	Off road	Yes - widen roadway	No
	U3	Minor arterial	Main road	Yes (M)	600m (±20%)	Not allowed */**	No	70	Co-ordinated traffic signal, roundabout	4 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, residential	Residential minor collector	No	> 150m	Yes	Yes if appropriate	50	Roundabout, mini-circle or priority	2/3 lane undivided	6-9m roadway, < 3.3m lanes	16 - 30m (20m)	Yes anywhere	Yes	Yes, on road or verge	Raised pedestrian, median, narrow lanes
	U5a	Local street, commercial	Commercial access street	No	-	Yes	Yes if conditions allow	40	Priority	2 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-ENGINEERING CALCULATIONS

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

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

The relevant 12-hour manual traffic counts were conducted on Friday 20 April 2018 at the following intersection under investigation:

a) **Point D**: Intersection of Randfontein Road (Road R41) and Corlette Avenue;
b) **Point E**: Intersection of Randfontein Road (Road R41) and Mathews Goniwe Drive;
c) **Point F**: Intersection of Randfontein Road (Road R41), Iridium Street and Nick Toomey Boulevard;
d) **Point G**: Intersection of Randfontein Road (Road R41) and Gustaf Street;
e) **Point H**: Intersection of Randfontein Road (Road R41), Miles Stoker Road, Main Reef Road and Cemetery Road;
f) **Point I**: Intersection of Main Reef Road (Road R41) and Reid Road;
g) **Point J**: Intersection of Main Reef Road (Road R41) and Westlake Road; and
h) **Point K**: Intersection of Main Reef Road (Road R41) and Mine Road.

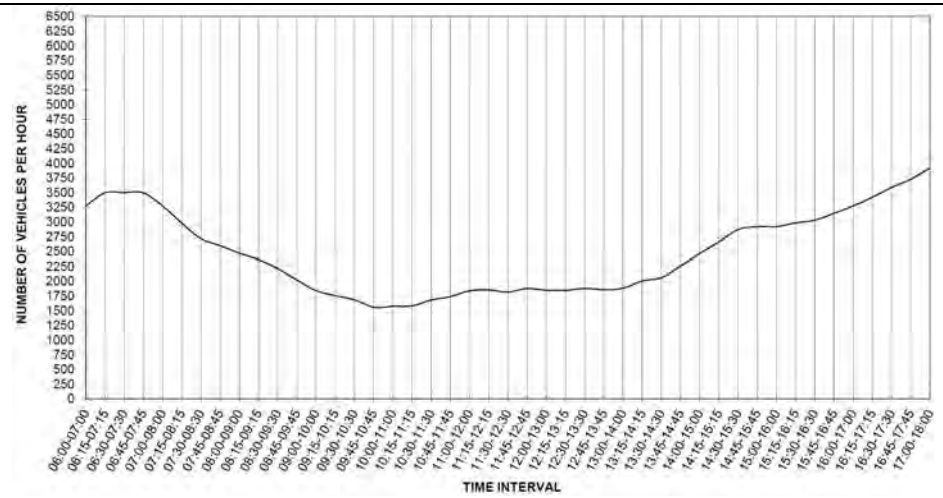
The combined hourly totals of all the vehicle types for the traffic survey conducted on Friday 20 April 2018 between 06:00 and 18:00 are indicated in **Tables A-1** to **A-8** of **Appendix A** of this report. The description of the relevant vehicle movements at the relevant intersection appears in **Figure A-1** of **Appendix A**. **Figure B-1** provides a graphical presentation of the peak-hour traffic volumes as derived from the relevant manual traffic counts.

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

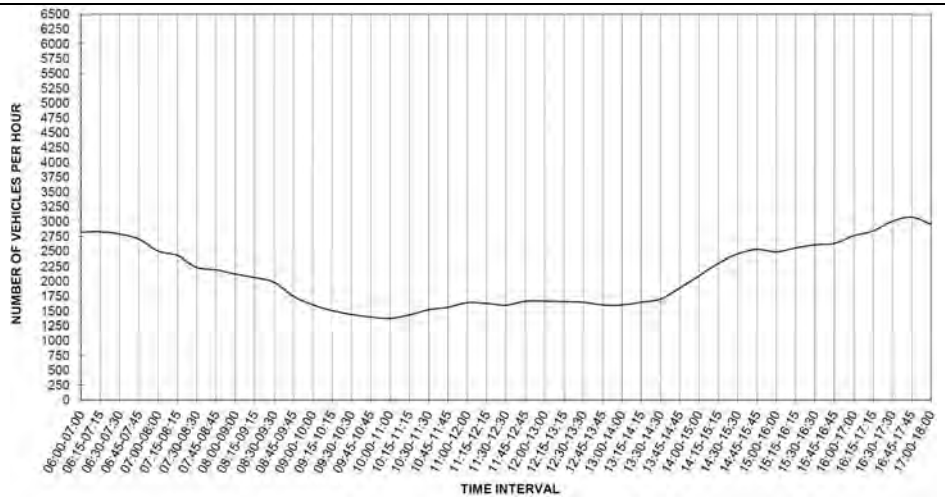
It is assumed, as a worst case scenario, that shift starting and ending times of the proposed mining development (see **Table 1.1**) would fall within the existing vehicle traffic peak times for the purpose of the TIA.

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
D	Randfontein Road (Road R41) and Corlette Avenue	06:30 – 07:30	3 500	17:00 to 18:00	3 918
E	Randfontein Road (Road R41) and Mathews Goniwe Drive	06:15 – 07:15	2 828	16:45 to 17:45	3 074
F	Randfontein Road (Road R41), Iridium Street and Nick Toomey Boulevard	06:30 – 07:30	4 066	16:45 to 17:45	4 339
G	Randfontein Road (Road R41) and Gustaf Street	06:00 – 07:00	3 945	16:45 to 17:45	3 839
H	Randfontein Road (Road R41), Miles Stoker Road, Main Reef Road and Cemetery Road	06:15 – 07:15	5 195	16:15 to 17:15	5 265
I	Main Reef Road (Road R41) and Reid Road	06:45 – 07:45	5 066	17:00 to 18:00	3 692
J	Main Reef Road (Road R41) and Westlake Road	06:45 – 07:45	6 246	17:00 to 18:00	4 350
K	Main Reef Road (Road R41) and Mine Road	06:45 – 07:45	5 553	17:00 to 18:00	3 605

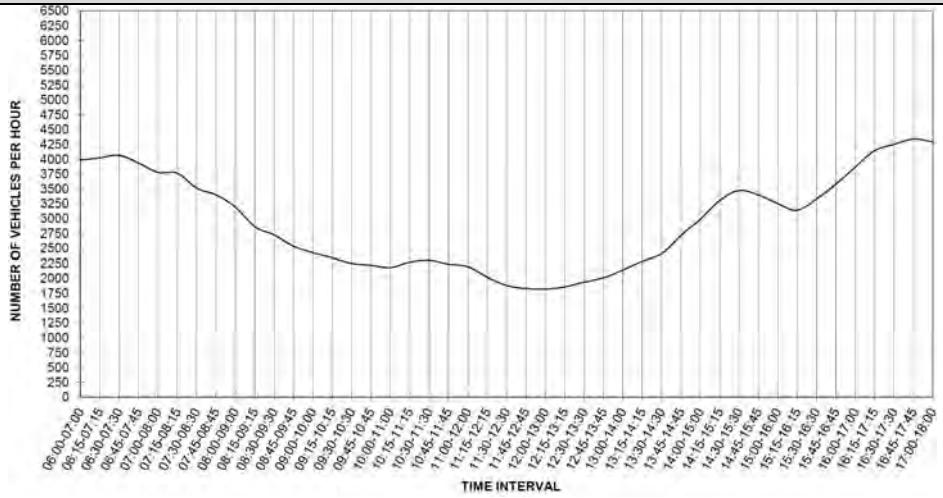
Figure 2.2 indicates the hourly traffic pattern, per 15-minute interval, for all modes of vehicles at the relevant intersections between 06:00 and 18:00 on Friday 20 April 2018. A graphical presentation of the peak-hour vehicle flows is indicated with **Figure B-1** of **Appendix B**.



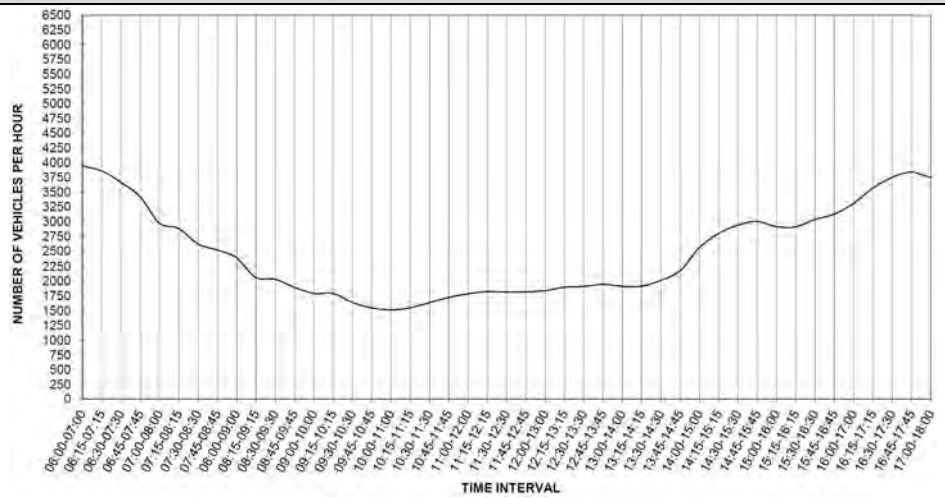
INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND CORLETTE AVENUE (POINT D)



INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND MATHEWS GONIWE DRIVE (POINT E)

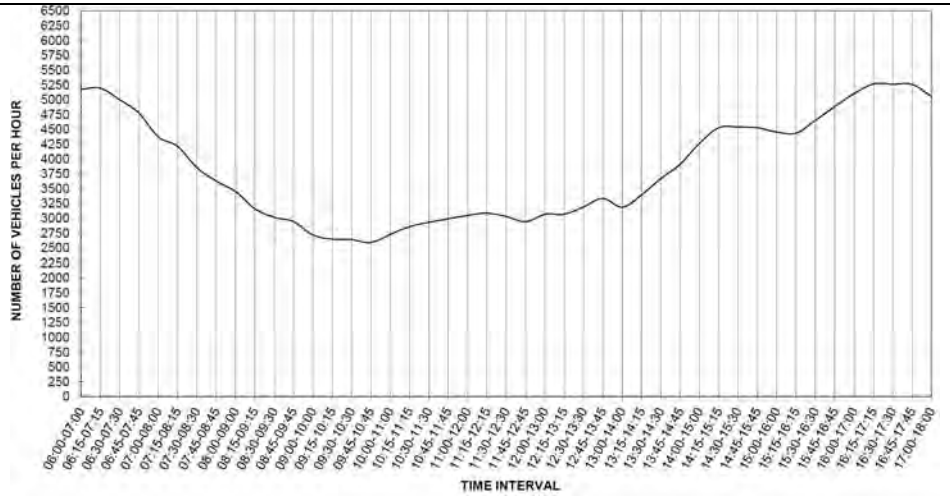


INTERSECTION OF RANDFONTEIN ROAD (ROAD R41), IRIDIUM STREET AND NICK TOOMEY BOULEVARD (POINT F)

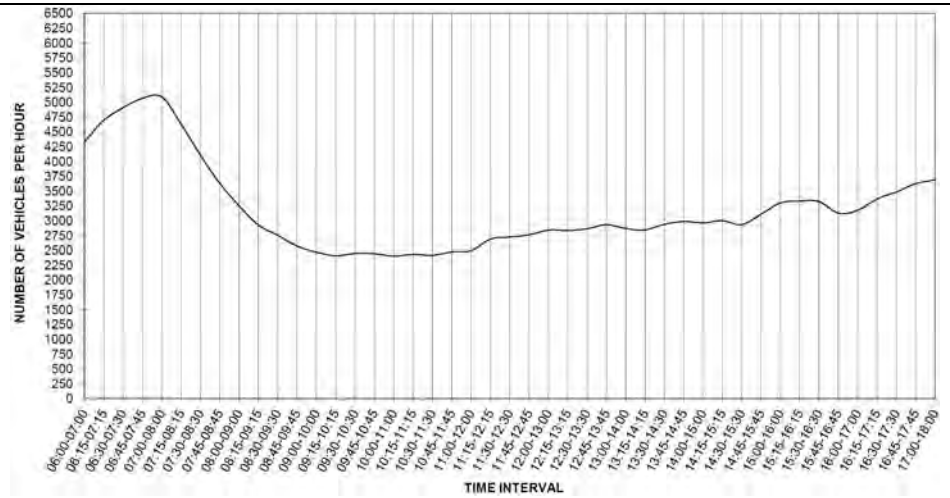


INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND GUSTAF STREET (POINT G)

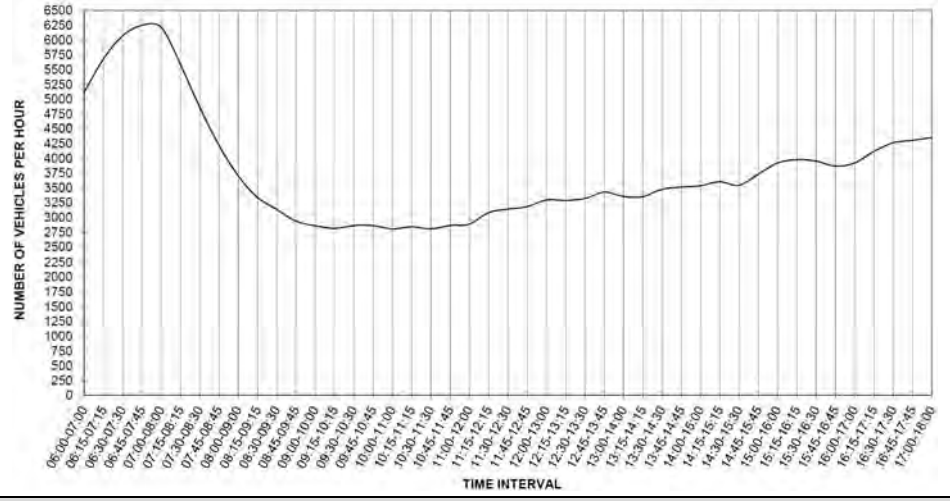
FIGURE 2.2: HOURLY TRAFFIC PATTERN PER 15-MINUTE INTERVAL FOR ALL MODES OF VEHICLES (06:00 to 18:00) AT THE RELEVANT INTERSECTIONS



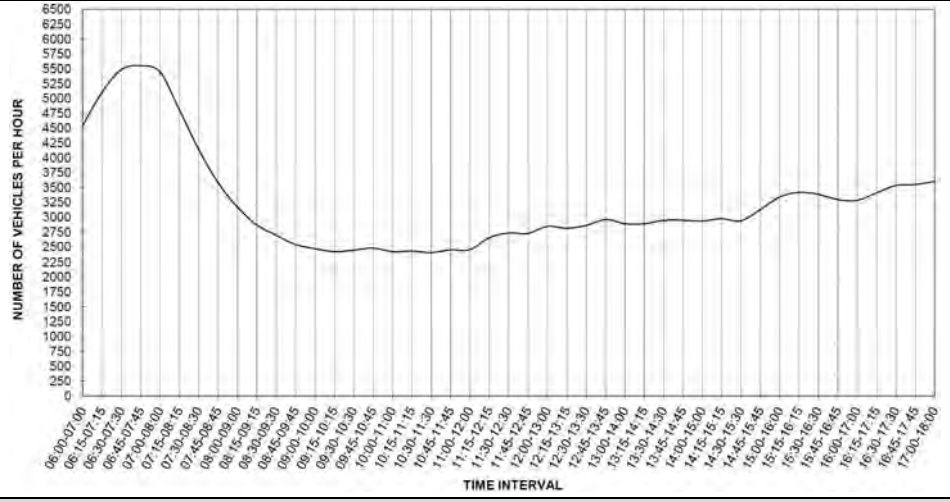
INTERSECTION OF RANDFONTEIN ROAD (ROAD R41), MILES STOKER ROAD, MAIN REEF ROAD AND CEMETERY ROAD (POINT H)



INTERSECTION OF MAIN REEF ROAD (ROAD R41) AND REID ROAD (POINT I)



INTERSECTION OF MAIN REEF ROAD (ROAD R41) AND WESTLAKE ROAD (POINT J)



INTERSECTION OF MAIN REEF ROAD (ROAD R41) AND MINE ROAD (POINT K)

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

2.2 FUTURE LAND USE AND ROAD CHARACTERISTICS

The following are relevant:

a) Land use information, including existing and proposed future approved developments in the area;
b) Future planned roads in the vicinity of the proposed mining development; and
c) Determination of the vehicle trips anticipated to be generated by the proposed mining development.

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

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

A mixed-use residential and commercial development, known as the Goudrand Mega City is planned to be developed by Dino Properties (Pty) Ltd. on Portions of the Remainder of Portion 1 and Portions of the Remainder of Portion 5 and Portion 404 (a portion of Portion 1 of the Farm Roodepoort 237IQ). Refer to **Figure 2.3** for a graphical presentation of the locality of the proposed Goudrand Mega City.

Currently the whole township is known as Goudrand Ext 4 and it will be subdivided into 15 different phases to be known as Goudrand Ext 5 to 19. The proposed Goudrand Ext 4 development is an integrated development consisting of 13 000 plus potential housing opportunities. The first phase of the development is a mixed use project comprising of 13 197 housing opportunities in a mix of 1 204 Residential 1 bonded units, 1 325 Residential 1 FLISP units, 10 668 Residential 3 units, 5 educational sites, 3 shopping centre sites, and 7 crèche sites, 8 worship sites, a hospital site, a cemetery and municipal sites.

The proposed Goudrand Mega City is planned to comprise a total of 20 000 to 25 000 housing units.

It is important to take note that the proposed Goudrand Mega City is planned for only after the rehabilitation of the Durban Deep mining development and is therefore envisaged to not have an impact on the proposed mining development within the timeframe for which this study has been conducted.

Information source: The Gauteng Department of Human Settlements' (GDHS): MEGA-Projects-Booklet-V7

FIGURE 2.3: LOCALITY OF THE PROPOSED GOUDRAND MEGA CITY

Source: The Gauteng Department of Human Settlements' (GDHS): MEGA-Projects-Booklet-V7

2.2.2 FUTURE PLANNED ROADS IN THE VICINITY OF THE PROPOSED MINING DEVELOPMENT

Information was gathered in terms of the future planned roads network within the vicinity of the proposed mining development. Information was obtained from the Gauteng Province: Department of Roads and Transport (Gautrans) "*Gauteng Roads Atlas 2015/2016*". The following planned future roads were identified:

a) Proposed extension of Road N17 south of the proposed mining development; and
b) Proposed Road PWV5 west of the proposed mining development.

Refer to **Figure 2.4** for a graphical presentation of the proposed road network within the vicinity of the proposed mining development.

It is anticipated that the construction of the proposed extension of Road N17 and the proposed Road PWV5 is not planned for in the near future and it is anticipated that the proposed roads would not have an impact on any of the proposed mining development activities.

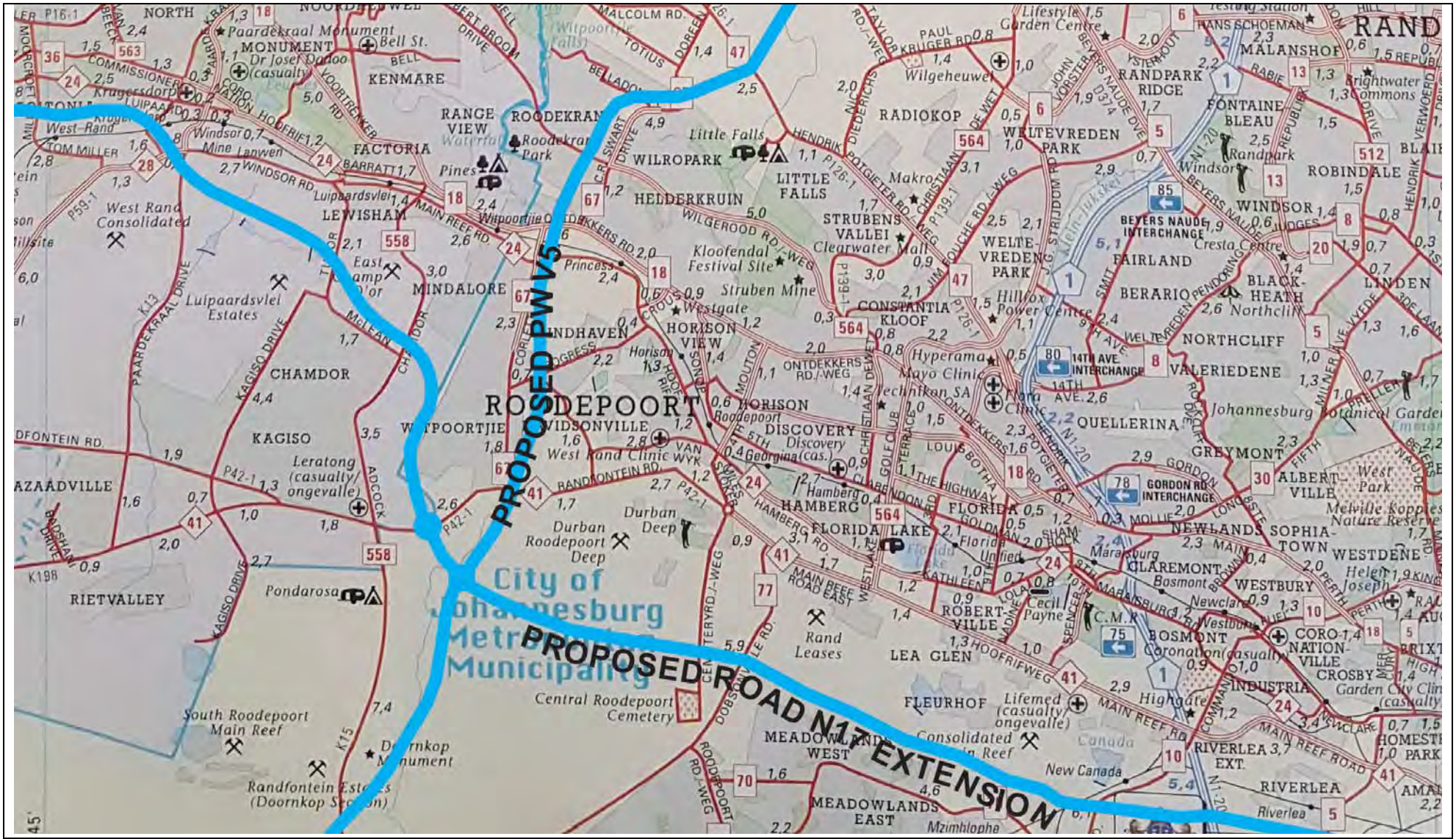


FIGURE 2.4: PROPOSED FUTURE ROADS NETWORK

Information regarding the proposed alignment of the proposed Roads N17 and PWV5 was obtained from the Gauteng Province: Department of Roads and Transport (Gautrans) "*Gauteng Roads Atlas 2015/2016*"

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

The following tables indicate the trip generation rates, the number of vehicle trips which are expected to be generated due to the proposed activities of the proposed mining development for the operational phases:

a) **Table 2.6**: Trip generation rates, expected number of vehicle trips to be generated due to the proposed mining development and the distribution of vehicle trips (**Phase 1 – Rugby Club Pit**).
b) **Table 2.7**: Trip generation rates, expected number of vehicle trips to be generated due to the proposed mining development and the distribution of vehicle trips (**Phase 2 – Roodepoort Main Reef Pit**).
c) **Table 2.8**: Trip generation rates, expected number of vehicle trips to be generated due to the proposed mining development and the distribution of vehicle trips (**Phase 3 – 11 Shaft Main Reef Pit**).
d) **Table 2.9**: Trip generation rates, expected number of vehicle trips to be generated due to the proposed mining development and the distribution of vehicle trips (**Phase 4 – Mona Lisa Pit**).
e) **Table 2.10**: Trip generation rates, expected number of vehicle trips to be generated due to the proposed mining development and the distribution of vehicle trips (**Phase 5 – Kimberley East Pit**).
f) **Table 2.11**: Trip generation rates, expected number of vehicle trips to be generated due to the proposed mining development and the distribution of vehicle trips (**Phase 6 – Bird Reef Underground**).
g) **Table 2.12**: Trip generation rates, expected number of vehicle trips to be generated due to the proposed mining development and the distribution of vehicle trips (**Phase 6 – Kimberley East Underground**).

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.

At the time of preparing this study it was not determined to where exactly the ore that is proposed to be excavated will be transported to for processing.

It could be expected that most anticipated heavy vehicles transporting excavated ore as part of the proposed mining development would transport ore via Road R558 towards the south.

TABLE 2.6: TRIP GENERATION RATES, EXPECTED NUMBER OF VEHICLE TRIPS TO BE GENERATED DUE TO THE PROPOSED MINING DEVELOPMENT AND THE DISTRIBUTION OF VEHICLE TRIPS (PHASE 1 – RUGBY CLUB PIT)

Item	Component	Number Workers per Day	% Workers active during Peak Hour	Number Workers Active per Peak Hour	Number Trucks Per Day	% Trucks active during Peak Hour	Number Trucks active during Peak Hour	Assumed Average Number Persons per Veh	Comments	Trip Generation Calculations for Peak Hour						Final Trip Information for Traffic Engineering Calculations			
										If Inward Movement is relevant Value = 1	Number Vehicle Trips for Inwards Direction	If Outward Movement is relevant Value = 1	Number Vehicle Trips for Outwards Direction	Total Number Vehicle Trips Generated during Peak Hour (In & Out)	Calculated Trip Generation Rate per Vehicle during Peak Hour	Trip Dist. %		Trip Generation	
																In	Out	In	Out
AM Peak Hour																			
1.	Permanent Mining workers (Management / supervision) using own transport	6	100%	6				1,2	Trips per Worker (1.2 Persons per Vehicle)	1	5	0	0	5	**0,83**	100%	0%	5	0
2.	Permanent Mining workers (Semi-skilled) using public transport or walking to site	10	100%	10				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	100%	0%	0	0
3.	Contract Mining workers (Management / supervision) using own transport	3	100%	3				1,2	Trips per Worker (1.2 Persons per Vehicle)	1	3	0	0	3	**0,83**	100%	0%	3	0
4.	Contract Mining workers (Semi-skilled) using public transport or walking to site	28	100%	28				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	100%	0%	0	0
5.	Heavy vehicles transporting excavated ore to processing plant				7	20%	2	1,0	20% of heavy vehicles expected during peak periods	1	2	1	2	4	**2,00**	50%	50%	2	2
6.	Additional heavy vehicles delivering consumables per day				5	20%	1	1,0	20% of heavy vehicles expected during peak periods	1	1	1	1	2	**2,00**	50%	50%	1	1
									TOTAL					14				11	3
PM Peak Hour																			
1.	Permanent Mining workers (Management / supervision) using own transport	6	100%	6				1,2	Trips per Worker (1.2 Persons per Vehicle)	0	0	1	5	5	**0,83**	0%	100%	0	5
2.	Permanent Mining workers (Semi-skilled) using public transport or walking to site	10	100%	10				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	0%	100%	0	0
3.	Contract Mining workers (Management / supervision) using own transport	3	100%	3				1,2	Trips per Worker (1.2 Persons per Vehicle)	0	0	1	3	3	**0,83**	0%	100%	0	3
4.	Contract Mining workers (Semi-skilled) using public transport or walking to site	28	100%	28				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	0%	100%	0	0
5.	Heavy vehicles transporting excavated ore to processing plant				7	20%	2	1,0	20% of heavy vehicles expected during peak periods	1	2	1	2	4	**2,00**	50%	50%	2	2
6.	Additional heavy vehicles delivering consumables per day				5	20%	1	1,0	20% of heavy vehicles expected during peak periods	1	1	1	1	2	**2,00**	50%	50%	1	1
									TOTAL					14				3	11

TABLE 2.7: TRIP GENERATION RATES, EXPECTED NUMBER OF VEHICLE TRIPS TO BE GENERATED DUE TO THE PROPOSED MINING DEVELOPMENT AND THE DISTRIBUTION OF VEHICLE TRIPS (PHASE 2 – ROODEPOORT MAIN REEF PIT)

Item	Component	Number Workers per Day	% Workers active during Peak Hour	Number Workers Active per Peak Hour	Number Trucks Per Day	% Trucks active during Peak Hour	Number Trucks active during Peak Hour	Assumed Average Number Persons per Veh	Comments	Trip Generation Calculations for Peak Hour						Final Trip Information for Traffic Engineering Calculations			
										If Inward Movement is relevant Value = 1	Number Vehicle Trips for Inwards Direction	If Outward Movement is relevant Value = 1	Number Vehicle Trips for Outwards Direction	Total Number Vehicle Trips Generated during Peak Hour (In & Out)	Calculated Trip Generation Rate per Vehicle during Peak Hour	Trip Dist. %		Trip Generation	
																In	Out	In	Out
AM Peak Hour																			
1.	Permanent Mining workers (Management / supervision) using own transport	6	100%	6				1,2	Trips per Worker (1.2 Persons per Vehicle)	1	5	0	0	5	**0,83**	100%	0%	5	0
2.	Permanent Mining workers (Semi-skilled) using public transport or walking to site	10	100%	10				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	100%	0%	0	0
3.	Contract Mining workers (Management / supervision) using own transport	3	100%	3				1,2	Trips per Worker (1.2 Persons per Vehicle)	1	3	0	0	3	**0,83**	100%	0%	3	0
4.	Contract Mining workers (Semi-skilled) using public transport or walking to site	28	100%	28				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	100%	0%	0	0
5.	Heavy vehicles transporting excavated ore to processing plant				42	20%	8	1,0	20% of heavy vehicles expected during peak periods	1	8	1	8	16	**2,00**	50%	50%	8	8
6.	Additional heavy vehicles delivering consumables per day				5	20%	1	1,0	20% of heavy vehicles expected during peak periods	1	1	1	1	2	**2,00**	50%	50%	1	1
									TOTAL					**26**				**17**	**9**
PM Peak Hour																			
1.	Permanent Mining workers (Management / supervision) using own transport	6	100%	6				1,2	Trips per Worker (1.2 Persons per Vehicle)	0	0	1	5	5	**0,83**	0%	100%	0	5
2.	Permanent Mining workers (Semi-skilled) using public transport or walking to site	10	100%	10				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	0%	100%	0	0
3.	Contract Mining workers (Management / supervision) using own transport	3	100%	3				1,2	Trips per Worker (1.2 Persons per Vehicle)	0	0	1	3	3	**0,83**	0%	100%	0	3
4.	Contract Mining workers (Semi-skilled) using public transport or walking to site	28	100%	28				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	0%	100%	0	0
5.	Heavy vehicles transporting excavated ore to processing plant				42	20%	8	1,0	20% of heavy vehicles expected during peak periods	1	8	1	8	16	**2,00**	50%	50%	8	8
6.	Additional heavy vehicles delivering consumables per day				5	20%	1	1,0	20% of heavy vehicles expected during peak periods	1	1	1	1	2	**2,00**	50%	50%	1	1
									TOTAL					**26**				**9**	**17**

TABLE 2.8: TRIP GENERATION RATES, EXPECTED NUMBER OF VEHICLE TRIPS TO BE GENERATED DUE TO THE PROPOSED MINING DEVELOPMENT AND THE DISTRIBUTION OF VEHICLE TRIPS (PHASE 3 –11 SHAFT MAIN REEF PIT)

Item	Component	Number Workers per Day	% Workers active during Peak Hour	Number Workers Active per Peak Hour	Number Trucks Per Day	% Trucks active during Peak Hour	Number Trucks active during Peak Hour	Assumed Average Number Persons per Veh	Comments	Trip Generation Calculations for Peak Hour						Final Trip Information for Traffic Engineering Calculations			
										If Inward Movement is relevant Value = 1	Number Vehicle Trips for Inwards Direction	If Outward Movement is relevant Value = 1	Number Vehicle Trips for Outwards Direction	Total Number Vehicle Trips Generated during Peak Hour (In & Out)	Calculated Trip Generation Rate per Vehicle during Peak Hour	Trip Dist. %		Trip Generation	
																In	Out	In	Out
AM Peak Hour																			
1.	Permanent Mining workers (Management / supervision) using own transport	6	100%	6				1,2	Trips per Worker (1.2 Persons per Vehicle)	1	5	0	0	5	**0,83**	100%	0%	5	0
2.	Permanent Mining workers (Semi-skilled) using public transport or walking to site	10	100%	10				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	100%	0%	0	0
3.	Contract Mining workers (Management / supervision) using own transport	3	100%	3				1,2	Trips per Worker (1.2 Persons per Vehicle)	1	3	0	0	3	**0,83**	100%	0%	3	0
4.	Contract Mining workers (Semi-skilled) using public transport or walking to site	28	100%	28				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	100%	0%	0	0
5.	Heavy vehicles transporting excavated ore to processing plant				27	20%	6	1,0	20% of heavy vehicles expected during peak periods	1	6	1	6	12	**2,00**	50%	50%	6	6
6.	Additional heavy vehicles delivering consumables per day				5	20%	1	1,0	20% of heavy vehicles expected during peak periods	1	1	1	1	2	**2,00**	50%	50%	1	1
									TOTAL					22				15	7
PM Peak Hour																			
1.	Permanent Mining workers (Management / supervision) using own transport	6	100%	6				1,2	Trips per Worker (1.2 Persons per Vehicle)	0	0	1	5	5	**0,83**	0%	100%	0	5
2.	Permanent Mining workers (Semi-skilled) using public transport or walking to site	10	100%	10				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	0%	100%	0	0
3.	Contract Mining workers (Management / supervision) using own transport	3	100%	3				1,2	Trips per Worker (1.2 Persons per Vehicle)	0	0	1	3	3	**0,83**	0%	100%	0	3
4.	Contract Mining workers (Semi-skilled) using public transport or walking to site	28	100%	28				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	0%	100%	0	0
5.	Heavy vehicles transporting excavated ore to processing plant				27	20%	6	1,0	20% of heavy vehicles expected during peak periods	1	6	1	6	12	**2,00**	50%	50%	6	6
6.	Additional heavy vehicles delivering consumables per day				5	20%	1	1,0	20% of heavy vehicles expected during peak periods	1	1	1	1	2	**2,00**	50%	50%	1	1
									TOTAL					22				7	15

TABLE 2.9: TRIP GENERATION RATES, EXPECTED NUMBER OF VEHICLE TRIPS TO BE GENERATED DUE TO THE PROPOSED MINING DEVELOPMENT AND THE DISTRIBUTION OF VEHICLE TRIPS (PHASE 4 –MONA LISA PIT)

Item	Component	Number Workers per Day	% Workers active during Peak Hour	Number Workers Active per Peak Hour	Number Trucks Per Day	% Trucks active during Peak Hour	Number Trucks active during Peak Hour	Assumed Average Number Persons per Veh	Comments	Trip Generation Calculations for Peak Hour						Final Trip Information for Traffic Engineering Calculations			
										If Inward Movement is relevant Value = 1	Number Vehicle Trips for Inwards Direction	If Outward Movement is relevant Value = 1	Number Vehicle Trips for Outwards Direction	Total Number Vehicle Trips Generated during Peak Hour (In & Out)	Calculated Trip Generation Rate per Vehicle during Peak Hour	Trip Dist. %		Trip Generation	
																In	Out	In	Out
AM Peak Hour																			
1.	Permanent Mining workers (Management / supervision) using own transport	6	100%	6				1,2	Trips per Worker (1.2 Persons per Vehicle)	1	5	0	0	5	**0,83**	100%	0%	5	0
2.	Permanent Mining workers (Semi-skilled) using public transport or walking to site	10	100%	10				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	100%	0%	0	0
3.	Contract Mining workers (Management / supervision) using own transport	3	100%	3				1,2	Trips per Worker (1.2 Persons per Vehicle)	1	3	0	0	3	**0,83**	100%	0%	3	0
4.	Contract Mining workers (Semi-skilled) using public transport or walking to site	28	100%	28				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	100%	0%	0	0
5.	Heavy vehicles transporting excavated ore to processing plant				16	20%	3	1,0	20% of heavy vehicles expected during peak periods	1	3	1	3	6	**2,00**	50%	50%	3	3
6.	Additional heavy vehicles delivering consumables per day				5	20%	1	1,0	20% of heavy vehicles expected during peak periods	1	1	1	1	2	**2,00**	50%	50%	1	1
									TOTAL					16				12	4
PM Peak Hour																			
1.	Permanent Mining workers (Management / supervision) using own transport	6	100%	6				1,2	Trips per Worker (1.2 Persons per Vehicle)	0	0	1	5	5	**0,83**	0%	100%	0	5
2.	Permanent Mining workers (Semi-skilled) using public transport or walking to site	10	100%	10				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	0%	100%	0	0
3.	Contract Mining workers (Management / supervision) using own transport	3	100%	3				1,2	Trips per Worker (1.2 Persons per Vehicle)	0	0	1	3	3	**0,83**	0%	100%	0	3
4.	Contract Mining workers (Semi-skilled) using public transport or walking to site	28	100%	28				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	0%	100%	0	0
5.	Heavy vehicles transporting excavated ore to processing plant				16	20%	3	1,0	20% of heavy vehicles expected during peak periods	1	3	1	3	6	**2,00**	50%	50%	3	3
6.	Additional heavy vehicles delivering consumables per day				5	20%	1	1,0	20% of heavy vehicles expected during peak periods	1	1	1	1	2	**2,00**	50%	50%	1	1
									TOTAL					16				4	12

TABLE 2.10: TRIP GENERATION RATES, EXPECTED NUMBER OF VEHICLE TRIPS TO BE GENERATED DUE TO THE PROPOSED MINING DEVELOPMENT AND THE DISTRIBUTION OF VEHICLE TRIPS (PHASE 5 – KIMBERLEY EAST PIT)

Item	Component	Number Workers per Day	% Workers active during Peak Hour	Number Workers Active per Peak Hour	Number Trucks Per Day	% Trucks active during Peak Hour	Number Trucks active during Peak Hour	Assumed Average Number Persons per Veh	Comments	Trip Generation Calculations for Peak Hour						Final Trip Information for Traffic Engineering Calculations			
										If Inward Movement is relevant Value = 1	Number Vehicle Trips for Inwards Direction	If Outward Movement is relevant Value = 1	Number Vehicle Trips for Outwards Direction	Total Number Vehicle Trips Generated during Peak Hour (In & Out)	Calculated Trip Generation Rate per Vehicle during Peak Hour	Trip Dist. %		Trip Generation	
																In	Out	In	Out
AM Peak Hour																			
1.	Permanent Mining workers (Management / supervision) using own transport	6	100%	6				1,2	Trips per Worker (1.2 Persons per Vehicle)	1	5	0	0	5	**0,83**	100%	0%	5	0
2.	Permanent Mining workers (Semi-skilled) using public transport or walking to site	10	100%	10				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	100%	0%	0	0
3.	Contract Mining workers (Management / supervision) using own transport	3	100%	3				1,2	Trips per Worker (1.2 Persons per Vehicle)	1	3	0	0	3	**0,83**	100%	0%	3	0
4.	Contract Mining workers (Semi-skilled) using public transport or walking to site	28	100%	28				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	100%	0%	0	0
5.	Heavy vehicles transporting excavated ore to processing plant				18	20%	4	1,0	20% of heavy vehicles expected during peak periods	1	4	1	4	8	**2,00**	50%	50%	4	4
6.	Additional heavy vehicles delivering consumables per day				5	20%	1	1,0	20% of heavy vehicles expected during peak periods	1	1	1	1	2	**2,00**	50%	50%	1	1
									TOTAL					18				13	5
PM Peak Hour																			
1.	Permanent Mining workers (Management / supervision) using own transport	6	100%	6				1,2	Trips per Worker (1.2 Persons per Vehicle)	0	0	1	5	5	**0,83**	0%	100%	0	5
2.	Permanent Mining workers (Semi-skilled) using public transport or walking to site	10	100%	10				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	0%	100%	0	0
3.	Contract Mining workers (Management / supervision) using own transport	3	100%	3				1,2	Trips per Worker (1.2 Persons per Vehicle)	0	0	1	3	3	**0,83**	0%	100%	0	3
4.	Contract Mining workers (Semi-skilled) using public transport or walking to site	28	100%	28				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	0%	100%	0	0
5.	Heavy vehicles transporting excavated ore to processing plant				18	20%	4	1,0	20% of heavy vehicles expected during peak periods	1	4	1	4	8	**2,00**	50%	50%	4	4
6.	Additional heavy vehicles delivering consumables per day				5	20%	1	1,0	20% of heavy vehicles expected during peak periods	1	1	1	1	2	**2,00**	50%	50%	1	1
									TOTAL					18				5	13

TABLE 2.11: TRIP GENERATION RATES, EXPECTED NUMBER OF VEHICLE TRIPS TO BE GENERATED DUE TO THE PROPOSED MINING DEVELOPMENT AND THE DISTRIBUTION OF VEHICLE TRIPS (PHASE 6 – BIRD REEF UNDERGROUND)

Item	Component	Number Workers per Day	% Workers active during Peak Hour	Number Workers Active per Peak Hour	Number Trucks Per Day	% Trucks active during Peak Hour	Number Trucks active during Peak Hour	Assumed Average Number Persons per Veh	Comments	Trip Generation Calculations for Peak Hour						Final Trip Information for Traffic Engineering Calculations			
										If Inward Movement is relevant Value = 1	Number Vehicle Trips for Inwards Direction	If Outward Movement is relevant Value = 1	Number Vehicle Trips for Outwards Direction	Total Number Vehicle Trips Generated during Peak Hour (In & Out)	Calculated Trip Generation Rate per Vehicle during Peak Hour	Trip Dist. %		Trip Generation	
																In	Out	In	Out
AM Peak Hour																			
1.	Mining workers (Management / supervision) using own transport	47	33%	16				1,2	Trips per Worker (1.2 Persons per Vehicle) Shift starting IN, Shift Ending OUT	1	13	1	13	26	**1,67**	50%	50%	13	13
2.	Mining workers (Semi-skilled) using public transport or walking to site (80%)	404	33%	135				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	0%	0%	0	0
3.	Mining workers (Semi-skilled) using own transport (20%)	101	33%	34				1,2	Trips per Worker (1.2 Persons per Vehicle) Shift starting IN, Shift Ending OUT	1	28	1	28	56	**1,67**	50%	50%	28	28
4.	Heavy vehicles transporting excavated ore to processing plant				18	20%	4	1,0	20% of heavy vehicles expected during peak periods	1	4	1	4	8	**2,00**	50%	50%	4	4
5.	Additional heavy vehicles delivering consumables per day				5	20%	1	1,0	20% of heavy vehicles expected during peak periods	1	1	1	1	2	**2,00**	50%	50%	1	1
									TOTAL					92				46	46
PM Peak Hour																			
1.	Mining workers (Management / supervision) using own transport	47	33%	16				1,2	Trips per Worker (1.2 Persons per Vehicle) Shift starting IN, Shift Ending OUT	1	13	1	13	26	**1,67**	50%	50%	13	13
2.	Mining workers (Semi-skilled) using public transport or walking to site (80%)	404	33%	135				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	0%	0%	0	0
3.	Mining workers (Semi-skilled) using own transport (20%)	101	33%	34				1,2	Trips per Worker (1.2 Persons per Vehicle) Shift starting IN, Shift Ending OUT	1	28	1	28	56	**1,67**	50%	50%	28	28
4.	Heavy vehicles transporting excavated ore to processing plant				18	20%	4	1,0	20% of heavy vehicles expected during peak periods	1	4	1	4	8	**2,00**	50%	50%	4	4
5.	Additional heavy vehicles delivering consumables per day				5	20%	1	1,0	20% of heavy vehicles expected during peak periods	1	1	1	1	2	**2,00**	50%	50%	1	1
									TOTAL					92				46	46

TABLE 2.12: TRIP GENERATION RATES, EXPECTED NUMBER OF VEHICLE TRIPS TO BE GENERATED DUE TO THE PROPOSED MINING DEVELOPMENT AND THE DISTRIBUTION OF VEHICLE TRIPS (PHASE 6 – KIMBERLEY EAST UNDERGROUND)

Item	Component	Number Workers per Day	% Workers active during Peak Hour	Number Workers Active per Peak Hour	Number Trucks Per Day	% Trucks active during Peak Hour	Number Trucks active during Peak Hour	Assumed Average Number Persons per Veh	Comments	Trip Generation Calculations for Peak Hour						Final Trip Information for Traffic Engineering Calculations			
										If Inward Movement is relevant Value = 1	Number Vehicle Trips for Inwards Direction	If Outward Movement is relevant Value = 1	Number Vehicle Trips for Outwards Direction	Total Number Vehicle Trips Generated during Peak Hour (In & Out)	Calculated Trip Generation Rate per Vehicle during Peak Hour	Trip Dist. %		Trip Generation	
																In	Out	In	Out
AM Peak Hour																			
1.	Mining workers (Management / supervision) using own transport	47	33%	16				1,2	Trips per Worker (1.2 Persons per Vehicle) Shift starting IN, Shift Ending OUT	1	13	1	13	26	**1,67**	50%	50%	13	13
2.	Mining workers (Semi-skilled) using public transport or walking to site (80%)	404	33%	135				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	0%	0%	0	0
3.	Mining workers (Semi-skilled) using own transport (20%)	101	33%	34				1,2	Trips per Worker (1.2 Persons per Vehicle) Shift starting IN, Shift Ending OUT	1	28	1	28	56	**1,67**	50%	50%	28	28
4.	Heavy vehicles transporting excavated ore to processing plant				18	20%	4	1,0	20% of heavy vehicles expected during peak periods	1	4	1	4	8	**2,00**	50%	50%	4	4
5.	Additional heavy vehicles delivering consumables per day				5	20%	1	1,0	20% of heavy vehicles expected during peak periods	1	1	1	1	2	**2,00**	50%	50%	1	1
									TOTAL					92				46	46
PM Peak Hour																			
1.	Mining workers (Management / supervision) using own transport	47	33%	16				1,2	Trips per Worker (1.2 Persons per Vehicle) Shift starting IN, Shift Ending OUT	1	13	1	13	26	**1,67**	50%	50%	13	13
2.	Mining workers (Semi-skilled) using public transport or walking to site (80%)	404	33%	135				0,0	Workers will make use of existing public transport or walk to site	0	0	0	0	0	**0,00**	0%	0%	0	0
3.	Mining workers (Semi-skilled) using own transport (20%)	101	33%	34				1,2	Trips per Worker (1.2 Persons per Vehicle) Shift starting IN, Shift Ending OUT	1	28	1	28	56	**1,67**	50%	50%	28	28
4.	Heavy vehicles transporting excavated ore to processing plant				18	20%	4	1,0	20% of heavy vehicles expected during peak periods	1	4	1	4	8	**2,00**	50%	50%	4	4
5.	Additional heavy vehicles delivering consumables per day				5	20%	1	1,0	20% of heavy vehicles expected during peak periods	1	1	1	1	2	**2,00**	50%	50%	1	1
									TOTAL					92				46	46

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

The detailed traffic-related investigation was conducted for the operational phases of the proposed mining development. The following figures are relevant:

a) **Figure B-1:** 2018 peak hour traffic (background traffic) without the proposed mining development **(Scenario 1)**;
b) **Figure B-2:** Projected vehicle trip distribution for the proposed mining development **(Rugby Club Pit, Phase 1)**;
c) **Figure B-3:** Projected vehicle trip distribution for the proposed mining development **(Roodepoort Main Reef Pit, Phase 2)**;
d) **Figure B-4:** Projected vehicle trip distribution for the proposed mining development **(11 Shaft Main Reef Pit, Phase 3)**;
e) **Figure B-5:** Projected vehicle trip distribution for the proposed mining development **(Mona Lisa Pit, Phase 4)**;
f) **Figure B-6:** Projected vehicle trip distribution for the proposed mining development (**Kimberley East Pit, Phase 5**);
g) **Figure B-7:** Projected vehicle trip distribution for the proposed mining development **(Bird Reef Underground, Phase 6)**;
h) **Figure B-8:** Projected vehicle trip distribution for the proposed mining development **(Kimberley East Underground, Phase 6)**;
i) **Figure B-9:** Projected vehicle trips generated by the proposed mining development **(Rugby Club Pit)**;
j) **Figure B-10:** Projected vehicle trips generated by the proposed mining development **(Roodepoort Main Reef Pit)**;
k) **Figure B-11:** Projected vehicle trips generated by the proposed mining development **(11 Shaft Main Reef Pit)**;
l) **Figure B-12:** Projected vehicle trips generated by the proposed mining development **(Mona Lisa Pit)**;
m) **Figure B-13:** Projected vehicle trips generated by the proposed mining development **(Kimberley East Pit)**;
n) **Figure B-14:** Projected vehicle trips generated by the proposed mining development **(Bird Reef Underground)**;
o) **Figure B-15:** Projected vehicle trips generated by the proposed mining development **(Kimberley East Underground)**;
p) **Figure B-16:** Projected 2019 peak hour traffic with the proposed mining development (**Mining Phase 1**) **(Scenario 2)**;
q) **Figure B-17:** Projected 2019 peak hour traffic with the proposed mining development **(Mining Phases 2 & 3) (Scenario 3);**
r) **Figure B-18:** Projected 2020 peak hour traffic without the proposed mining development **(Scenario 4)**;
s) **Figure B-19:** Projected 2020 peak hour traffic with the proposed mining development **(Mining Phases 3 & 4) (Scenario 5)**;
t) **Figure B-20:** Projected 2020 peak hour traffic with the proposed mining development **(Mining Phases 4 & 5) (Scenario 6)**;

u) **Figure B-21:** Projected 2021 peak hour traffic without the proposed mining development **(Scenario 7)**;
v) **Figure B-22:** Projected 2021 peak hour traffic with the proposed mining development **(Mining Phase 6) (Scenario 8)**;
w) **Figure B-23:** Projected 2029 peak hour traffic without the proposed mining development **(Scenario 9)**; and
x) **Figure B-24:** Projected 2029 peak hour traffic with the proposed mining development **(Mining Phase 6) (Scenario 10)**;

2.2.5 ACCESS OPTIONS FOR CONSIDERATION TO AND FROM THE PROPOSED MINING DEVELOPMENT

Access to and from the proposed mining development would be required from the existing roads network. Access options for consideration were identified for the proposed mining development with the following criteria in consideration:

a) Class of existing roads;
b) Intersection and access spacing requirements;
c) Since the majority of the vehicle trips anticipated to be generated will be heavy vehicles hauling excavated ore, travelling through residential areas were avoided if possible; and
d) Intersection and stopping sight distances.

The section below provides more information on the above mentioned.

2.2.5.1 Portion 152 of the Farm Vogelstruisfontein 231 IQ - Rugby Club Pit (Opencast)

Access to and from the proposed Rugby Club Main Reef Pit site would be possible via existing roads that link up with Main Reef Road (Road R41) at **Points I** and **J**. All roads and intersections to be used to gain access to and from the proposed site are existing roads and intersections, and it was therefore assumed that intersection spacing and sight distances are acceptable.

Further investigation and collaboration with the relevant roads authority and the proposed mining development project team would be required as part of the detail design phase. Refer to **Figure 2.4.1** for a graphical presentation of the proposed potential access routes.

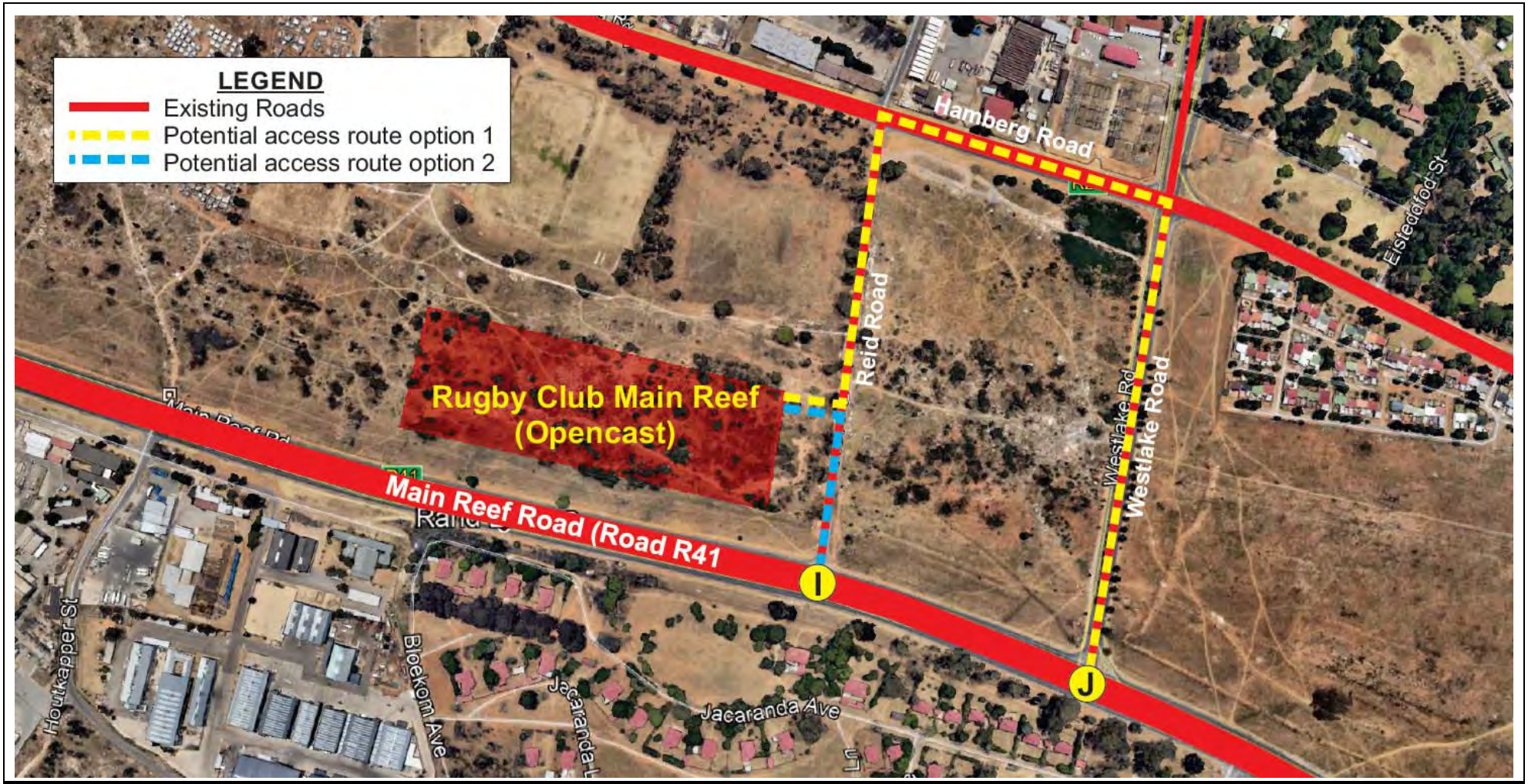


FIGURE 2.4.1: POTENTIAL ACCESS TO THE PROPOSED RUGBY CLUB SITE (OPENCAST)

2.2.5.2 Portion 407 of the Farm Roodepoort 237 IQ – Roodepoort Main Reef Pit (Opencast)

Access to and from the proposed Roodepoort site would be possible from and to existing roads which link with Randfontein Road (Road R41) which are:

a) Access to and from Gustaf Street which links with Randfontein Road (Road R41) at **Point G** providing access to both portions of the proposed Roodepoort Main Reef site which is intersected by Gustaf Street.
b) Access to and from Irridium Street which links with Randfontein Road (Road R41) at **Point F**. This access option would require the access to Gustaf Street as well since the proposed site is located on both sides of Gustaf Street.

Further investigation and collaboration with the relevant roads authority and the proposed mining development project team would be required as part of the detail design phase. Refer to **Figure 2.4.2** for a graphical presentation of the proposed potential access routes.

2.2.5.3 Portion 017 & 018 of the Farm Vogelstruisfontein 231 IQ - Kimberley Reef East Pit (Opencast and underground) AND Portions 0148 and 161 of the Farm 231 IQ – 11 Shaft (Opencast)

Access to and from the proposed Kimberley Reef East and 11 Shaft sites (opencast and underground activities) would be possible via an existing road that links up with Main Reef Road (Road R41) at **Point K**. All roads and intersections to be used to gain access to and from the proposed sites are existing roads and intersections, and it was therefore assumed that intersection spacing and sight distances are acceptable.

Further investigation and collaboration with the relevant roads authority and the proposed mining development project team would be required as part of detail design phase. Refer to **Figure 2.4.3** for a graphical presentation of the proposed potential access routes.

2.2.5.4 Portion 014 of the Farm Roodepoort 237 IQ – Mona Lisa Pit (Opencast)

Access to and from the proposed Mona Liza site would require a new access road to the north of the proposed site to link up with Randfontein Road (Road R41) and should avoid the Goudrand Township. Two potential points for the proposed access road to link up with Randfontein Road (Road R41) were identified which are:

a) Via a new intersection with Randfontein Road (Road R41) west of the Goudrand township (**Option 1**); or
b) Via an internal haul road to the east from where access could be gained to and from Randfontein Road (Road R41) via Gustav Street at **Point G** (**Option 2**).

It was determined from intersection performance evaluations that a new access point on Randfontein Road (Road R41) (Option 1) would require an intersection layout with excessive upgrades and a traffic light signal which is not viable in terms of costs and the short lifespan of the Mona Lisa Site. It is therefore recommended to provide an internal haul road to the east of the relevant mine site to join with Gustaf Street and in turn provide access from and to Randfontein Road (Road R41) at **Point G**.

Further investigation and collaboration with the relevant roads authority and the proposed mining development project team would be required as part of the detail design phase. Refer to **Figure 2.4.4** for a graphical presentation of the proposed potential access routes for consideration.

2.2.5.5 Portion 001 of the Farm Roodepoort 237 IQ – Bird Reef Shaft (Underground)

Access to and from the proposed Bird Reef Shaft site would be possible via existing roads (Gustaf Street) that links up with Main Reef Road (Road R41) at **Point G**. All roads and intersections to be used to gain access to and from the proposed site are existing roads and intersections, and it was therefore assumed that intersection spacing and sight distances are acceptable.

Further investigation and collaboration with the relevant roads authority and the proposed mining development project team would be required as part of the detail design phase. Refer to **Figure 2.4.5** for a graphical presentation of the proposed potential access routes.

FIGURE 2.4.2: POTENTIAL ACCESS TO THE PROPOSED ROODEPOORT MAIN REEF (OPENCAST)

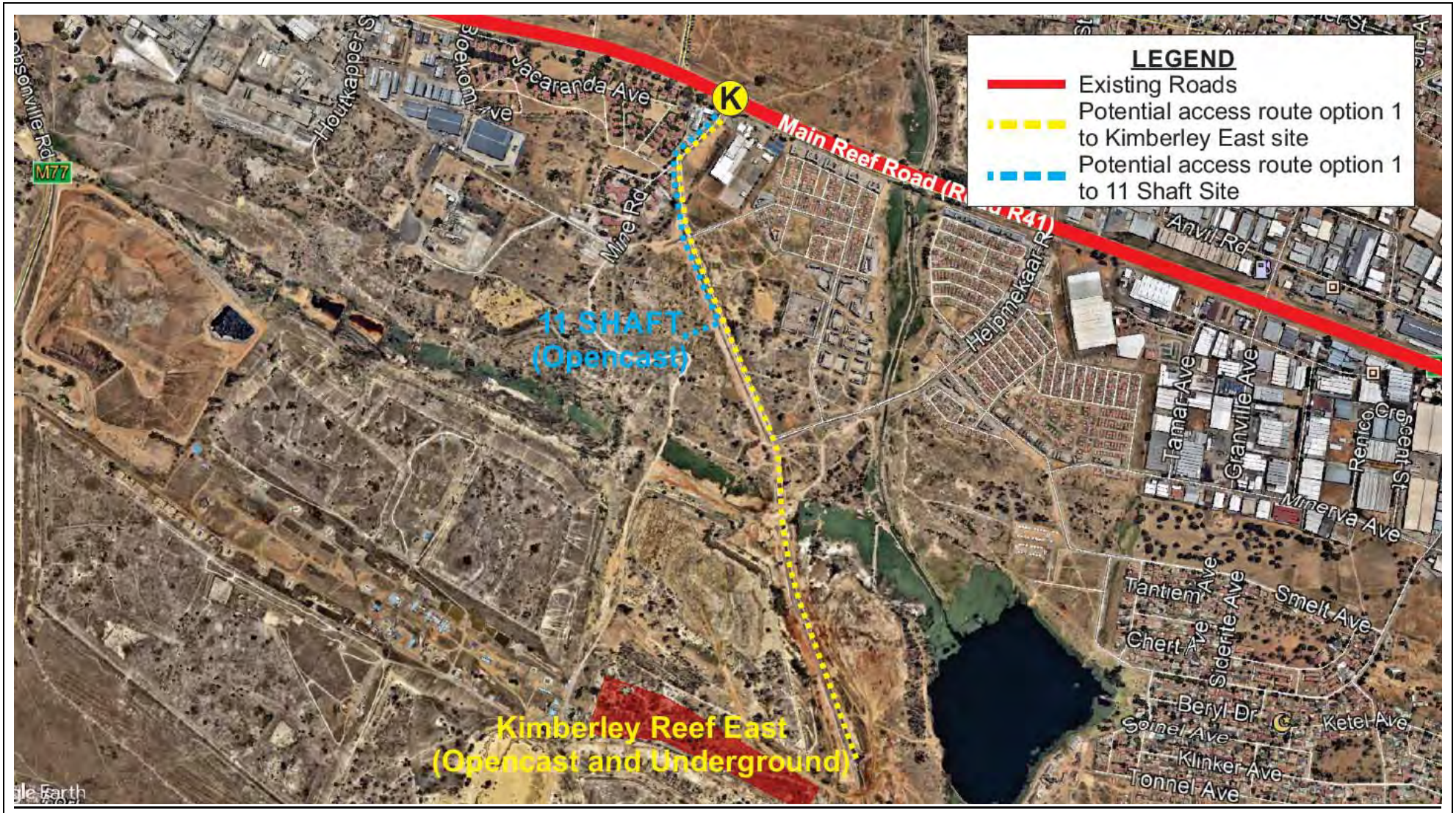


FIGURE 2.4.3: POTENTIAL ACCESS TO THE PROPOSED 11 SHAFT (OPENCAST) AND KIMBERLEY REEF EAST (UNDERGROUND) SITES

FIGURE 2.4.4: POTENTIAL ACCESS TO THE PROPOSED MONA LISA SITE (OPENCAST)

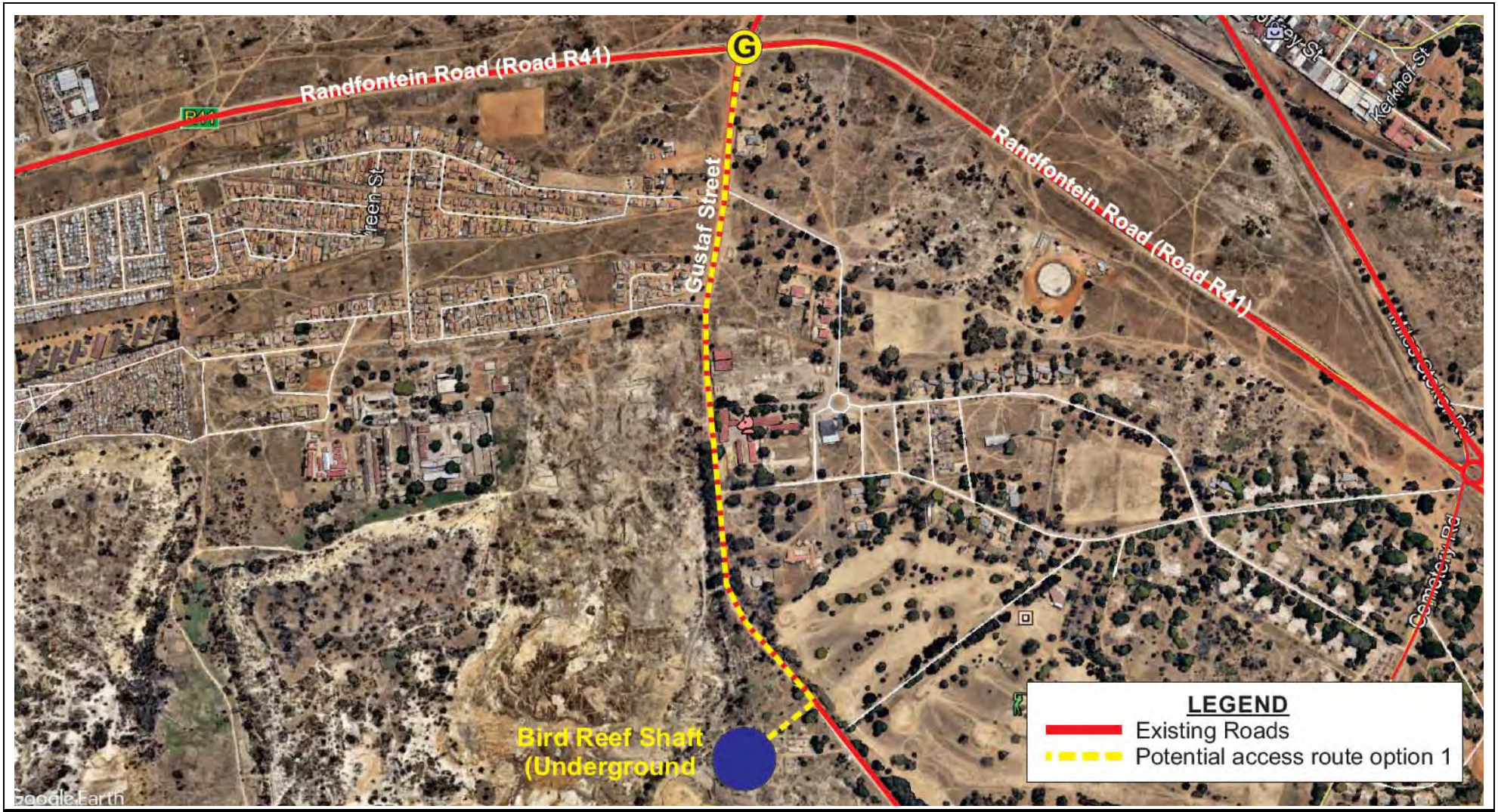


FIGURE 2.4.5: POTENTIAL ACCESS TO THE PROPOSED BIRD REEF SITE (UNDERGROUND)

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:

Existing Intersections:

a) **Point D**: Intersection of Randfontein Road (Road R41) and Corlette Avenue;
b) **Point E**: Intersection of Randfontein Road (Road R41) and Mathews Goniwe Drive;
c) **Point F**: Intersection of Randfontein Road (Road R41), Iridium Street and Nick Toomey Boulevard;
d) **Point G**: Intersection of Randfontein Road (Road R41) and Gustaf Street;
e) **Point H**: Intersection of Randfontein Road (Road R41), Miles Stoker Road, Main Reef Road and Cemetery Road;
f) **Point I**: Intersection of Main Reef Road (Road R41) and Reid Road;
g) **Point J**: Intersection of Main Reef Road (Road R41) and Westlake Road; and
h) **Point K**: Intersection of Main Reef Road (Road R41) and Mine Road.

Potential Future Access Intersections:

i) Proposed Mona Lisa Pit Access Intersection with Randfontein Road (**Option 1**) referred to as **Mona Lisa Pit Access**; and
j) Proposed Roodepoort Main Reef Pit Access Intersection with Gustav Street (**Option 1**) referred to as **Roodepoort Main Reef Pit Access**.

In Appendix C Tables C-1 to C-10 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 2019 (background traffic) **without** the proposed mining development **(Scenario 1)**;
b) **Table C-2:** Levels of service for various approaches for the year 2019 **with** the proposed mining development (**Mining Phase 1**)**(Scenario 2)**;
c) **Table C-3:** Levels of service for various approaches for the year 2019 **with** the proposed mining development (**Mining Phases 2 & 3**)**(Scenario 3)**;
d) **Table C-4:** Levels of service for various approaches for the year 2020 **without** the proposed mining development **(Scenario 4)**;
e) **Table C-5:** Levels of service for various approaches for the year 2020 **with** the proposed mining development (**Mining Phases 3 & 4**)**(Scenario 5)**;

f) **Table C-6:** Levels of service for various approaches for the year 2020 **with** the proposed mining development (**Mining Phases 4 & 5**)**(Scenario 6)**;
g) **Table C-7:** Levels of service for various approaches for the year 2021 **without** the proposed mining development **(Scenario 7)**;
h) **Table C-8:** Levels of service for various approaches for the year 2021 **with** the proposed mining development (**Mining Phase 6**)**(Scenario 8)**;
i) **Table C-9:** Levels of service for various approaches for the year 2029 **without** the proposed mining development **(Scenario 9)**; and
j) **Table C-10:** Levels of service for various approaches for the year 2029 **with** the proposed mining development (**Mining Phase 6**)**(Scenario 10)**.

From **Tables C-1** to **C-10** it is possible to note that:

a) The relevant intersections under investigation would require geometric upgrading by the relevant roads department (existing upgrading requirement) without the proposed mining development;
b) No additional geometric upgrading would be required due to the proposed mining development (as long as the required road network improvements as recommended are implemented) apart from the construction of the proposed access intersection along Gustav Street; and
c) Refer to **Section 3** of this report for more information regarding required improvements.

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

Table 2.13 provides a summary of the available reserve capacity on the various sections of roads that had been investigated without the proposed mining development.

TABLE 2.13: AVAILABLE RESERVE CAPACITY FOR RELEVANT ROAD SECTIONS WITH MITIGATION MEASURES IMPLEMENTED BY THE RELEVANT ROADS AUTHORITY															
Point	Intersection	Direction of Road Section	Capacity per Lane	2019 Number of Lanes	2019 Total Capacity	2029 Number of Lanes	2029 Total Capacity	2019 Actual Number of Vehicles		2019 Reserve Capacity Available		2029 Actual Number of Vehicles		2029 Reserve Capacity Available	
								AM	PM	AM	PM	AM	PM	AM	PM
D	Intersection of Randfontein Road (Road R41) and Corlette Avenue	North (Corlett)	1100	1	1100	1	1100	561	314	539	787	766	426	334	674
		East (R41)	1100	2	2200	2	2200	1841	1600	359	600	2482	2168	-282	32
		West (R41)	1100	2	2200	2	2200	1242	2161	958	39	1680	2918	520	-718
E	Intersection of Randfontein Road (Road R41) and Mathews Goniwe Drive	East (Road R41)	1100	2	2200	2	2200	2003	1660	197	540	2712	2261	-512	-61
		South (Mathews Goniwe Dr)	700	1	700	1	700	122	105	578	595	163	141	537	559
		West (Road R41)	1100	2	2200	2	2200	828	1441	1372	759	1142	1956	1058	244
F	Intersection of Randfontein Road (Road R41), Iridium Street and Nick Toomey Boulevard	North (Iridium Str)	1100	1	1100	1	1100	513	565	587	535	706	774	394	326
		East (Road R41)	1100	2	2200	2	2200	2183	1977	17	223	2968	2704	-768	-504
		South (Nick Toomey Blv)	800	1	800	1	800	421	319	379	481	566	429	234	371
		West (Road R41)	1100	2	2200	2	2200	1112	1649	1088	551	1524	2236	676	-36
G	Intersection of Randfontein Road (Road R41) and Gustaf Street	North (Gustaf Str)	1100	1	1100	2	2200	231	308	869	792	302	401	1898	1799
		East (Road R41)	1100	2	2200	3	3300	2546	1866	-346	334	3446	2481	-146	819
		South (Gustaf Str)	800	1	800	2	1600	476	445	324	355	687	645	913	955
		West (Road R41)	1100	2	2200	3	3300	855	1418	1345	782	1188	1948	2112	1352
H	Intersection of Randfontein Road (R41), Miles Stoker Road, Main Reef Road and Cemetery Road	North (Miles Stoker)	1100	1	1100	1	1100	859	1398	241	-298	1154	1878	-54	-778
		East (Main Reef)	1100	3	3300	3	3300	3933	2972	-633	328	5311	4010	-2011	-710
		South (Cemetery)	800	1	800	1	800	398	581	402	219	534	781	266	19
		West (Randfontein)	1100	2	2200	2	2200	715	1064	1485	1136	975	1454	1225	746
I	Intersection of Main Reef and Reid Roads	North (Reid Rd)	800	1	800	1	800	106	46	694	754	143	62	657	738
		East (Main Reef Rd)	1100	3	3300	3	3300	3779	1807	-479	1493	5087	2430	-1787	870
		West (Main Reef Rd)	1100	3	3300	3	3300	1370	1986	1930	1314	1843	2678	1457	622
J	Intersection of Main Reef and Westlake Roads	North (Westlake Road)	1100	2	2200	2	2200	1333	599	867	1601	1787	797	413	1403
		East (Main Reef Rd)	1100	3	3300	4	4400	3767	1911	-467	1389	5099	2613	-699	1787
		West (Main Reef Rd)	1100	3	3300	4	4400	1375	2011	1925	1289	1869	2721	2531	1679
K	Intersection of Main Reef Road and Mine Road	East (Main Reef Rd)	1100	3	3300	3	3300	3700	1633	-400	1667	4989	2209	-1689	1091
		South (Mine Rd)	800	1	800	1	800	354	300	446	500	503	439	297	361
		West (Main Reef Rd)	1100	3	3300	3	3300	1688	1803	1612	1497	2312	2409	988	891

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 mining 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.

The following figures are presented as part of the sensitive road sections **without** and **with** the proposed mining development:

a) **Figures 2.6.1:** Sensitive road sections and Intersections indicating existing sensitive areas and Intersections **WITHOUT** the proposed mining development and mitigating measures (West of Point H);
b) **Figures 2.6.2:** Sensitive road sections and Intersections indicating existing sensitive areas and Intersections **WITHOUT** the proposed mining development and mitigating measures (East of Point H);
c) **Figures 2.7.1:** Sensitive road sections and Intersections indicating the anticipated sensitive areas and Intersections **WITHOUT** the proposed mining development with mitigating measures (West of Point H);
d) **Figures 2.7.1:** Sensitive road sections and Intersections indicating the anticipated sensitive areas and Intersections **WITHOUT** the proposed mining development with mitigating measures (East of Point H);
e) **Figures 2.8.1:** Sensitive road sections and Intersections indicating the anticipated sensitive areas and Intersections with background mitigation and **WITH** the proposed mining development and improvements recommended as part of this report (West of Point H); and
f) **Figures 2.8.2:** Sensitive road sections and Intersections indicating the anticipated sensitive areas and Intersections with background mitigation and **WITH** the proposed mining development and improvements recommended as part of this report (East of Point H).

It can be concluded from **Figures 2.6.1 to 2.8.2** that:

a) The sensitivity of the relevant section of Randfontein Road (Road R41) under investigation and the relevant intersections under investigation would improve with background mitigation that is recommended as part of this report (Refer to **Section 3)**;
b) The proposed mining development would have an insignificant impact on the sensitivity of the roads network within the vicinity during mining **Phases 1** to **5**; and
c) The proposed mining development would have a low impact on the sensitivity of the roads network within the vicinity of the proposed mining development during **Mining Phase 6**.

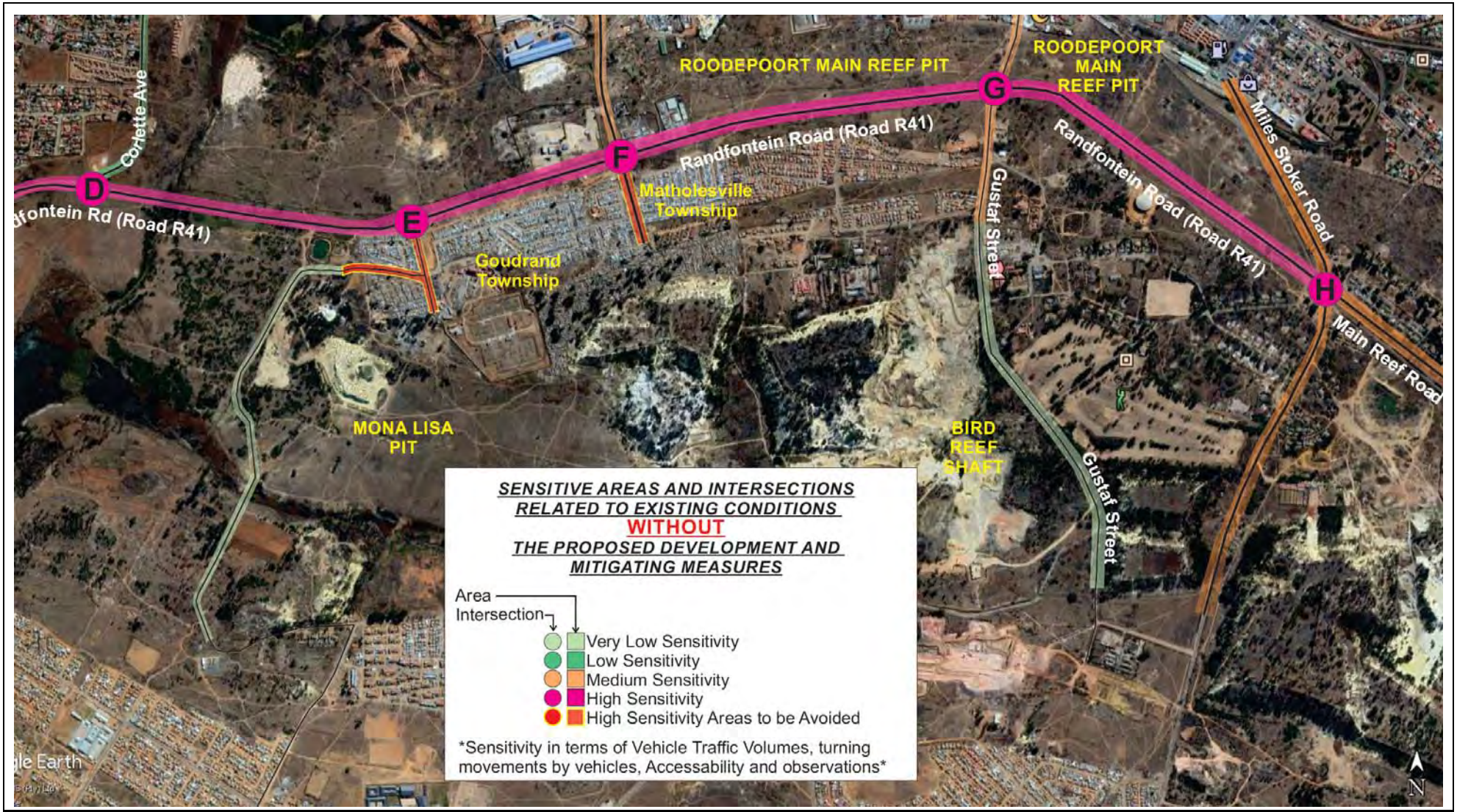


FIGURE 2.6.1: PRESENTATION OF EXISTING SENSITIVE ROAD SECTIONS AND INTERSECTIONS WITHOUT THE PROPOSED MINING DEVELOPMENT (WEST OF POINT H)

FIGURE 2.6.2: PRESENTATION OF EXISTING SENSITIVE ROAD SECTIONS AND INTERSECTIONS WITHOUT THE PROPOSED MINING DEVELOPMENT (EAST OF POINT H)

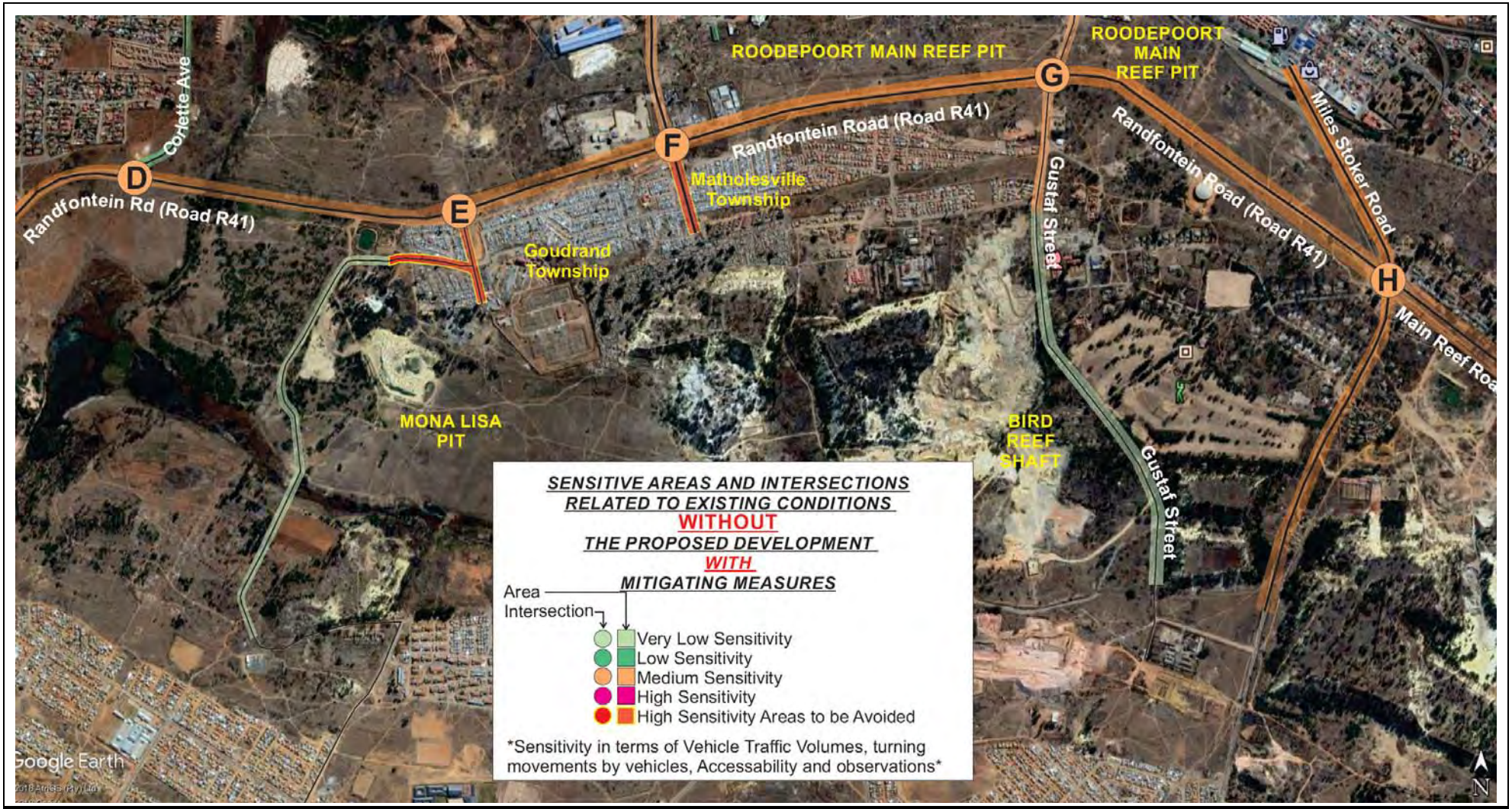


FIGURE 2.7.1: PRESENTATION OF PROPOSED SENSITIVE ROAD SECTIONS AND INTERSECTIONS WITH BACKROUND MITIGATING MEASURES WITHOUT THE PROPOSED MINING DEVELOPMENT (WEST OF POINT H)

FIGURE 2.7.2: PRESENTATION OF PROPOSED SENSITIVE ROAD SECTIONS AND INTERSECTIONS WITH BACKROUND MITIGATING MEASURES WITHOUT THE PROPOSED MINING DEVELOPMENT (EAST OF POINT H)

FIGURE 2.8.1: PRESENTATION OF PROPOSED SENSITIVE ROAD SECTIONS AND INTERSECTIONS WITH BACKROUND MITIGATION MEASURES WITH THE PROPOSED MINING DEVELOPMENT (WEST OF POINT H)

FIGURE 2.8.2: PRESENTATION OF PROPOSED SENSITIVE ROAD SECTIONS AND INTERSECTIONS WITH BACKROUND MITIGATION MEASURES WITH THE PROPOSED MINING DEVELOPMENT (EAST OF POINT H)

2.5 INFORMATION REQUESTED BY RELEVANT ROAD AUTHORITY

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

2.6 CONSULTATION WITH INTERESTED AND AFFECTED PARTIES (IAP)

Several public participation meetings were held during 2018 with the relevant communities that could potentially be affected by the proposed mining development. **Table E-1** of **Appendix E** provides a summary of all comments made by the Interested and Affected parties. The Traffic Impact Assessment was prepared in such a manner to address all comments and concerns.

2.7 OTHER TRAFFIC-RELATED MATTERS

Table 2.14 provides a summary of the following:

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

TABLE 2.14: SUMMARY OF OTHER TRAFFIC-RELATED MATTERS RELEVANT TO ALL PHASES OF THE PROPOSED MINING DEVELOPMENT				
Item	**Description of Element**	**General Comments**	**Specific Issues**	**Actions Required**
1.	**ROAD SAFETY ISSUES**			
1.1	**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) Need for reflective road studs at strategic points; b) Need for overhead lighting at intersections; c) Road markings are fading; and d) Need for relevant road traffic signs.	In general the report was compiled so as to address the road safety issues as far as practically possible. Refer to **Section 3.2** for the required and recommended intersection improvements. <u>The proposed mining development should:</u> a) Collaborate with the relevant road authority to ensure that the road maintenance plan to maintain the relevant road network on which heavy vehicle movement is anticipated incorporates the necessary measures to support road safety conditions; a) Provide mine and contractor workers with training on road safety; and b) Road safety and awareness campaigns should be run at the mine. <u>The relevant Roads Authority should provide:</u> a) Reflective road studs at strategic points (LED if possible) to ensure the safe operation of the relevant intersections under investigation at night time; b) Required road traffic signs for the relevant intersections; c) Relevant road markings at relevant intersections under investigation (highway paint recommended); d) Provide mine and contractor workers with training on road safety; and e) Road safety and awareness campaigns should be run at the mine.
2.	**NON-MOTORISED TRANSPORT**			
2.1	**Non-motorised transport**	a) Non-mine related pedestrian activity around the relevant intersections under investigation was observed during the site visit.	a) No pedestrian walkways are provided in order to split motorised and non-motorised traffic at most intersections. b) No pedestrian crossings are provided at some of the relevant intersections.	<u>The relevant Roads Authority should provide:</u> a) Paved pedestrian walkways to create a safe environment for pedestrians to move around and within the relevant intersections under investigation; and b) Provide pedestrian crossings at the relevant intersection under investigation. Actions required are relevant without the proposed mining development.

TABLE 2.14: SUMMARY OF OTHER TRAFFIC-RELATED MATTERS				
Item	**Description of Element**	**General Comments**	**Specific Issues**	**Actions Required**
3.	**PUBLIC TRANSPORT**			
3.1	**Public transport**	a) Two types of public transport commuters are relevant: i) Firstly, workers who are travel to and from the proposed mining development during all phases; and ii) Secondly, visitors to the development during all phases. b) In general, public transport is readily available within the vicinity of the proposed mining development and most workers (At least 80%) are anticipated to reside within walking distance from the proposed mining development or within the vicinity and would not result in additional vehicle trips along Randfontein Road (Road R41).	a) None	a) None
4.	**OTHER TRAFFIC-RELATED MATTERS**			
4.1	**Rand Water Pipeline Road Crossings**	A main water pipeline is currently located within the vicinity of the proposed mining development.	a) Increased vehicle traffic and heavy vehicle movements crossing the pipeline are of concern to Rand Water.	a) From a visual inspection it was determined that no new road crossings due to activities of the proposed mining development would be required over the existing pipeline as long as access to the relevant sites are obtained as determined as part of this report. b) Some road crossings over the pipeline exist, although these crossings are existing crossings. c) Should it be required that a new road crossing over the existing pipeline is required, the following would be applicable: i. Rand Water shall have unimpeded access to pipeline/s at all times; ii. Culverts shall be provided at all crossings to provide such access; iii. Under roadway culverts would be required unless it can be proven to Rand Water that traffic density and the cover over the pipeline/s affect Rand Water; iv. In general the cover over Rand Water's pipeline/s may vary between 800mm and 1 500mm however, an undisturbed layer of at least 300mm shall be maintained between the pipeline/s and road works during construction; and Reinforced concrete box culverts with compartments having minimum internal dimensions as indicated on Rand Water's standard drawings No. B1933 and B1934 shall be provided for both existing and future pipelines. Culverts shall preferably be drained by a gravity system.

Section 3

FINDINGS AND RECOMMENDATIONS

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

3.1 FINDINGS

The following are discussed in terms of the findings:

a) Traffic impact during the respective phases
b) Site accessibility;
c) Future planned roads within the vicinity of the proposed mining development; and
d) Other traffic related matters.

3.1.1 TRAFFIC IMPACT DURING THE RESPECTIVE PHASES

The capacity calculations for the TIA were conducted for the years 2019 (Phases 1, 2 and 3 operational), 2020 (phases 3, 4 and 5 operational), 2021 (Phase 6 operational) and 2029 (Phase 6 operational) 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.

Furthermore, owing to the type and nature of the proposed mining activities, it is expected that the proposed activities will have a manageable impact on traffic during all phases, provided that road infrastructure improvements are implemented as indicated in **Tables 3.1** to **3.4** and **Figures 3.2** to **3.5** to mitigate the impact of the proposed land development area.

Tables F-1 to F-6 of **Appendix F** provides a summary of the impact ratings for the operational phase respectively for each proposed site of the proposed mining development before and after mitigating measures implemented. **Table F-1** of **Appendix F** was derived from **Table G-1 of Appendix G** of the report that provides the criteria used in terms of the assessments process.

3.1.2 SITE ACCESSIBILITY

Access to and from the proposed mining development sites would be possible from and to the existing roads network. Access options for consideration were identified for the proposed mining development with the following criteria in consideration:

a) Class of existing roads;
b) Intersection and access spacing requirements;
c) Since the majority of the vehicle trips anticipated to be generated will be heavy vehicles hauling excavated ore, travelling through residential areas were avoided if possible; and
d) Intersection and stopping sight distances.

Section 3.2 provides more information on the recommendations for access from and to the proposed mining sites.

3.1.3 FUTURE PLANNED ROADS IN THE VICINITY OF THE PROPOSED MINING DEVELOPMENT

Information was gathered in terms of the future planned roads network within the vicinity of the proposed mining development. Information was obtained from the Gauteng Province: Department of Roads and Transport (Gautrans) "*Gauteng Roads Atlas 2015/2016*". The following planned future roads were identified:

a) Proposed extension of Road N17 south of the proposed mining development; and
b) Proposed Road PWV5 west of the proposed mining development.

Refer to **Figure 3.1** for a graphical presentation of the proposed road network within the vicinity of the proposed mining development.

It is anticipated that the construction of the proposed extension of Road N17 and the proposed Road PWV5 is not planned for in the near future and it is anticipated that the proposed roads would not have a major impact on the proposed mining development activities. Further collaboration with the relevant road authorities will be conducted as part of the traffic impact assessment to confirm the last mentioned.

3.1.4 OTHER TRAFFIC RELATED MATTERS

<u>RAND WATER PIPELINE</u>

A main Rand Water pipeline is currently located within the vicinity of the proposed mining development and even though the proposed mining development mining areas would not have any impact on the pipeline, vehicular traffic to and from the proposed mining development might need to cross the pipeline.

From a visual inspection it was determined that no new road crossings due to activities of the proposed mining development would be required over the existing pipeline as long as access to the relevant sites are obtained as determined as part of this report. Some road crossings over the pipeline exist, although these road crossings are existing.
Should it be required that a new road crossing over the existing pipeline is required, the following would be applicable:

a) Rand Water shall have unimpeded access to pipeline/s at all times;
b) Culverts shall be provided at all crossings to provide such access;
c) Under roadway culverts would be required unless it can be proven to Rand Water that traffic density and the cover over the pipeline/s affect Rand Water;
d) In general the cover over Rand Water's pipeline/s may vary between 800mm and 1 500mm however, an undisturbed layer of at least 300mm shall be maintained between the pipeline/s and road works during construction; and
e) Reinforced concrete box culverts with compartments having minimum internal dimensions as indicated on Rand Water's standard drawings No. B1933 and B1934 shall be provided for both existing and future pipelines. Culverts shall preferably be drained by a gravity system.

VEHICLE CAPACITY OF RANDFONTEIN AND MAIN REEF ROADS (ROAD R41)

It is possible to conclude from the relevant manual vehicle traffic counts and traffic engineering calculations of anticipated future background (non-mine related) vehicle traffic volumes that Randfontein Road and Main Reef Road (Road R41) is currently heavily congested during peak hours and that the vehicle capacity of the roadway is insufficient and would remain so in the future.

With the anticipated future vehicle traffic volume projections and the potential vehicle traffic volumes that could be generated due to the planned future Goudrand Mega City it is deemed acceptable to assume that Randfontein Road and Main Reef Road (Road R41) would not be able to accommodate the anticipated future non-mine related vehicle traffic volumes and it is therefore recommended that the relevant roads authorities investigate the implementation of alternative roadways to accommodate the anticipated growth of non-mine related vehicle traffic volumes in the area.

From observations it is possible to assume that a large number of current and future vehicle traffic volumes along Randfontein Road (Road R41) comes from and goes to the west of Roodepoort (Randfontein direction as well as to and from the north and south of Road R558) and utilises Randfontein Road and Main Reef Road to gain access from and to Johannesburg CBD area and surrounding suburbs.

It would therefore make sense for the relevant roads authorities to investigate the implementation of the planned extension of Road N17 and the planned Road PWV5 in the near future which could result in a reduction of vehicle traffic volumes along Randfontein Road and Main Reef Road and in turn the last mentioned roadways' main purpose would be to serve local vehicle traffic coming to and from the relevant areas and not through traffic.

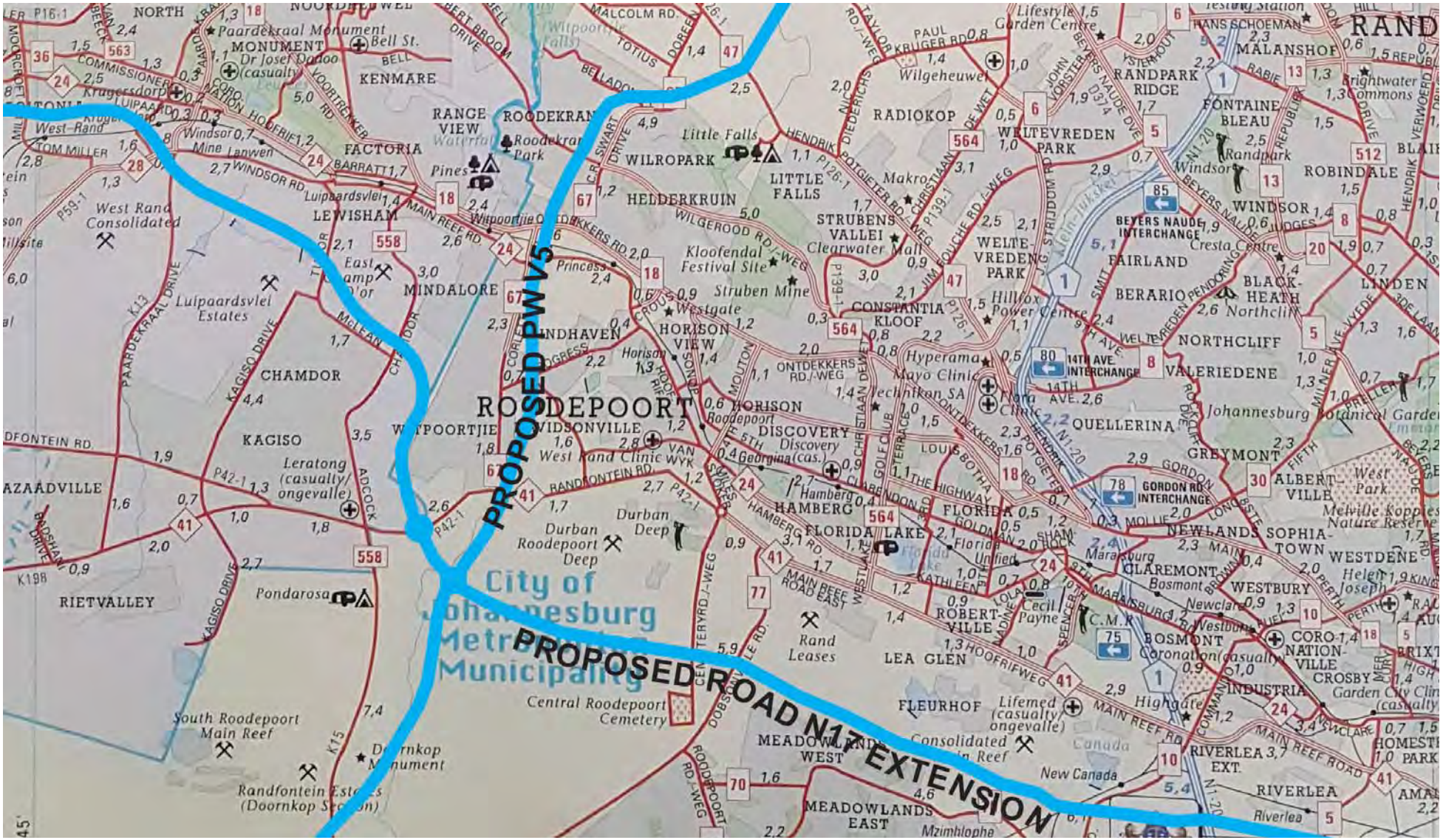


FIGURE 3.1: PROPOSED FUTURE ROADS NETWORK

3.2 RECOMMENDATIONS

The following are discussed in terms of the recommendations:

a) Recommendations for Access to and from the proposed mining development sites;
b) Summary of Intersections that require improvements without and with the proposed mining development;
c) Need for improvements without and with the proposed mining development;
d) Institutional arrangements; and
e) Reasoned opinion for authorisation.

3.2.1 RECOMMENDATIONS FOR ACCESS TO AND FROM THE PROPOSED MINING DEVELOPMENT SITES

Access to and from the proposed mining development would be possible from and to the existing roads network. Access options for consideration were identified for the proposed mining development with the following criteria in consideration:

a) Class of existing roads;
b) Intersection and access spacing requirements;
c) Since the majority of the vehicle trips anticipated to be generated will be heavy vehicles hauling excavated ore, travelling through residential areas were avoided if possible; and
d) Intersection and stopping sight distances.

The section below provides more information on the above mentioned.

3.2.1.1 Portion 152 of the Farm Vogelstruisfontein 231 IQ - Rugby Club Pit (Opencast)

Access to and from the proposed Rugby Club Main Reef Pit site would be possible via existing roads that links up with Main Reef Road (Road R41) at **Points I** and **J**. All roads and intersections to be used to gain access to and from the proposed site are existing roads and intersections, and it was therefore assumed that intersection spacing and sight distances are acceptable.

It was determined from the intersection performance evaluations that Point I is currently operating at an unacceptable level of service and that vehicles wishing to join the main traffic flow along Main Reef Road and vehicles wishing to turn right into Reid Road from the eastern approach of Main Reef Road is currently problematic from an intersection performance perspective and would remain so for the future.

Due to the close proximity of the main road Westlake Road that intersects with Main Reef Road (**Point J**), upgrading Point I would not be advisable and it is recommended that **Point I** be closed off permanently in the long term by the relevant roads department as part of their planning. This is deemed an acceptable option due to a low number of vehicle trips currently making use of Reid Road to gain access from and to Main Reef Road.

In the short-term it is recommended that the proposed mining development limit the use of **Point I** by mining related vehicle trips in the following manner:

a) By only making left-turns from the west into Reid Road to the proposed mine site (Inbound vehicle trips);
b) Inbound vehicle trips related to the proposed mine site from the east should travel via Point J and Westlake Road; and
c) Outbound vehicle trips related to the proposed mine site should gain access to Main Reef Road at **Point J**.

Refer to **Figure 3.2.1.1** for a graphical presentation of the last mentioned.

3.2.1.2 Portion 407 of the Farm Roodepoort 237 IQ – Roodepoort Main Reef Pit (Opencast)

Access to and from the proposed Roodepoort site would be possible from and to the existing roads which link with Randfontein Road (Road R41) for which the recommended option is access to and from Gustaf Street which links with Randfontein Road (Road R41) at **Point G** providing access to both portions of the proposed Roodepoort Main Reef site which is intersected by Gustaf Street.

It was possible to conclude from the intersection performance evaluations conducted for the proposed Roodepoort Main Reef Pit Access that the access intersection would experience delays for mine related vehicles exiting the proposed mine site during the AM peak. Due to the short duration of the proposed mining at the relevant proposed site, outbound mine related vehicle trips during the AM peak should be limited to left-out movements only.

Refer to **Figure 3.2.1.2** for a graphical presentation of the last mentioned.

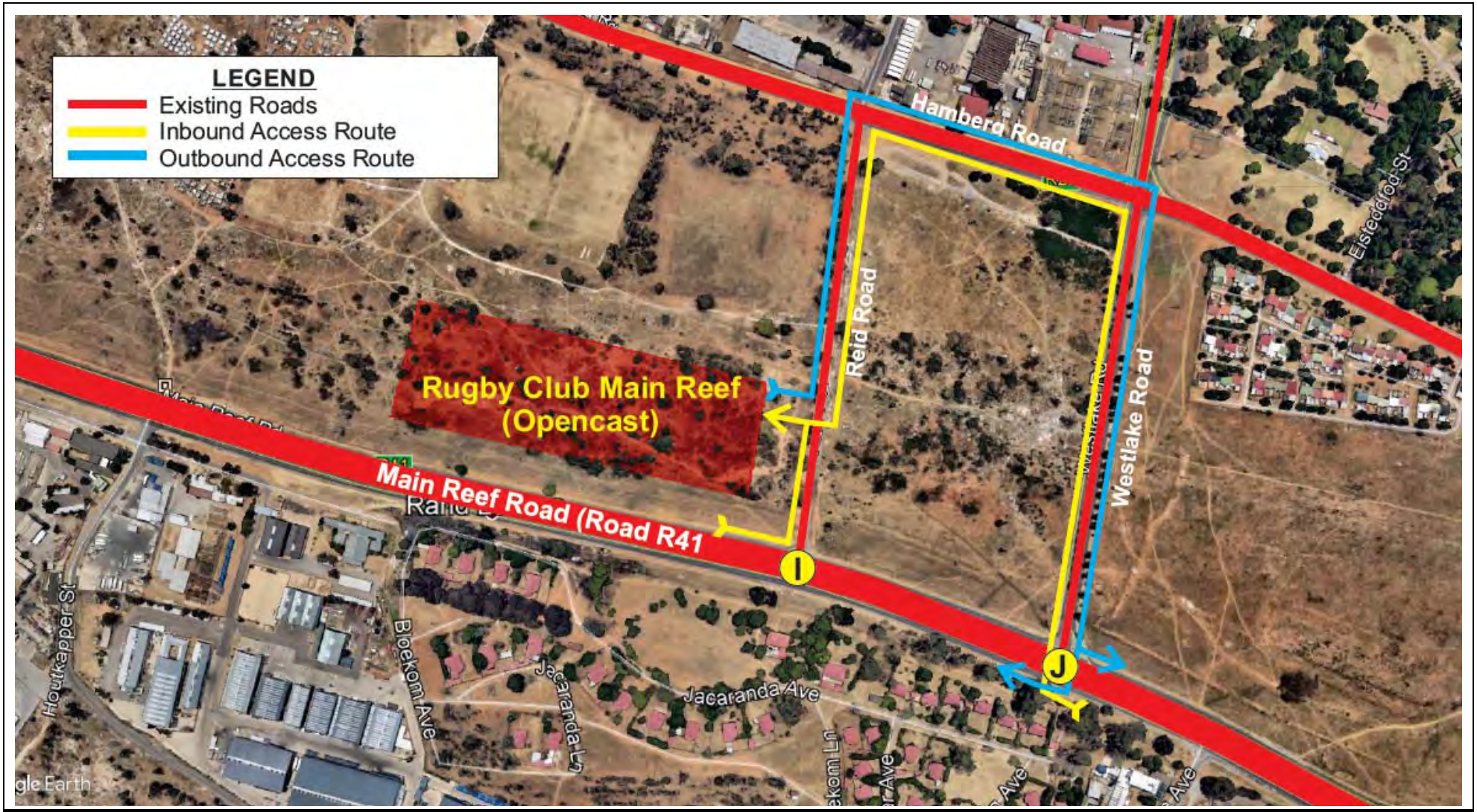


FIGURE 3.2.1.1: POTENTIAL ACCESS TO THE PROPOSED RUGBY CLUB SITE (OPENCAST)

FIGURE 3.2.1.2: POTENTIAL ACCESS TO THE PROPOSED ROODEPOORT MAIN REEF (OPENCAST)

3.2.1.3 Portion 017 & 018 of the Farm Vogelstruisfontein 231 IQ - Kimberley Reef East Pit (Opencast and underground) AND Portions 0148 and 161 of the Farm 231 IQ – 11 Shaft (Opencast)

Access to and from the proposed Kimberley Reef East and 11 Shaft sites (opencast and underground activities) would be possible via an existing road that links up with Main Reef Road (Road R41) at **Point K**. All roads and intersections to be used to gain access to and from the proposed sites are existing roads and intersections, and it was therefore assumed that intersection spacing and sight distances are acceptable.

Refer to **Figure 3.2.1.3** for a graphical presentation of the last mentioned.

3.2.1.4 Portion 014 of the Farm Roodepoort 237 IQ – Mona Lisa Pit (Opencast)

Access to and from the proposed Mona Lisa site would be required via a new access road and should avoid the Goudrand Township. Two potential points for the proposed access road to link up with Randfontein Road (Road R41) were identified which are:

a) Via a new intersection with Randfontein Road (Road R41) west of the Goudrand township (**Option 1**); or
b) Via an internal haul road to the east from where access could be gained to and from Randfontein Road (Road R41) via Gustav Street at **Point G** (**Option 2**).

It was determined from intersection performance evaluations that a new access point on Randfontein Road (Road R41) (Option 1) would require an intersection layout with excessive upgrades and a traffic light signal which is not viable in terms of costs and the short lifespan of the Mona Lisa Site. It is therefore recommended to provide an internal haul road to the east of the relevant mine site to join with Gustaf Street and in turn provide access from and to Randfontein Road (Road R41) at **Point G**.

Refer to **Figure 3.2.1.4** for a graphical presentation of the last mentioned.

3.2.1.5 Portion 001 of the Farm Roodepoort 237 IQ – Bird Reef Shaft (Underground)

Access to and from the proposed Bird Reef Shaft site would be possible via existing roads (Gustaf Street) that links up with Main Reef Road (Road R41) at **Point G**. All roads and intersections to be used to gain access to and from the proposed site are existing roads and intersections, and it was therefore assumed that intersection spacing and sight distances are acceptable.

Refer to **Figure 3.2.1.5** for a graphical presentation of the last mentioned.

FIGURE 3.2.1.3: POTENTIAL ACCESS TO THE PROPOSED 11 SHAFT (OPENCAST) AND KIMBERLEY REEF EAST (UNDERGROUND) SITES

FIGURE 3.2.1.4: POTENTIAL ACCESS TO THE PROPOSED MONA LISA SITE (OPENCAST)

FIGURE 3.2.1.5: POTENTIAL ACCESS TO THE PROPOSED BIRD REEF SITE (UNDERGROUND)

3.2.2 SUMMARY OF REQUIRED INTERSECTION IMPROVEMENTS WITHOUT AND WITH THE PROPOSED MINING DEVELOPEMNT

Tables 3.1 and **3.2** provides a short summary of the intersection improvements required without and with the proposed mining development, and whether the improvements are required from an Intersection performance point of view (Technical / Capacity) or a road safety point of view.

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

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

a) **Figure 3.3**: Graphical presentation of the required intersection and roads network improvements **WITHOUT** the proposed mining development (2019);
b) **Figure 3.4**: Graphical presentation of the required intersection and roads network improvements **WITHOUT** the proposed mining development (2029);
c) **Figure 3.5**: Graphical presentation of the required intersection and roads network improvements **WITH** the proposed mining development;
d) **Table 3.3**: Intersection improvements required **WITHOUT** the proposed mining development (2019);
e) **Table 3.4**: Intersection improvements required **WITHOUT** the proposed mining development (2029); and
f) **Table 3.5**: Intersection improvements required **WITH** the proposed mining development.

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

<u>The following is also relevant in terms of mitigation requirements without the proposed mining development:</u>

a) Pedestrian walkways and crossings should be provided at all intersections where not currently provided to ensure a split between vehicle traffic and pedestrians moving around the intersections; and
b) Road markings, reflective road studs (LED), road signs, overhead lights should be provided and maintained at all the relevant intersections under investigation to ensure visibility during night time, proper visibility of intersection lane geometry and sufficient information to road users; and

As part of the proposed mining development, it is recommended that ore haulage heavy vehicles avoid transporting ore during the relevant Am and PM peak periods.

TABLE 3.1: SUMMARY OF INTERSECTION IMPROVEMENTS REQUIRED IN TERMS OF ROAD / EARTH WORKS WITHOUT AND WITH THE PROPOSED MINING DEVELOPMENT (2019)					
Point	Intersection Description	**WITHOUT** proposed development		**WITH** proposed development	
		Intersection Performance Perspective	Road Safety Perspective	Intersection Performance Perspective	Road Safety Perspective
D	Intersection of Randfontein Road (Road R41) and Corlette Avenue	Yes, capacity	Yes	No improvements required from a road capacity or safety perspective with the proposed mining development.	
E	Intersection of Randfontein Road (Road R41) and Mathews Goniwe Drive	Yes, capacity	Yes	No improvements required from a road capacity or safety perspective with the proposed mining development.	
F	Intersection of Randfontein Road (Road R41), Iridium Street and Nick Toomey Boulevard	Yes, capacity	Yes	No improvements required from a road capacity or safety perspective with the proposed mining development.	
G	Intersection of Randfontein Road (Road R41) and Gustaf Street	Yes, capacity	Yes	No improvements required from a road capacity or safety perspective with the proposed mining development.	
H	Intersection of Randfontein Road (Road R41), Miles Stoker Road, Main Reef Road and Cemetery Road	Yes, capacity	Yes	No improvements required from a road capacity or safety perspective with the proposed mining development.	
I	Intersection of Main Reef Road (Road R41) and Reid Road	No upgrading recommended. To be closed by relevant roads authority in the long-term.		No improvements required from a road capacity or safety perspective with the proposed mining development.	
J	Intersection of Main Reef Road (Road R41) and Westlake Road	Yes, capacity	Yes	No improvements required from a road capacity or safety perspective with the proposed mining development.	
K	Intersection of Main Reef Road (Road R41) and Mine Road	Yes, capacity	Yes	No improvements required from a road capacity or safety perspective with the proposed mining development.	
	Intersection of Gustaf Street and Proposed Main Reef Pit Access	Intersection not relevant without the proposed mining development		No	Road Safety and Access

TABLE 3.2: SUMMARY OF INTERSECTION IMPROVEMENTS REQUIRED IN TERMS OF ROAD / EARTH WORKS WITHOUT AND WITH THE PROPOSED MINING DEVELOPMENT (2029)					
Point	Intersection Description	**WITHOUT** proposed development		**WITH** proposed development	
		Intersection Performance Perspective	Road Safety Perspective	Intersection Performance Perspective	Road Safety Perspective
D	Intersection of Randfontein Road (Road R41) and Corlette Avenue	No additional improvements required from a road capacity or safety perspective without and with the proposed mining development.			
E	Intersection of Randfontein Road (Road R41) and Mathews Goniwe Drive	No additional improvements required from a road capacity or safety perspective without and with the proposed mining development.			
F	Intersection of Randfontein Road (Road R41), Iridium Street and Nick Toomey Boulevard	No additional improvements required from a road capacity or safety perspective without and with the proposed mining development.			
G	Intersection of Randfontein Road (Road R41) and Gustaf Street	Yes, capacity	Yes	No improvements required from a road capacity or safety perspective with the proposed mining development.	
H	Intersection of Randfontein Road (Road R41), Miles Stoker Road, Main Reef Road and Cemetery Road	Yes, capacity	Yes	No improvements required from a road capacity or safety perspective with the proposed mining development.	
I	Intersection of Main Reef Road (Road R41) and Reid Road	No upgrading recommended. To be close in the long-term.		No improvements required from a road capacity or safety perspective with the proposed mining development.	
J	Intersection of Main Reef Road (Road R41) and Westlake Road	Yes, capacity	Yes	No improvements required from a road capacity or safety perspective with the proposed mining development.	
K	Intersection of Main Reef Road (Road R41) and Mine Road	Yes, capacity	Yes	No improvements required from a road capacity or safety perspective with the proposed mining development.	
	Intersection of Gustaf Street and Proposed Roodepoort Main Reef Pit Access	Intersection not relevant without the proposed mining development		Mining of the Roodepoort Main Reef Pit would be completed by 2029.	

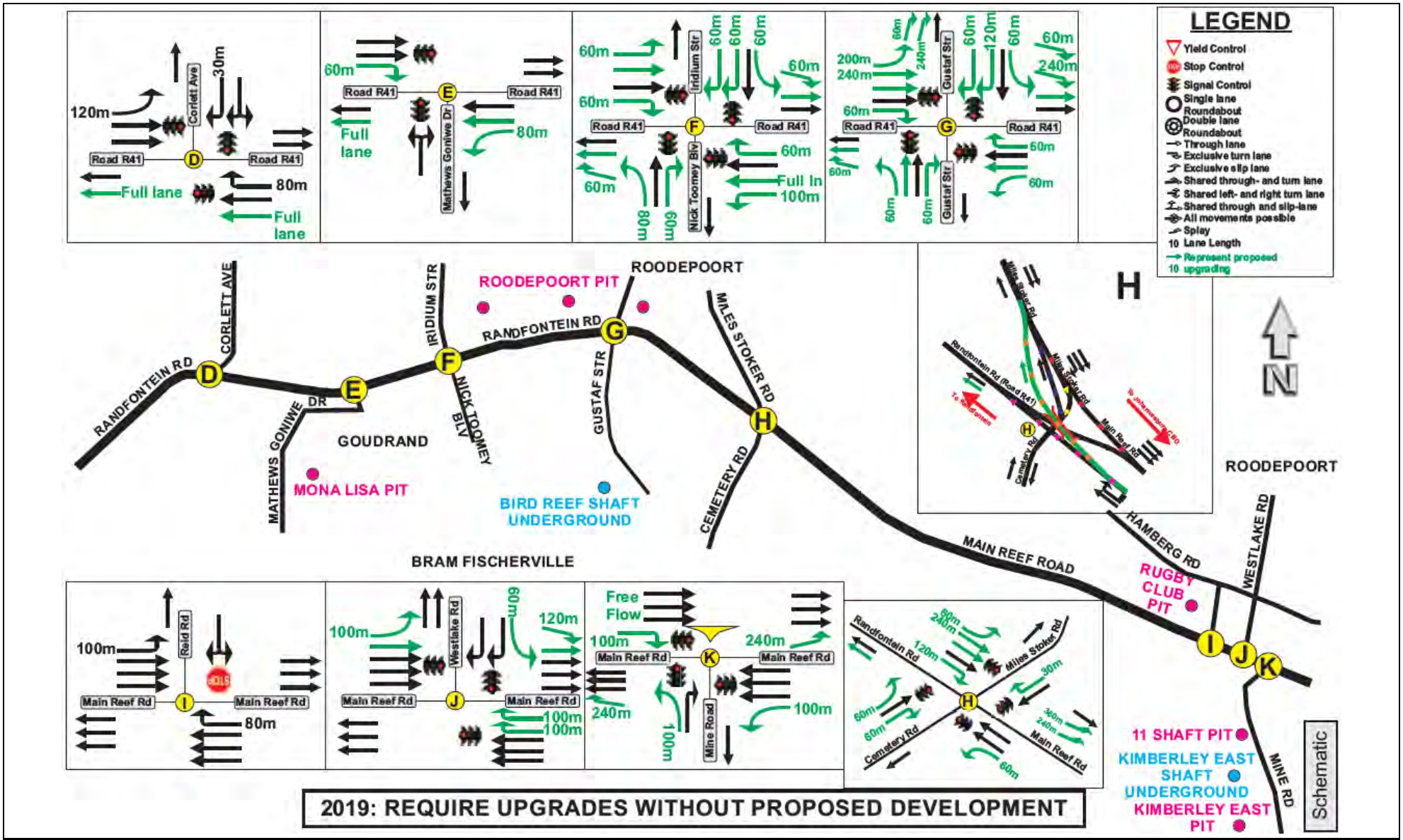


FIGURE 3.3: GRAPHICAL PRESENTATION OF THE REQUIRED INTERSECTION AND ROADS NETWORK IMPROVEMENTS WITHOUT THE PROPOSED MINING DEVELOPMENT (2019)

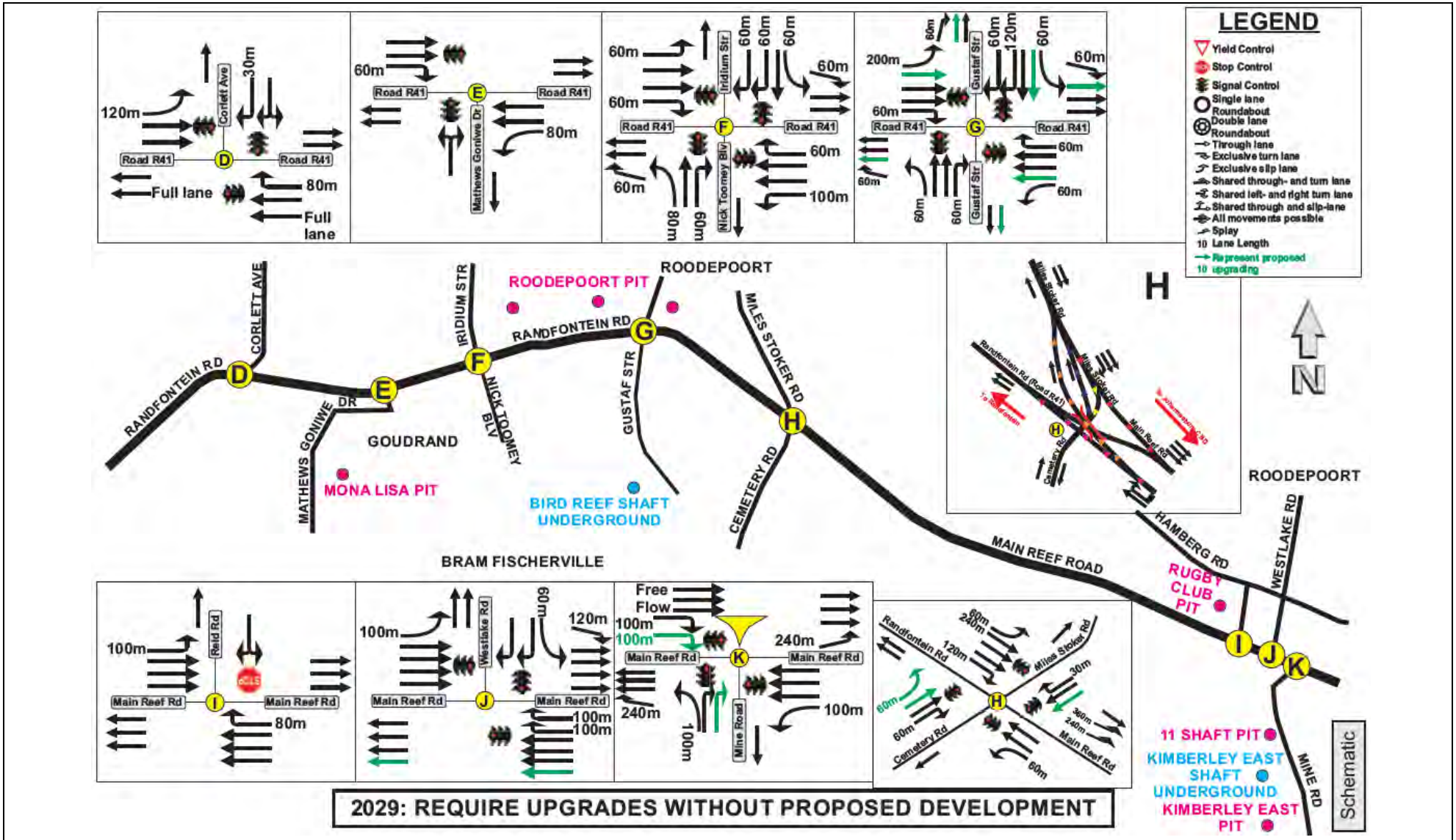


FIGURE 3.4: GRAPHICAL PRESENTATION OF THE REQUIRED INTERSECTION AND ROADS NETWORK IMPROVEMENTS WITHOUT THE PROPOSED MINING DEVELOPMENT (2029)

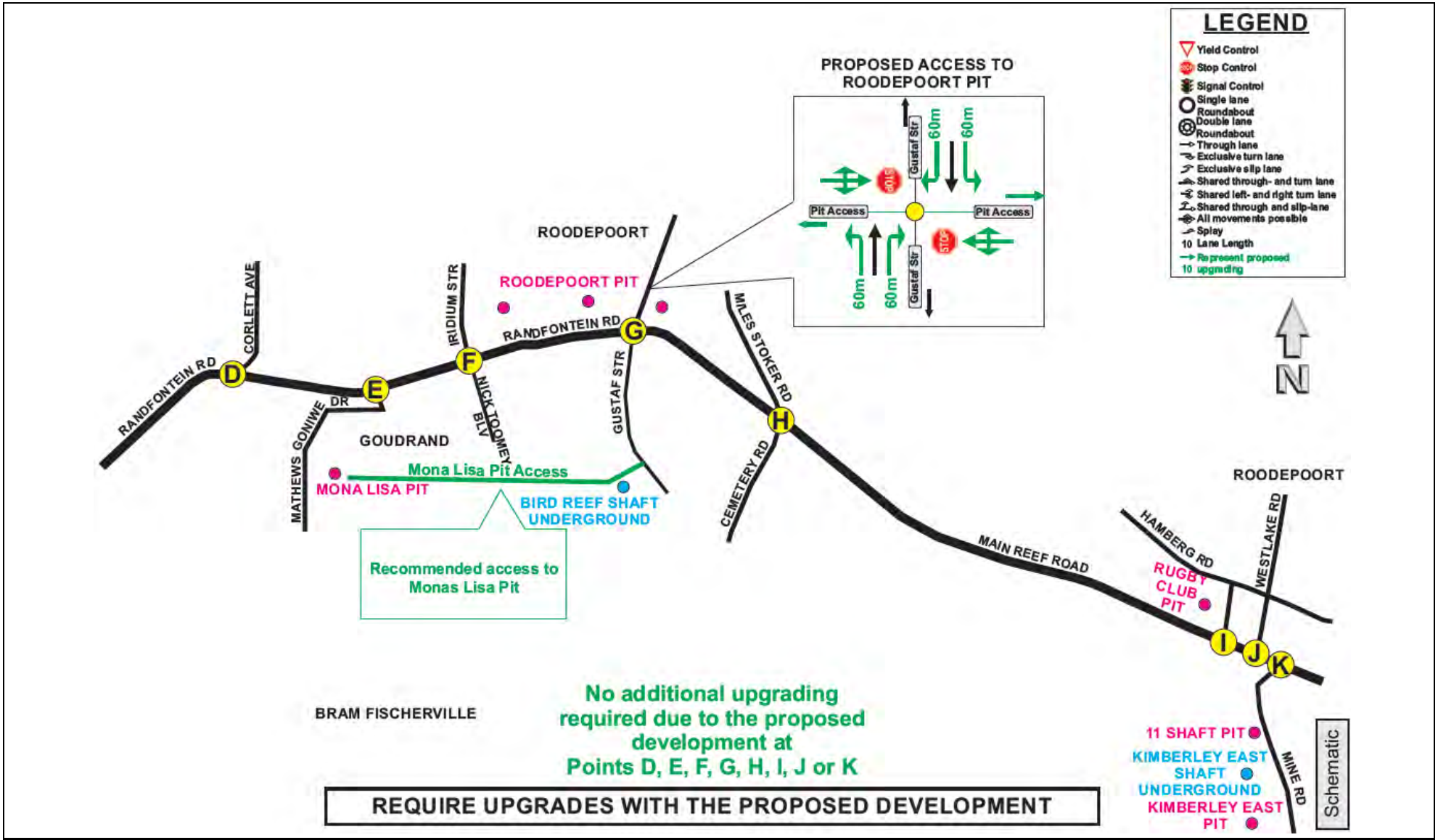


FIGURE 3.5: GRAPHICAL PRESENTATION OF THE REQUIRED INTERSECTION AND ROADS NETWORK IMPROVEMENTS WITH THE PROPOSED MINING DEVELOPMENT

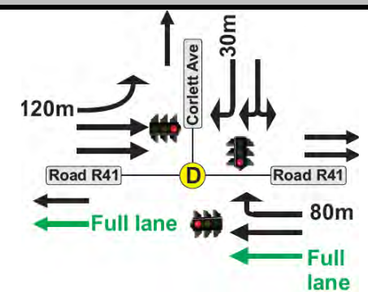
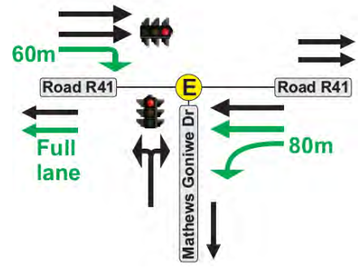
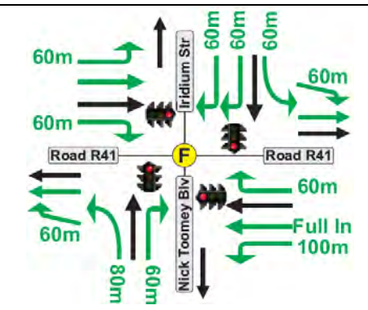
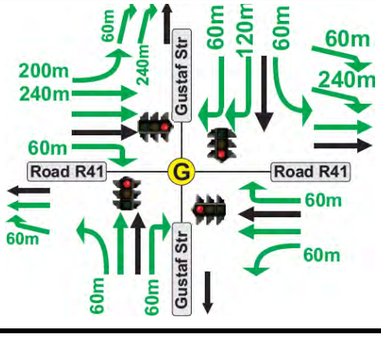
TABLE 3.3: RECOMMENDED ROAD NETWORK IMPROVEMENTS WITHOUT THE PROPOSED MINING DEVELOPMENT (2019)																		
POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED															GEOMETRY DETERMINED BY MEANS OF SIDRA
			Approach Traffic Control				Extra Lanes Required (m)											
			Free-Flow	Stop	60m 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	
D	Intersection of Randfontein Road (Road R41) and Corlette Avenue	*North (Corlett Ave)*	-	-	-	Yes	-	-	-	-	-	-	Performance	Yes	Yes	Yes	Yes	Yes	
		East (Road R41)	-	-	-	Yes	-	-	-	-	-	1	Performance		Yes	Yes	Yes	Yes	
		West (Road R41)	-	-	-	Yes	-	-	-	-	-	-	Performance		Yes	Yes	Yes	Yes	
E	Intersection of Randfontein Road (Road R41) and Mathews Goniwe Drive	*East (Road R41)*	-	-	-	Yes	-	Yes, 80m slip lane	-	-	-	1	Performance and Road Safety	Yes	Yes	Yes	Yes	Yes	
		South (Mathews Goniwe Dr)	-	-	-	Yes	-	-	-	-	-	-	Performance and Road Safety		Yes	Yes	Yes	Yes	
		West (Road R41)	-	-	-	Yes	-	-	-	-	Yes, 60m	1	Performance and Road Safety		Yes	Yes	Yes	Yes	
F	Intersection of Randfontein Road (Road R41), Iridium Street and Nick Toomey Boulevard	*North (Iridium Str)*	-	-	-	Yes	-	Yes, 60m slip lane	-	-	Yes, 2 x 60m	-	Performance	Yes	Yes	Yes	Yes	Yes	
		East (Road R41)	-	-	-	Yes	-	Yes, 100m	Yes	-	Yes, 60m	1	Performance		Yes	Yes	Yes	Yes	
		South (Nick Toomey Blv)	-	-	-	Yes	-	Yes, 60m slip lane	-	-	Yes, 60m	-	Performance		Yes	Yes	Yes	Yes	
		West (Road R41)	-	-	-	Yes	-	Yes, 60m	Yes	-	Yes, 60m	1	Performance		Yes	Yes	Yes	Yes	
G	Intersection of Randfontein Road (Road R41) and Gustaf Street	*North (Gustaf Str)*	-	-	-	Yes	-	Yes, 60m slip lane	Yes x 2 lanes	-	Yes, 2 x lanes	-	Performance	Yes	Yes	Yes	Yes	Yes	
		East (Road R41)	-	-	-	Yes	-	Yes, 60m slip lane	Yes x 3 lanes	-	Yes, 60m	1	Performance		Yes	Yes	Yes	Yes	
		South (Gustaf Str)	-	-	-	Yes	-	Yes, 60m slip lane	-	-	Yes, 60m	1	Performance		Yes	Yes	Yes	Yes	
		West (Road R41)	-	-	-	Yes	-	Yes, 200m slip lane	Yes x 2 lanes	-	Yes, 60m	1	Performance		Yes	Yes	Yes	Yes	

TABLE 3.3: RECOMMENDED ROAD NETWORK IMPROVEMENTS WITHOUT THE PROPOSED MINING DEVELOPMENT (2019) Continued...

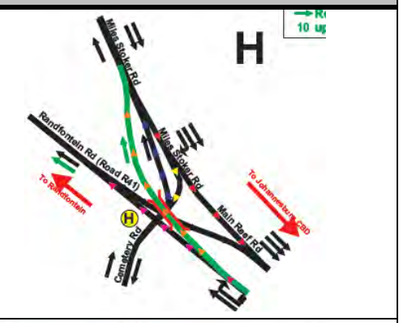
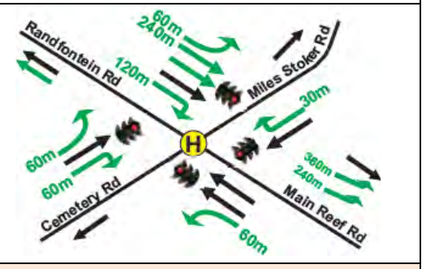
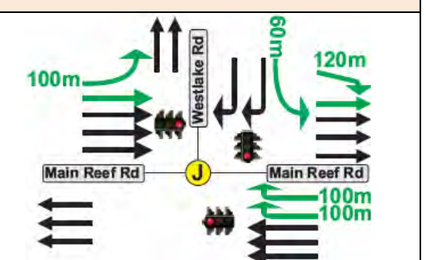
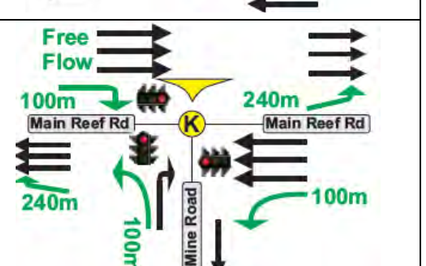
POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED															GEOMETRY DETERMINED BY MEANS OF SIDRA
			Approach Traffic Control				Extra Lanes Required (m)											
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration 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	
H	Intersection of Randfontein Road (Road R41), Miles Stoker Road, Main Reef Road and Cemetery Road	*North (Miles Stoker)*	-	-	-	Yes	-	-	-	-	Yes, 30m	-	Performance	Yes	Yes	Yes	Yes	Yes	
		East (Road R41)	-	-	-	Yes	-	Yes, 60m slip lane	-	-	-	-	Performance		Yes	Yes	Yes	Yes	
		South (Cemetery Rd)	-	-	-	Yes	-	Yes, 60m slip lane	-	-	Yes, 60m	-	Performance		Yes	Yes	Yes	Yes	
		West (Road R41)	-	-	-	Yes	-	Yes, 60m slip lane	-	-	Yes, 120m	2	Performance		Yes	Yes	Yes	Yes	
I	Intersection of Main Reef Road (Road R41) and Reid Road	No upgrading recommended.																
J	Intersection of Main Reef Road (Road R41) and Westlake Road	*North (Westlake Rd)*	-	-	-	Yes	-	Yes, 60m slip lane	-	-	-	-	Performance	Yes	Yes	Yes	Yes	Yes	
		East (Road R41)	-	-	-	Yes	-	-	-	-	Yes, 2 x 100m	-	Performance		Yes	Yes	Yes	Yes	
		West (Road R41)	-	-	-	Yes	-	Yes, 100m slip lane	-	-	-	1	Performance		Yes	Yes	Yes	Yes	
K	Intersection of Main Reef Road (Road R41) and Mine Road	*East (Road R41)*	-	-	-	Yes	-	Yes, 100m slip lane	-	-	-	-	Performance	Yes	Yes	Yes	Yes	Yes	
		South (Mine Road)	-	-	-	Yes	-	Yes, 100m slip lane	-	-	-	-	Performance		Yes	Yes	Yes	Yes	
		West (Road R41)	Yes	-	-	Yes, right turn	-	-	-	-	Yes, 100m	-	Performance		Yes	Yes	Yes	Yes	

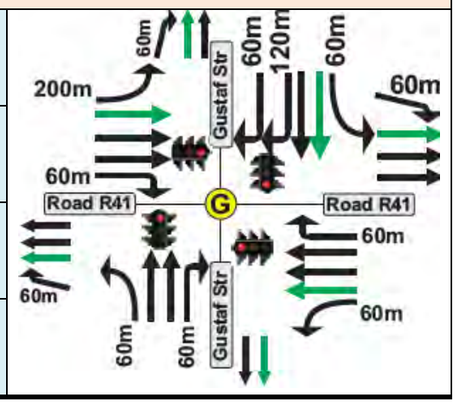
TABLE 3.4: RECOMMENDED ROAD NETWORK IMPROVEMENTS WITHOUT THE PROPOSED MINING DEVELOPMENT (2029)																				
POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED																	GEOMETRY DETERMINED BY MEANS OF SIDRA
			Approach Traffic Control				Extra Lanes Required (m)													
			Free-Flow	Stop	60m 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	
D	Intersection of Randfontein Road (Road R41) and Corlette Avenue	No additional upgrading recommended.																		
E	Intersection of Randfontein Road (Road R41) and Mathews Goniwe Drive	No additional upgrading recommended.																		
F	Intersection of Randfontein Road (Road R41), Iridium Street and Nick Toomey Boulevard	No additional upgrading recommended.																		
G	Intersection of Randfontein Road (Road R41) and Gustaf Street	*North (Gustaf Str)*	-	-	-	Yes	-	-	-	-	-	1	Performance	Yes	Yes	Yes	Yes	Yes	Yes	
		East (Road R41)	-	-	-	Yes	-	-	-	-	-	1	Performance		Yes	Yes	Yes	Yes	Yes	
		South (Gustaf Str)	-	-	-	Yes	-	-	-	-	-	-	Performance		Yes	Yes	Yes	Yes	Yes	
		West (Road R41)	-	-	-	Yes	-	-	-	-	-	1	Performance		Yes	Yes	Yes	Yes	Yes	

TABLE 3.4: RECOMMENDED ROAD NETWORK IMPROVEMENTS WITHOUT THE PROPOSED MINING DEVELOPMENT (2029) Continued...

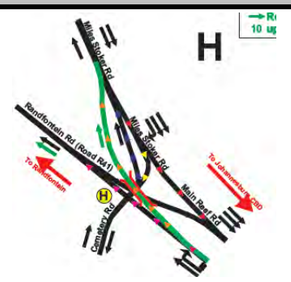
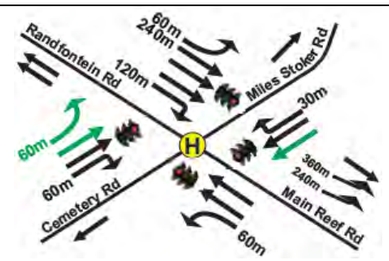
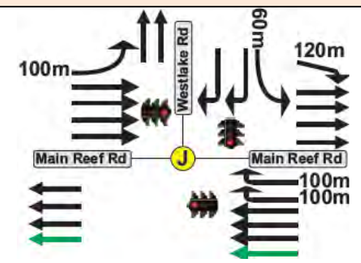
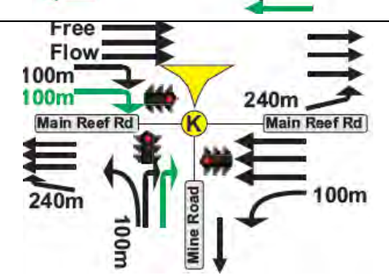
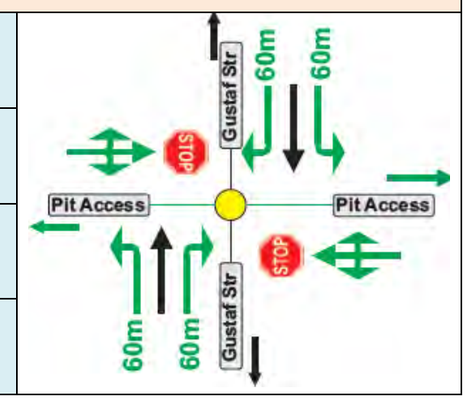
JOINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED															GEOMETRY DETERMINED BY MEANS OF SIDRA
			Approach Traffic Control				Extra Lanes Required (m)											
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration 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	
H	Intersection of Randfontein Road (Road R41), Miles Stoker Road, Main Reef Road and Cemetery Road	*North (Miles Stoker)*	-	-	-	Yes	-	-	-	-	-	1	Performance	Yes	Yes	Yes	Yes	Yes	
		East (Road R41)	-	-	-	Yes	-	-	-	-	-	-	Performance		Yes	Yes	Yes	Yes	
		South (Cemetery Rd)	-	-	-	Yes	-	Yes, 60m slip lane	-	-	-	1	Performance		Yes	Yes	Yes	Yes	
		West (Road R41)	-	-	-	Yes	-	-	-	-	-	-	Performance		Yes	Yes	Yes	Yes	
I	Intersection of Main Reef Road (Road R41) and Reid Road	No upgrading recommended.																	
J	Intersection of Main Reef Road (Road R41) and Westlake Road	*North (Westlake Rd)*	-	-	-	Yes	-	-	-	-	-	-	Performance	Yes	Yes	Yes	Yes	Yes	
		East (Road R41)	-	-	-	Yes	-	-	-	-	-	1	Performance		Yes	Yes	Yes	Yes	
		West (Road R41)	-	-	-	Yes	-	-	-	-	-	-	Performance		Yes	Yes	Yes	Yes	
K	Intersection of Main Reef Road (Road R41) and Mine Road	*East (Road R41)*	-	-	-	Yes	-	-	-	-	-	-	Performance	Yes	Yes	Yes	Yes	Yes	
		South (Mine Road)	-	-	-	Yes	-	-	-	-	Yes	-	Performance		Yes	Yes	Yes	Yes	
		West (Road R41)	Yes	-	-	Yes, right turn	-	-	-	-	Yes, 100m	-	Performance		Yes	Yes	Yes	Yes	

TABLE 3.5: RECOMMENDED ROAD NETWORK IMPROVEMENTS WITH THE PROPOSED MINING DEVELOPMENT																				
JUNCTION	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED																	GEOMETRY DETERMINED BY MEANS OF SIDRA
			Approach Traffic Control				Extra Lanes Required (m)						Improvements required from a Road Safety or intersection performance Perspective	Reflective Road Studs required at Intersection	Road Markings Required	Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways	
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane	Number of Extra Through Lanes							
D	Intersection of Randfontein Road (Road R41) and Corlette Avenue	No additional upgrading required due to the proposed mining development.																		
E	Intersection of Randfontein Road (Road R41) and Mathews Goniwe Drive	No additional upgrading required due to the proposed mining development.																		
F	Intersection of Randfontein Road (Road R41), Iridium Street and Nick Toomey Boulevard	No additional upgrading required due to the proposed mining development.																		
G	Intersection of Randfontein Road (Road R41) and Gustaf Street	No additional upgrading required due to the proposed mining development.																		
H	Intersection of Randfontein Road (Road R41), Miles Stoker Road, Main Reef Road and Cemetery Road	No additional upgrading required due to the proposed mining development.																		
I	Intersection of Main Reef Road (Road R41) and Reid Road	No additional upgrading required due to the proposed mining development.																		
J	Intersection of Main Reef Road (Road R41) and Westlake Road	No additional upgrading required due to the proposed mining development.																		

TABLE 3.5: RECOMMENDED ROAD NETWORK IMPROVEMENTS WITH THE PROPOSED MINING DEVELOPMENT Continued...

POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED																GEOMETRY DETERMINED BY MEANS OF SIDRA
			Approach Traffic Control				Extra Lanes Required (m)												
			Free-Flow	Stop	60m 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	
K	Intersection of Main Reef Road (Road R41) and Mine Road	No additional upgrading required due to the proposed mining development.																	
	Intersection of Gustaf Street and Proposed Roodepoort Main Reef Pit Access	*North (Gustaf Str)*	Yes	-	-	-	-	Yes, 60m	-	-	-	-	Road Safety and Access	Yes	Yes	Yes	-	-	
		East (Pit Access)	-	Yes	-	-	-	-	-	-	Yes, 60m	1	Road Safety and Access		Yes	Yes	-	-	
		South (Gustaf Str)	Yes	-	-	-	-	Yes, 60m	-	-	-	-	Road Safety and Access		Yes	Yes	-	-	
		West (Pit Access)	-	Yes	-	-	-	-	-	-	Yes, 60m	1	Road Safety and Access		Yes	Yes	-	-	

3.2.4 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 consumables, ROM ore and workers will 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 consumables, ROM ore and workers can be transported at all times.

3.2.5 REASONED OPINION FOR AUTHORISATION

In conclusion of the findings as part of the investigations, Siyazi Gauteng Consulting Services (Pty) Ltd is of the opinion that the proposed mining 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.

APPENDIX A

INFORMATION RELATED TO STATUS QUO

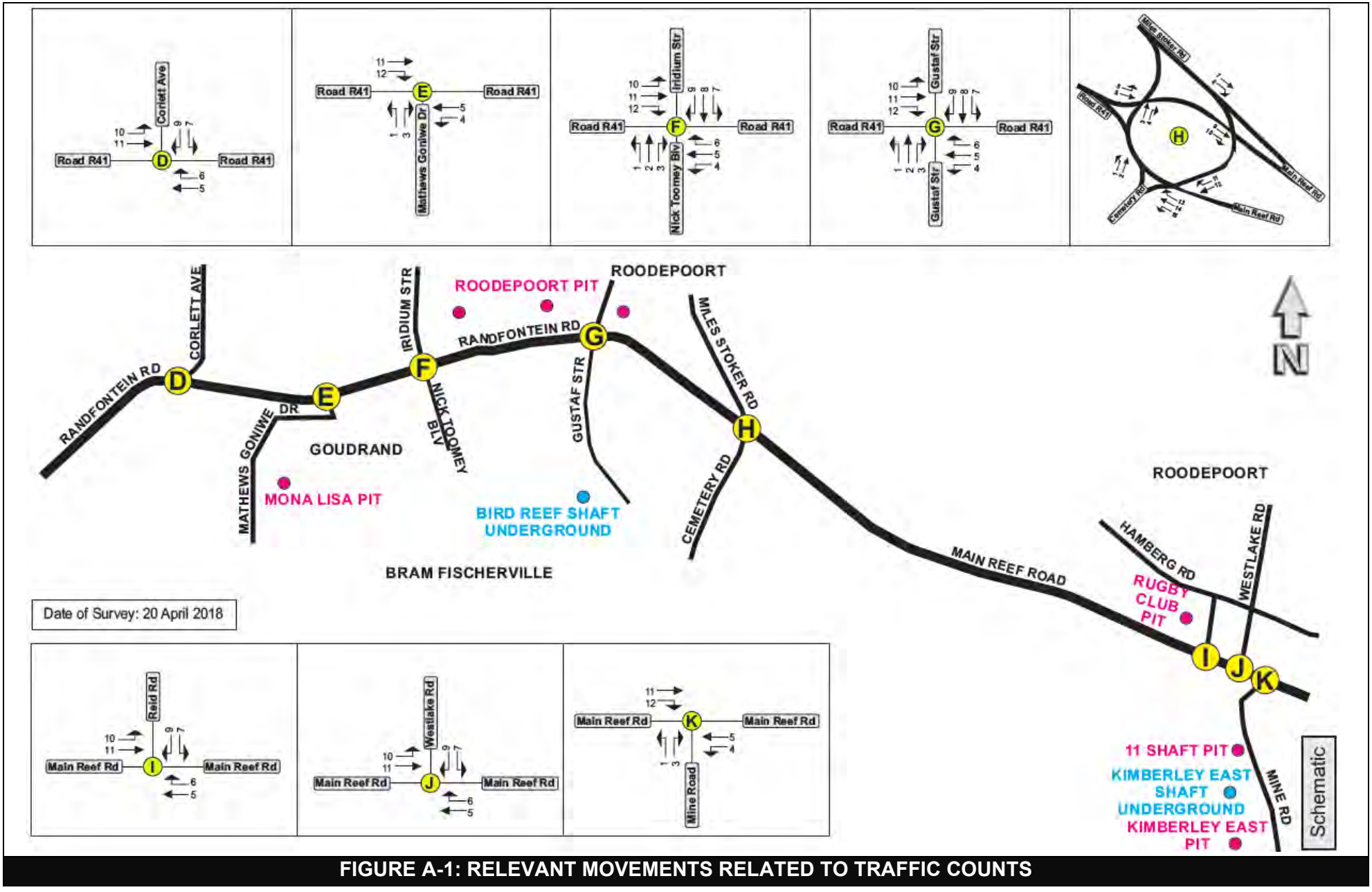


FIGURE A-1: RELEVANT MOVEMENTS RELATED TO TRAFFIC COUNTS

TABLE A-1: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND CORLETTE AVENUE (POINT D) (20 APRIL 2018)							
TIME INTERVALS	**MOVEMENTS**						
	5	**6**	**7**	**9**	**10**	**11**	**TOTAL**
06:00-07:00	728	43	78	256	226	1944	**3275**
06:15-07:15	807	61	107	319	402	1799	**3495**
06:30-07:30	838	82	115	348	463	1654	**3500**
06:45-07:45	858	88	110	371	489	1578	**3494**
07:00-08:00	837	78	98	320	456	1485	**3274**
07:15-08:15	751	56	62	245	297	1570	**2981**
07:30-08:30	678	36	50	189	232	1531	**2716**
07:45-08:45	612	25	40	166	203	1550	**2596**
08:00-09:00	526	24	31	190	212	1488	**2471**
08:15-09:15	538	27	32	199	200	1368	**2364**
08:30-09:30	554	27	27	200	191	1218	**2217**
08:45-09:45	568	33	29	203	210	978	**2021**
09:00-10:00	576	31	31	179	187	837	**1841**
09:15-10:15	579	28	35	182	177	755	**1756**
09:30-10:30	581	21	34	168	157	724	**1685**
09:45-10:45	567	18	28	146	113	687	**1559**
10:00-11:00	565	28	26	171	132	652	**1574**
10:15-11:15	579	37	20	150	124	672	**1582**
10:30-11:30	604	38	26	166	150	697	**1681**
10:45-11:45	619	48	32	178	171	691	**1739**
11:00-12:00	674	40	41	191	179	713	**1838**
11:15-12:15	662	36	42	194	178	741	**1853**
11:30-12:30	646	35	42	190	172	732	**1817**
11:45-12:45	666	25	38	190	184	774	**1877**
12:00-13:00	635	33	35	166	187	793	**1849**
12:15-13:15	659	33	31	178	188	757	**1846**
12:30-13:30	697	43	29	189	194	727	**1879**
12:45-13:45	684	44	30	194	199	707	**1858**
13:00-14:00	737	39	30	204	198	674	**1882**
13:15-14:15	805	42	32	225	226	674	**2004**
13:30-14:30	829	39	27	249	222	695	**2061**
13:45-14:45	878	37	34	263	235	812	**2259**
14:00-15:00	896	40	32	278	223	994	**2463**
14:15-15:15	932	38	35	280	207	1170	**2662**
14:30-15:30	971	36	41	293	219	1311	**2871**
14:45-15:45	1023	43	36	329	208	1282	**2921**
15:00-16:00	1075	39	44	338	236	1189	**2921**
15:15-16:15	1100	43	43	355	262	1181	**2984**
15:30-16:30	1121	43	32	344	279	1211	**3030**
15:45-16:45	1193	39	31	342	273	1269	**3147**
16:00-17:00	1234	44	23	353	262	1356	**3272**
16:15-17:15	1321	35	28	355	245	1437	**3421**
16:30-17:30	1376	35	43	399	233	1501	**3587**
16:45-17:45	1456	37	46	393	240	1555	**3727**
17:00-18:00	1664	36	55	416	264	1483	**3918**

TABLE A-2: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND MATHEWS GONIWE DRIVE (POINT E) (20 APRIL 2018)							
TIME INTERVALS	**MOVEMENTS**						
	1	**3**	**4**	**5**	**11**	**12**	**TOTAL**
06:00-07:00	9	47	69	677	2016	6	**2824**
06:15-07:15	24	52	82	764	1870	36	**2828**
06:30-07:30	42	58	86	834	1704	65	**2789**
06:45-07:45	49	53	77	838	1618	70	**2705**
07:00-08:00	49	37	61	771	1513	70	**2501**
07:15-08:15	38	22	41	696	1587	45	**2429**
07:30-08:30	18	11	21	605	1558	23	**2236**
07:45-08:45	15	4	13	573	1573	17	**2195**
08:00-09:00	13	11	15	565	1497	22	**2123**
08:15-09:15	25	23	27	591	1361	39	**2066**
08:30-09:30	52	32	53	603	1208	37	**1985**
08:45-09:45	49	36	66	591	955	52	**1749**
09:00-10:00	52	31	71	583	808	60	**1605**
09:15-10:15	41	25	62	588	745	45	**1506**
09:30-10:30	29	22	49	586	713	45	**1444**
09:45-10:45	32	16	36	599	680	35	**1398**
10:00-11:00	38	27	34	600	645	33	**1377**
10:15-11:15	48	33	50	611	664	28	**1434**
10:30-11:30	50	36	60	653	688	35	**1522**
10:45-11:45	51	37	63	690	694	29	**1564**
11:00-12:00	46	41	69	731	725	29	**1641**
11:15-12:15	37	35	49	724	745	38	**1628**
11:30-12:30	31	36	30	729	741	33	**1600**
11:45-12:45	35	46	45	728	773	39	**1666**
12:00-13:00	38	36	42	724	792	36	**1668**
12:15-13:15	32	41	50	749	757	31	**1660**
12:30-13:30	24	35	56	776	725	31	**1647**
12:45-13:45	30	25	42	769	707	30	**1603**
13:00-14:00	28	30	31	810	667	37	**1603**
13:15-14:15	29	26	27	862	672	34	**1650**
13:30-14:30	32	28	21	900	693	29	**1703**
13:45-14:45	19	37	16	972	817	29	**1890**
14:00-15:00	18	38	23	991	1009	17	**2096**
14:15-15:15	19	33	23	1027	1187	18	**2307**
14:30-15:30	19	37	20	1027	1336	16	**2455**
14:45-15:45	36	32	25	1121	1305	13	**2532**
15:00-16:00	40	26	33	1157	1202	31	**2489**
15:15-16:15	47	30	39	1216	1181	43	**2556**
15:30-16:30	57	32	42	1234	1192	51	**2608**
15:45-16:45	39	33	48	1212	1246	54	**2632**
16:00-17:00	34	41	36	1270	1335	44	**2760**
16:15-17:15	36	51	42	1249	1420	45	**2843**
16:30-17:30	40	47	46	1327	1494	50	**3004**
16:45-17:45	50	51	46	1326	1545	56	**3074**
17:00-18:00	50	39	53	1274	1486	52	**2954**

TABLE A-3: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF RANDFONTEIN ROAD (ROAD R41), IRIDIUM STREET AND NICK TOOMEY BOULEVARD (POINT F) (20 APRIL 2018)													
TIME INTERVALS	**MOVEMENTS**												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**TOTAL**
06:00-07:00	41	71	32	69	738	161	612	120	79	53	1899	111	**3986**
06:15-07:15	41	96	34	82	819	152	650	119	108	120	1663	139	**4023**
06:30-07:30	35	104	45	132	856	146	677	136	173	248	1373	141	**4066**
06:45-07:45	39	114	38	125	782	133	704	132	196	421	1025	225	**3934**
07:00-08:00	32	113	33	172	689	140	698	152	200	573	730	247	**3779**
07:15-08:15	27	78	26	193	602	123	696	123	287	596	785	228	**3764**
07:30-08:30	26	62	20	190	505	119	643	111	267	618	733	218	**3512**
07:45-08:45	19	45	25	206	420	120	589	95	302	623	820	134	**3398**
08:00-09:00	18	34	31	155	356	122	551	60	359	600	833	75	**3194**
08:15-09:15	10	34	35	117	342	104	491	68	279	630	684	70	**2864**
08:30-09:30	11	26	33	87	336	75	547	69	299	550	643	47	**2723**
08:45-09:45	10	27	44	66	334	68	616	68	311	467	490	34	**2535**
09:00-10:00	10	31	45	60	340	51	645	84	320	392	421	26	**2425**
09:15-10:15	11	32	49	53	336	46	622	73	350	344	406	20	**2342**
09:30-10:30	9	29	49	58	340	49	531	70	382	357	359	19	**2252**
09:45-10:45	10	38	50	63	364	52	427	87	433	335	344	17	**2220**
10:00-11:00	9	37	52	65	384	47	349	83	484	338	316	18	**2182**
10:15-11:15	7	38	51	66	458	41	320	71	525	327	354	16	**2274**
10:30-11:30	8	41	51	52	482	35	307	72	533	278	428	18	**2305**
10:45-11:45	7	31	37	41	491	25	314	43	520	231	482	18	**2240**
11:00-12:00	6	27	45	37	481	21	332	36	446	211	538	17	**2197**
11:15-12:15	6	31	41	28	432	20	336	34	313	179	580	21	**2021**
11:30-12:30	4	34	41	20	429	22	300	35	219	185	575	17	**1881**
11:45-12:45	4	34	46	20	405	30	279	52	141	184	622	13	**1830**
12:00-13:00	7	36	46	25	406	39	260	52	121	175	636	17	**1820**
12:15-13:15	10	32	52	26	418	55	278	51	138	184	593	21	**1858**
12:30-13:30	10	31	50	31	453	50	331	50	170	188	549	23	**1936**
12:45-13:45	8	33	52	30	538	44	342	31	200	200	508	24	**2010**
13:00-14:00	7	37	41	34	660	38	349	44	234	204	471	22	**2141**
13:15-14:15	7	40	33	35	762	33	347	58	276	199	482	17	**2289**
13:30-14:30	9	42	38	30	828	35	331	66	310	174	533	14	**2410**
13:45-14:45	12	42	32	35	960	37	315	97	334	176	663	15	**2718**
14:00-15:00	15	38	36	45	1005	52	313	109	327	172	853	22	**2987**
14:15-15:15	16	42	43	62	1103	53	330	119	315	212	983	25	**3303**
14:30-15:30	14	36	50	68	1141	57	326	107	301	257	1080	36	**3473**
14:45-15:45	18	37	50	73	1054	76	365	102	283	280	1015	42	**3395**
15:00-16:00	16	48	48	66	1011	66	394	90	283	316	871	41	**3250**
15:15-16:15	12	53	51	68	928	65	396	71	283	328	834	49	**3138**
15:30-16:30	13	55	51	75	1025	84	434	86	283	341	836	47	**3330**
15:45-16:45	8	56	55	66	1166	74	482	100	296	375	855	49	**3582**
16:00-17:00	8	52	51	73	1238	100	545	127	300	401	932	43	**3870**
16:15-17:15	11	49	54	59	1310	110	610	165	306	404	1020	47	**4145**
16:30-17:30	10	55	52	66	1246	112	656	187	326	394	1102	45	**4251**
16:45-17:45	10	55	62	83	1191	113	663	189	377	379	1179	38	**4339**
17:00-18:00	8	49	64	89	1208	103	635	182	430	358	1127	40	**4293**

TABLE A-4: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND GUSTAF STREET (POINT G) (20 APRIL 2018)													
TIME INTERVALS	**MOVEMENTS**												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**TOTAL**
06:00-07:00	16	115	4	23	468	45	190	216	325	58	2262	223	**3945**
06:15-07:15	11	225	11	24	496	30	121	217	377	77	2121	149	**3859**
06:30-07:30	36	348	15	20	508	33	38	210	363	138	1834	123	**3666**
06:45-07:45	54	460	20	15	528	34	32	207	299	205	1471	91	**3416**
07:00-08:00	67	450	19	15	527	32	23	167	213	254	1169	38	**2974**
07:15-08:15	76	373	18	23	518	29	16	168	153	242	1225	40	**2881**
07:30-08:30	61	292	19	25	506	27	16	162	117	221	1140	35	**2621**
07:45-08:45	50	214	17	24	482	27	14	139	117	193	1212	29	**2518**
08:00-09:00	40	174	15	21	464	27	12	119	102	165	1215	35	**2389**
08:15-09:15	34	133	12	12	427	26	11	101	97	132	1040	38	**2063**
08:30-09:30	31	112	12	12	415	23	8	100	96	108	1070	45	**2032**
08:45-09:45	32	111	10	14	400	19	6	77	77	92	995	63	**1896**
09:00-10:00	29	89	12	15	352	14	8	84	78	98	956	57	**1792**
09:15-10:15	37	82	14	20	381	11	7	91	71	98	925	54	**1791**
09:30-10:30	37	81	11	26	370	17	8	81	71	101	796	42	**1641**
09:45-10:45	34	76	15	24	386	19	8	89	75	101	692	28	**1547**
10:00-11:00	35	86	16	26	437	20	4	92	82	87	604	26	**1515**
10:15-11:15	34	107	16	22	430	17	6	93	98	93	597	35	**1548**
10:30-11:30	35	106	16	17	446	13	10	107	100	111	598	77	**1636**
10:45-11:45	43	110	15	18	462	12	13	108	110	104	649	80	**1724**
11:00-12:00	46	112	12	18	445	11	13	105	109	102	721	92	**1786**
11:15-12:15	42	108	10	17	455	12	10	114	99	93	776	88	**1824**
11:30-12:30	48	115	11	21	477	13	5	97	113	87	764	65	**1816**
11:45-12:45	47	117	10	22	457	11	0	98	111	111	777	59	**1820**
12:00-13:00	52	132	13	21	467	16	0	107	91	120	767	55	**1841**
12:15-13:15	54	125	16	27	483	32	6	124	109	137	736	50	**1899**
12:30-13:30	56	135	16	21	473	29	8	134	111	128	766	36	**1913**
12:45-13:45	52	125	19	19	513	28	12	160	116	104	758	40	**1946**
13:00-14:00	47	126	21	24	496	26	13	157	144	91	738	32	**1915**
13:15-14:15	49	133	22	18	523	12	10	141	145	78	748	36	**1915**
13:30-14:30	44	117	20	25	581	12	10	160	143	56	817	29	**2014**
13:45-14:45	56	128	17	37	593	19	7	156	155	39	952	19	**2178**
14:00-15:00	62	126	15	50	722	17	8	192	163	40	1132	30	**2557**
14:15-15:15	64	128	9	49	774	15	7	210	187	52	1267	37	**2799**
14:30-15:30	73	144	13	43	740	17	13	223	218	84	1310	62	**2940**
14:45-15:45	91	144	16	33	772	14	17	241	244	113	1227	90	**3002**
15:00-16:00	95	157	17	22	747	13	24	242	284	127	1099	87	**2914**
15:15-16:15	95	167	20	28	708	16	34	245	318	123	1074	84	**2912**
15:30-16:30	85	168	19	30	748	14	46	256	349	132	1115	74	**3036**
15:45-16:45	60	174	14	32	740	12	58	267	380	125	1201	66	**3129**
16:00-17:00	60	157	12	27	730	10	80	281	422	120	1332	76	**3307**
16:15-17:15	58	154	12	24	768	5	109	310	446	129	1474	81	**3570**
16:30-17:30	54	169	8	23	787	3	94	316	487	123	1601	86	**3751**
16:45-17:45	53	151	12	27	794	1	79	307	511	138	1668	98	**3839**
17:00-18:00	40	177	15	27	788	0	62	289	518	136	1582	108	**3742**

TABLE A-5: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF RANDFONTEIN ROAD (ROAD R41), MILES STOKER ROAD, MAIN REEF ROAD AND CEMETERY ROAD (POINT H) (20 APRIL 2018)																
TIME INTERVALS	**MOVEMENTS**															
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**TOTAL**
06:00-07:00	150	189	279	138	2388	68	1306	106	2350	176	3	279	446	444	78	**5175**
06:15-07:15	175	149	238	190	2168	85	1410	127	2203	155	3	279	481	496	104	**5195**
06:30-07:30	190	134	198	238	1773	114	1462	151	1881	130	5	276	535	527	112	**4998**
06:45-07:45	260	215	335	255	1407	116	1418	168	1578	84	4	248	542	532	115	**4773**
07:00-08:00	315	275	449	250	1083	128	1283	164	1273	60	5	219	521	494	109	**4372**
07:15-08:15	355	295	498	245	1141	118	1143	161	1336	50	10	201	505	401	93	**4212**
07:30-08:30	385	327	528	267	1077	98	967	148	1299	45	10	183	437	330	83	**3852**
07:45-08:45	383	272	465	258	1153	90	810	129	1372	39	10	158	422	298	68	**3625**
08:00-09:00	388	265	407	305	1164	78	686	129	1431	38	7	160	412	267	59	**3448**
08:15-09:15	333	245	358	285	997	66	612	124	1248	34	2	156	431	285	65	**3158**
08:30-09:30	288	228	308	275	939	51	565	117	1188	26	2	141	446	313	67	**3014**
08:45-09:45	240	218	242	312	835	76	571	128	1124	23	8	143	438	340	96	**2942**
09:00-10:00	185	170	205	262	763	67	539	125	1007	18	8	135	445	309	112	**2715**
09:15-10:15	195	185	231	267	703	97	547	115	953	17	9	123	407	280	118	**2647**
09:30-10:30	210	205	332	205	666	103	544	118	859	12	7	123	389	281	122	**2638**
09:45-10:45	250	245	392	203	594	75	513	120	783	14	3	131	395	299	100	**2591**
10:00-11:00	290	300	497	183	539	85	533	124	705	17	5	136	419	349	90	**2729**
10:15-11:15	325	362	517	238	556	63	547	131	779	15	4	142	455	350	68	**2857**
10:30-11:30	350	393	563	239	560	64	534	131	772	27	6	152	480	361	59	**2932**
10:45-11:45	345	418	586	234	608	69	539	127	820	22	4	145	486	340	57	**2989**
11:00-12:00	360	418	499	334	647	99	520	113	950	31	2	142	514	321	55	**3047**
11:15-12:15	370	396	529	295	670	126	510	122	931	34	4	152	496	335	58	**3083**
11:30-12:30	350	410	484	330	642	138	525	128	948	24	4	148	483	300	54	**3030**
11:45-12:45	340	385	455	330	634	153	536	140	936	28	4	164	441	251	60	**2940**
12:00-13:00	328	464	561	291	643	137	573	158	909	25	4	179	432	271	60	**3066**

TABLE A-5: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF RANDFONTEIN ROAD (ROAD R41), MILES STOKER ROAD, MAIN REEF ROAD AND CEMETERY ROAD (POINT H) (20 APRIL 2018) Continue...																
TIME INTERVALS	**MOVEMENTS**															
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**TOTAL**
12:15-13:15	341	479	560	313	612	146	561	165	892	33	2	196	416	293	53	**3066**
12:30-13:30	385	436	556	337	643	147	593	168	948	32	0	200	435	311	72	**3190**
12:45-13:45	420	461	628	321	634	199	586	156	922	33	0	189	487	322	68	**3333**
13:00-14:00	432	377	548	335	618	217	572	150	927	26	1	175	464	281	74	**3185**
13:15-14:15	409	437	591	347	630	261	611	151	960	17	1	167	495	306	92	**3392**
13:30-14:30	415	460	596	364	688	331	653	160	1035	17	1	176	526	352	85	**3670**
13:45-14:45	440	480	581	435	802	322	725	180	1225	12	2	190	529	336	96	**3910**
14:00-15:00	440	490	602	446	963	345	754	207	1395	14	2	219	590	359	118	**4266**
14:15-15:15	455	438	575	471	1077	362	776	226	1534	14	3	237	655	384	153	**4526**
14:30-15:30	448	437	600	471	1102	329	738	241	1561	12	6	247	685	373	186	**4539**
14:45-15:45	432	409	589	468	1028	289	716	246	1484	12	5	253	731	458	216	**4525**
15:00-16:00	422	427	577	503	924	224	708	238	1414	13	6	245	752	528	231	**4454**
15:15-16:15	437	489	656	499	902	183	686	240	1391	10	5	245	745	524	229	**4435**
15:30-16:30	459	555	740	518	944	205	700	240	1450	12	5	247	760	544	244	**4651**
15:45-16:45	453	519	717	517	1025	298	725	252	1529	13	6	259	802	547	262	**4883**
16:00-17:00	497	490	772	489	1157	389	763	260	1627	19	4	275	738	535	274	**5103**
16:15-17:15	495	413	693	497	1341	439	787	249	1805	33	5	277	737	522	282	**5265**
16:30-17:30	493	343	670	458	1470	460	802	248	1879	49	2	295	654	498	292	**5260**
16:45-17:45	485	370	716	433	1549	456	820	271	1924	58	1	328	536	477	294	**5258**
17:00-18:00	441	390	693	428	1454	490	790	251	1750	132	1	382	458	491	290	**5055**

TABLE A-6: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF MAIN REEF ROAD (ROAD R41) AND REID ROAD (POINT I) (20 APRIL 2018)							
TIME INTERVALS	**MOVEMENTS**						
	5	**6**	**7**	**9**	**10**	**11**	**TOTAL**
06:00-07:00	881	0	5	0	64	3382	**4332**
06:15-07:15	1104	0	20	0	78	3493	**4695**
06:30-07:30	1218	0	21	0	89	3580	**4908**
06:45-07:45	1310	7	24	0	96	3629	**5066**
07:00-08:00	1243	10	27	4	92	3714	**5090**
07:15-08:15	1106	13	14	11	88	3401	**4633**
07:30-08:30	991	15	11	13	72	3005	**4107**
07:45-08:45	885	10	7	14	53	2664	**3633**
08:00-09:00	904	9	8	14	40	2277	**3252**
08:15-09:15	898	8	7	9	29	1980	**2931**
08:30-09:30	913	7	8	7	22	1799	**2756**
08:45-09:45	926	7	11	8	19	1605	**2576**
09:00-10:00	919	9	8	5	15	1515	**2471**
09:15-10:15	927	7	7	4	15	1450	**2410**
09:30-10:30	912	8	6	5	18	1500	**2449**
09:45-10:45	899	8	5	5	12	1516	**2445**
10:00-11:00	859	5	6	7	10	1516	**2403**
10:15-11:15	841	8	4	8	13	1559	**2433**
10:30-11:30	864	10	6	8	11	1519	**2418**
10:45-11:45	890	8	5	7	15	1549	**2474**
11:00-12:00	893	9	5	5	20	1566	**2498**
11:15-12:15	954	8	6	4	20	1698	**2690**
11:30-12:30	970	6	8	6	20	1717	**2727**
11:45-12:45	1000	11	7	8	18	1720	**2764**
12:00-13:00	1034	12	7	11	17	1762	**2843**
12:15-13:15	1063	11	7	14	18	1725	**2838**
12:30-13:30	1072	14	13	17	20	1730	**2866**
12:45-13:45	1070	18	16	18	23	1789	**2934**
13:00-14:00	1085	18	16	15	23	1714	**2871**
13:15-14:15	1149	23	16	18	20	1620	**2846**
13:30-14:30	1263	23	9	14	21	1612	**2942**
13:45-14:45	1386	25	10	11	23	1533	**2988**
14:00-15:00	1421	29	9	13	20	1474	**2966**
14:15-15:15	1392	29	10	10	18	1544	**3003**
14:30-15:30	1360	34	11	9	16	1505	**2935**
14:45-15:45	1457	36	9	9	19	1580	**3110**
15:00-16:00	1636	38	11	9	18	1589	**3301**
15:15-16:15	1680	41	12	7	18	1575	**3333**
15:30-16:30	1702	47	14	8	16	1537	**3324**
15:45-16:45	1626	48	14	8	8	1426	**3130**
16:00-17:00	1676	47	12	5	8	1429	**3177**
16:15-17:15	1836	42	11	4	8	1467	**3368**
16:30-17:30	1845	37	9	5	11	1580	**3487**
16:45-17:45	1862	31	10	8	11	1705	**3627**
17:00-18:00	1898	34	12	15	11	1722	**3692**

TABLE A-7: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF MAIN REEF ROAD (ROAD R41) AND WESTLAKE ROAD (POINT J) (20 APRIL 2018)							
TIME INTERVALS	**MOVEMENTS**						
	5	**6**	**7**	**9**	**10**	**11**	**TOTAL**
06:00-07:00	718	370	477	163	626	2761	**5115**
06:15-07:15	898	491	566	206	631	2882	**5674**
06:30-07:30	971	596	656	247	636	2965	**6071**
06:45-07:45	1023	608	668	294	677	2976	**6246**
07:00-08:00	947	568	651	306	668	3073	**6213**
07:15-08:15	810	469	589	309	634	2781	**5592**
07:30-08:30	718	342	502	288	558	2458	**4866**
07:45-08:45	640	247	409	255	475	2196	**4222**
08:00-09:00	693	188	318	220	372	1913	**3704**
08:15-09:15	711	171	275	195	332	1655	**3339**
08:30-09:30	735	160	246	185	305	1502	**3133**
08:45-09:45	762	166	222	171	277	1339	**2937**
09:00-10:00	751	174	233	177	276	1247	**2858**
09:15-10:15	742	200	221	192	262	1195	**2812**
09:30-10:30	714	210	224	206	276	1230	**2860**
09:45-10:45	713	198	234	194	247	1274	**2860**
10:00-11:00	669	205	213	195	246	1276	**2804**
10:15-11:15	658	198	229	191	268	1295	**2839**
10:30-11:30	665	189	218	209	235	1290	**2806**
10:45-11:45	679	200	210	219	241	1313	**2862**
11:00-12:00	682	201	211	220	251	1320	**2885**
11:15-12:15	720	207	208	242	233	1471	**3081**
11:30-12:30	760	220	217	216	247	1478	**3138**
11:45-12:45	766	235	208	245	267	1460	**3181**
12:00-13:00	814	246	233	232	275	1494	**3294**
12:15-13:15	834	252	228	240	282	1450	**3286**
12:30-13:30	849	255	234	237	272	1471	**3318**
12:45-13:45	868	274	259	220	284	1521	**3426**
13:00-14:00	872	284	237	231	274	1456	**3354**
13:15-14:15	947	297	245	225	272	1364	**3350**
13:30-14:30	1000	325	242	286	273	1348	**3474**
13:45-14:45	1070	324	234	341	264	1279	**3512**
14:00-15:00	1075	340	262	375	258	1225	**3535**
14:15-15:15	1007	347	279	414	257	1297	**3601**
14:30-15:30	1015	357	276	379	267	1249	**3543**
14:45-15:45	1104	364	284	389	254	1335	**3730**
15:00-16:00	1286	371	274	388	231	1369	**3919**
15:15-16:15	1324	390	277	397	209	1378	**3975**
15:30-16:30	1319	370	282	430	187	1364	**3952**
15:45-16:45	1246	427	326	428	191	1249	**3867**
16:00-17:00	1244	419	337	479	212	1229	**3920**
16:15-17:15	1375	426	332	503	240	1238	**4114**
16:30-17:30	1378	444	346	504	257	1332	**4261**
16:45-17:45	1353	369	326	540	242	1473	**4303**
17:00-18:00	1389	348	336	543	222	1512	**4350**

TABLE A-8: HOURLY TRAFFIC COUNTS FOR ALL VEHICLES SIMULTANEOUSLY AT THE INTERSECTION OF MAIN REEF ROAD (ROAD R41) AND MINE ROAD (POINT K) (20 APRIL 2018)							
TIME INTERVALS	**MOVEMENTS**						
	1	**3**	**4**	**5**	**11**	**12**	**TOTAL**
06:00-07:00	249	156	63	839	3090	148	**4545**
06:15-07:15	304	208	59	1085	3247	201	**5104**
06:30-07:30	318	244	55	1249	3379	242	**5487**
06:45-07:45	312	232	46	1319	3360	284	**5553**
07:00-08:00	295	162	43	1220	3464	260	**5444**
07:15-08:15	263	114	42	1016	3115	255	**4805**
07:30-08:30	226	73	44	834	2728	232	**4137**
07:45-08:45	193	50	37	694	2423	182	**3579**
08:00-09:00	162	33	24	719	2074	157	**3169**
08:15-09:15	138	28	32	744	1802	128	**2872**
08:30-09:30	117	22	31	778	1644	104	**2696**
08:45-09:45	113	23	29	815	1455	106	**2541**
09:00-10:00	108	30	35	817	1399	81	**2470**
09:15-10:15	115	31	32	827	1329	87	**2421**
09:30-10:30	118	34	32	806	1367	87	**2444**
09:45-10:45	114	31	30	797	1421	87	**2480**
10:00-11:00	117	27	30	757	1365	124	**2420**
10:15-11:15	110	24	27	746	1403	121	**2431**
10:30-11:30	112	19	24	742	1369	139	**2405**
10:45-11:45	99	24	24	780	1367	156	**2450**
11:00-12:00	94	21	20	789	1374	157	**2455**
11:15-12:15	84	25	24	843	1522	157	**2655**
11:30-12:30	96	33	26	884	1552	143	**2734**
11:45-12:45	115	29	29	886	1533	135	**2727**
12:00-13:00	118	29	30	942	1595	132	**2846**
12:15-13:15	132	27	25	954	1544	134	**2816**
12:30-13:30	134	27	24	970	1550	155	**2860**
12:45-13:45	142	22	18	1000	1617	163	**2962**
13:00-14:00	167	25	17	989	1520	173	**2891**
13:15-14:15	184	21	16	1060	1423	186	**2890**
13:30-14:30	187	20	12	1138	1412	178	**2947**
13:45-14:45	191	26	16	1203	1337	176	**2949**
14:00-15:00	176	22	12	1239	1294	193	**2936**
14:15-15:15	166	28	17	1188	1383	193	**2975**
14:30-15:30	164	25	18	1208	1302	223	**2940**
14:45-15:45	163	23	20	1305	1387	232	**3130**
15:00-16:00	159	22	19	1498	1393	250	**3341**
15:15-16:15	186	27	22	1528	1391	264	**3418**
15:30-16:30	183	22	28	1506	1373	273	**3385**
15:45-16:45	182	21	27	1491	1285	290	**3296**
16:00-17:00	172	24	31	1491	1290	276	**3284**
16:15-17:15	137	13	29	1664	1283	287	**3413**
16:30-17:30	144	14	20	1678	1396	282	**3534**
16:45-17:45	127	14	16	1595	1515	284	**3551**
17:00-18:00	125	8	12	1612	1576	272	**3605**

APPENDIX B

TRIP INFORMATION RELATED TO THE EXISTING TRAFFIC

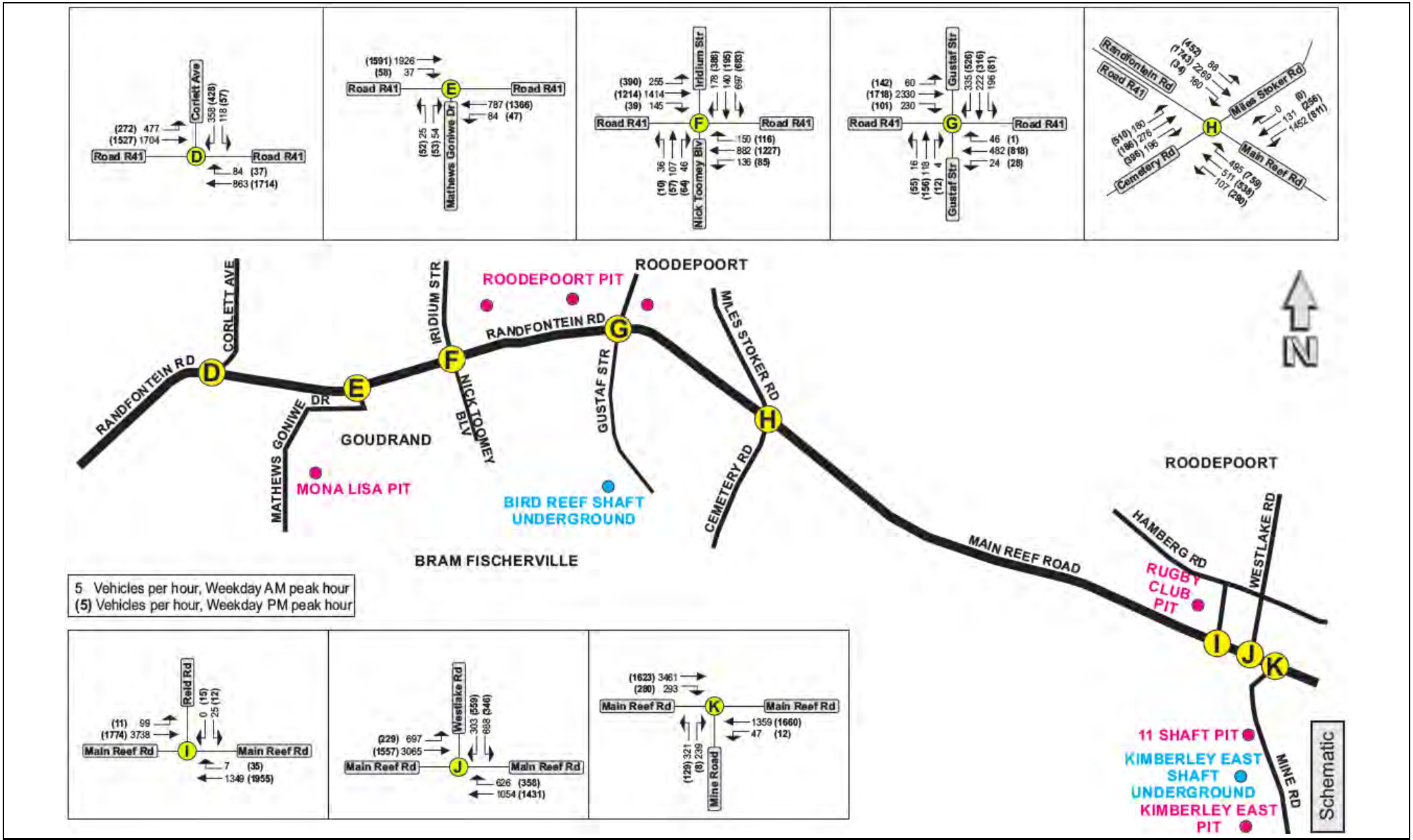


FIGURE B-1: 2018 PEAK HOUR TRAFFIC (BACKGROUND TRAFFIC) WITHOUT THE PROPOSED MINING DEVELOPMENT (SCENARIO 1)

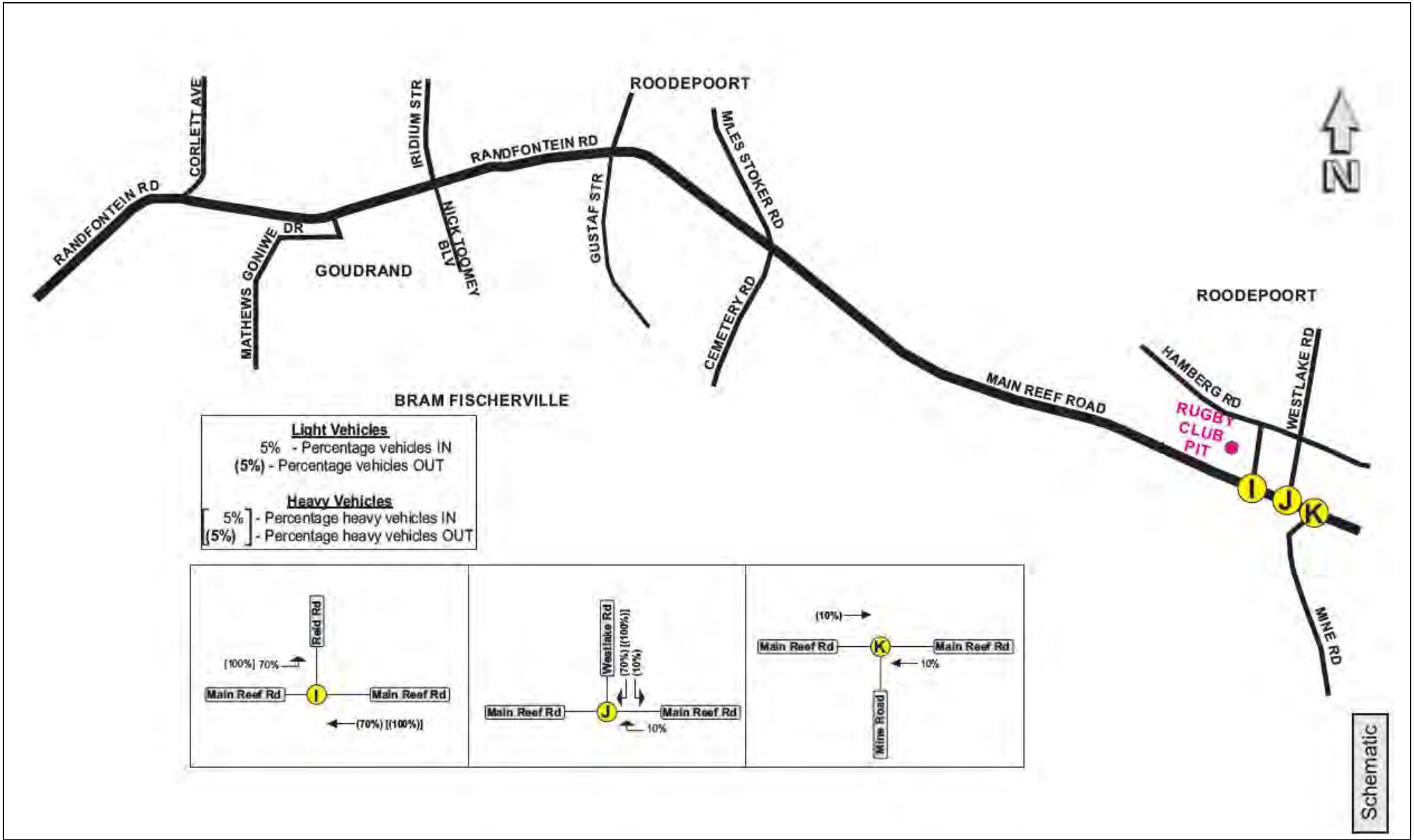


FIGURE B-2: PROJECTED VEHICLE TRIP DISTRIBUTION FOR THE PROPOSED MINING DEVELOPMENT (RUGBY CLUB PIT)

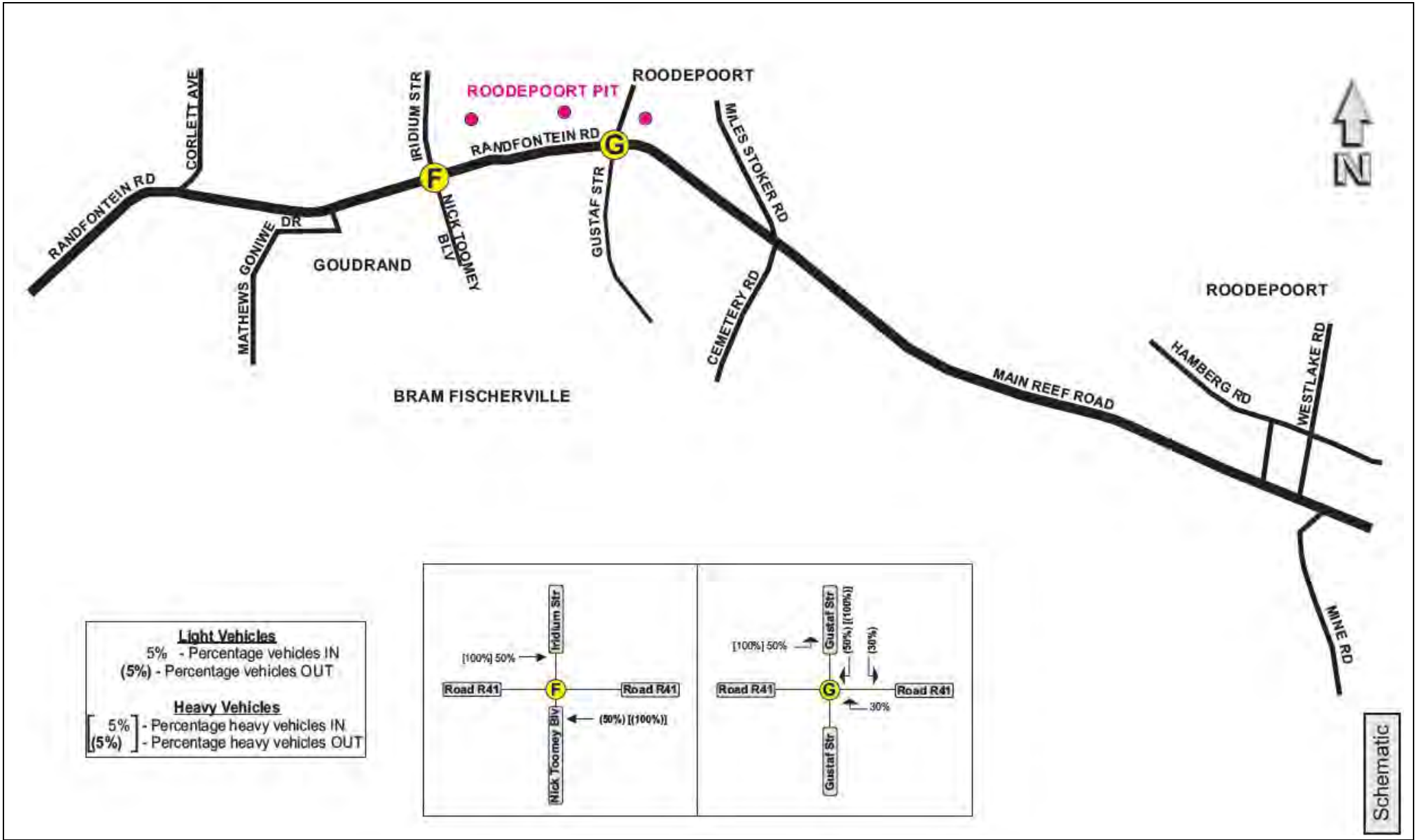


FIGURE B-3: PROJECTED VEHICLE TRIP DISTRIBUTION FOR THE PROPOSED MINING DEVELOPMENT (ROODEPOORT MAIN REEF PIT)

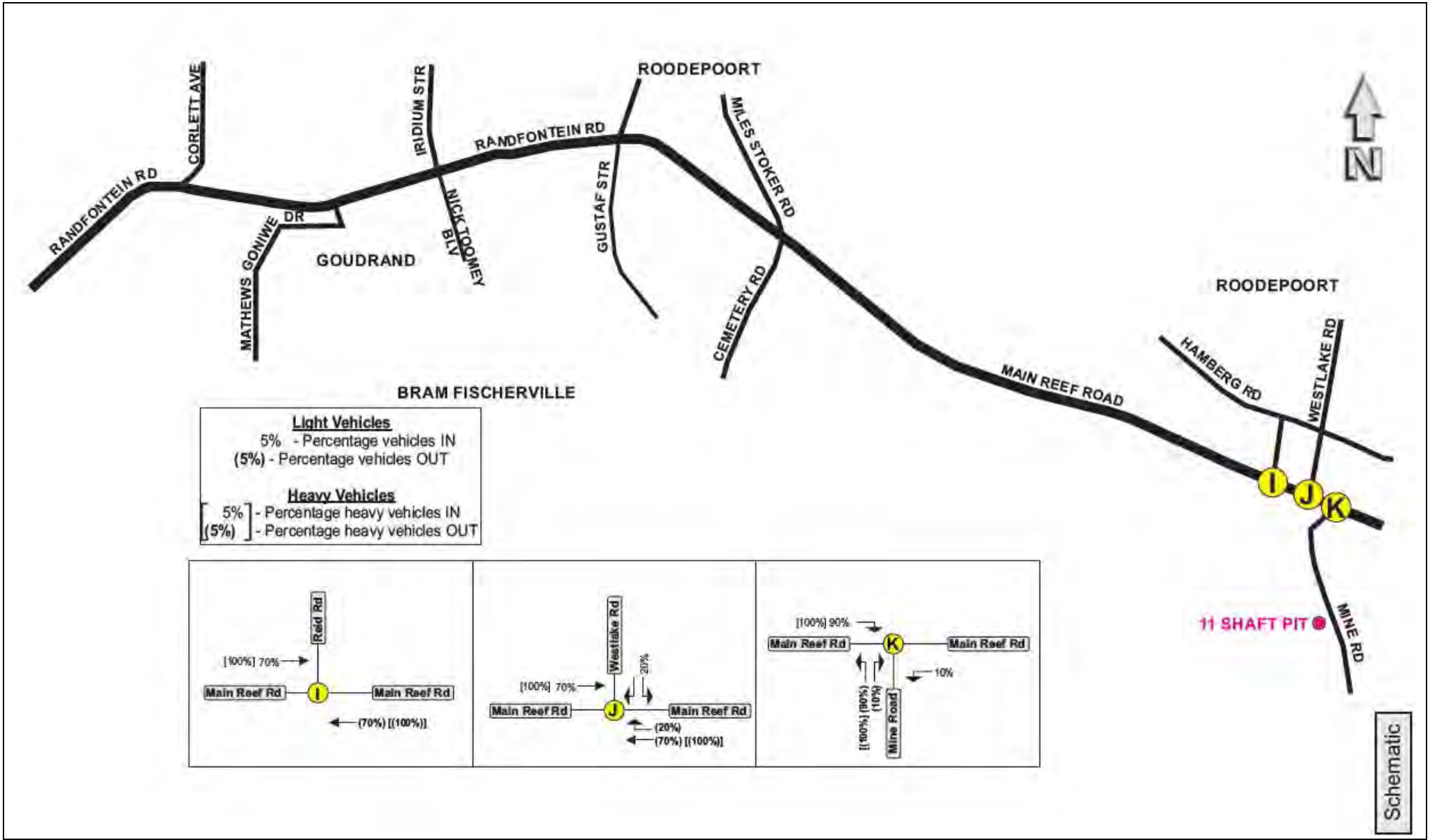


FIGURE B-4: PROJECTED VEHICLE TRIP DISTRIBUTION FOR THE PROPOSED MINING DEVELOPMENT (11 SHAFT MAIN REEF PIT)

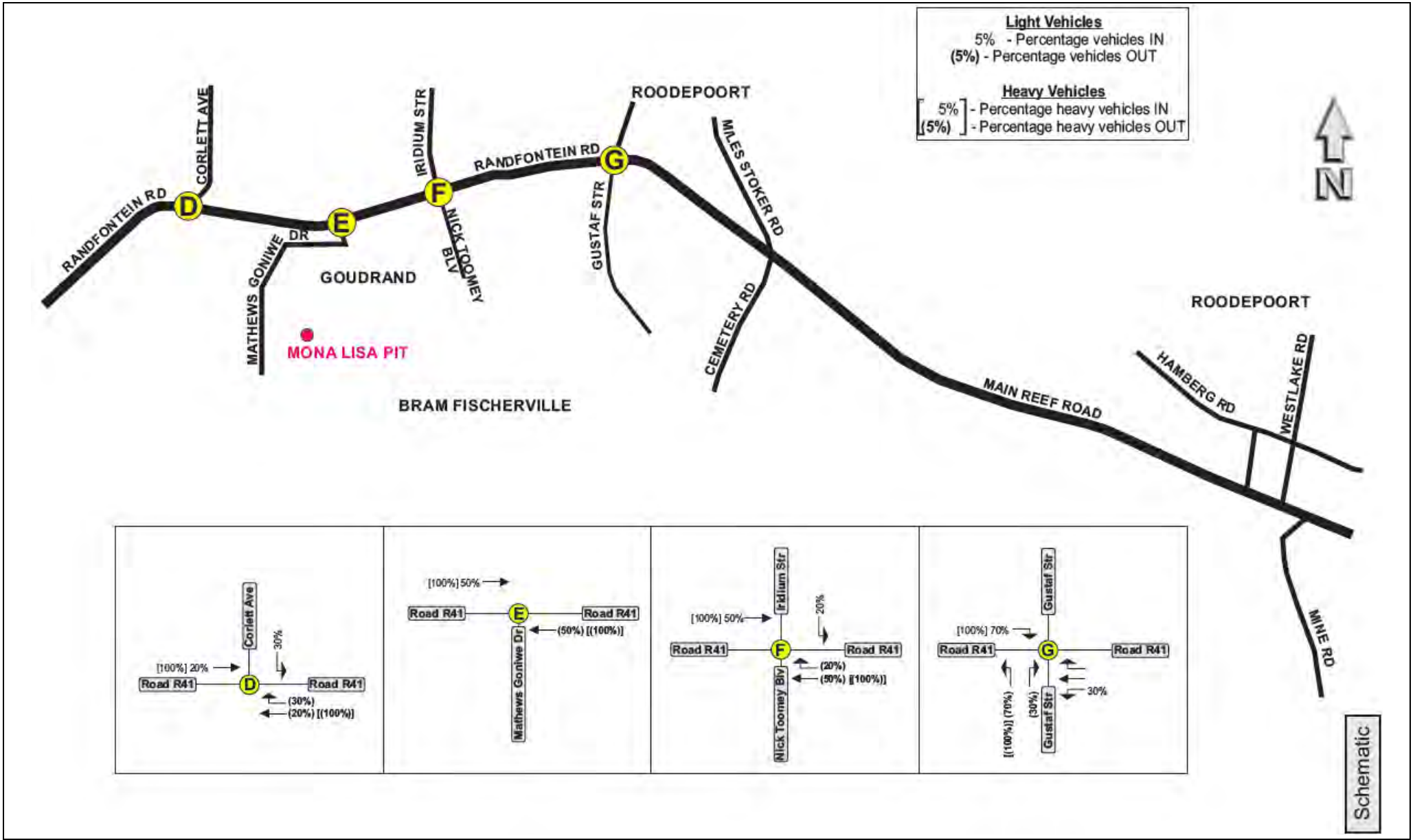


FIGURE B-5: PROJECTED VEHICLE TRIP DISTRIBUTION FOR THE PROPOSED MINING DEVELOPMENT (MONA LISA PIT)

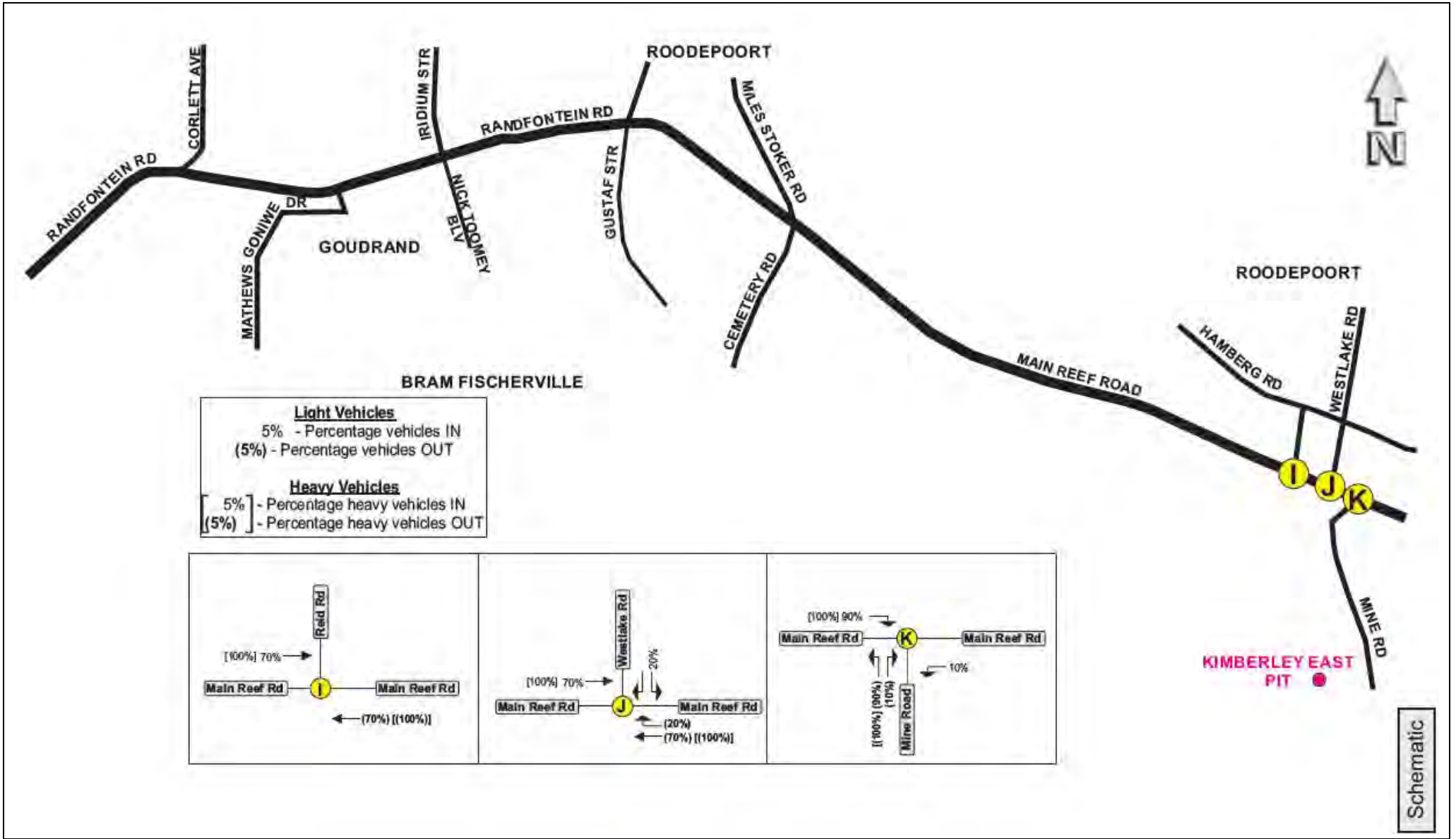


FIGURE B-6: PROJECTED VEHICLE TRIP DISTRIBUTION FOR THE PROPOSED MINING DEVELOPMENT (KIMBERLEY EAST PIT)

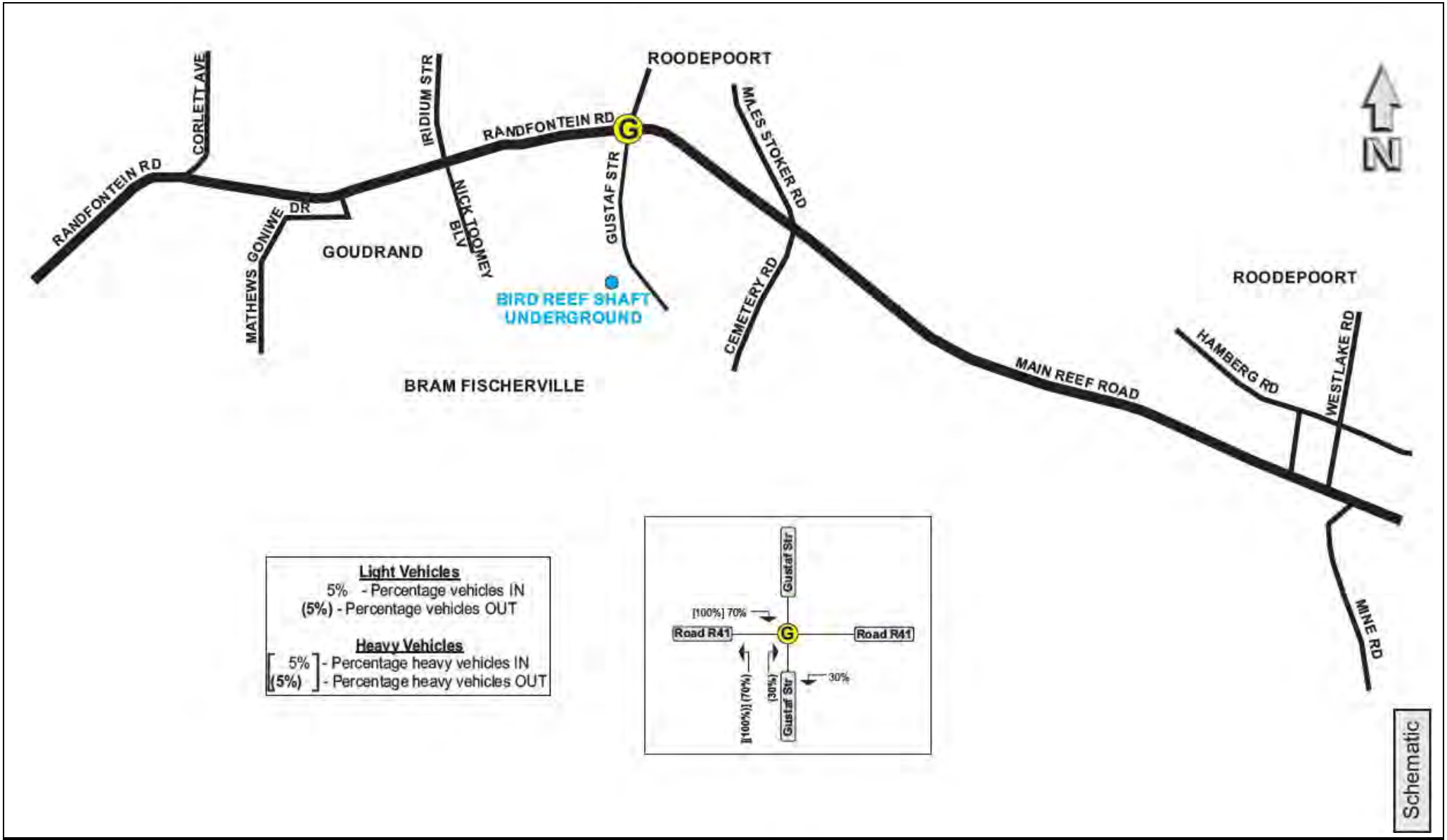


FIGURE B-7: PROJECTED VEHICLE TRIP DISTRIBUTION FOR THE PROPOSED MINING DEVELOPMENT (BIRD REEF UNDERGROUND)

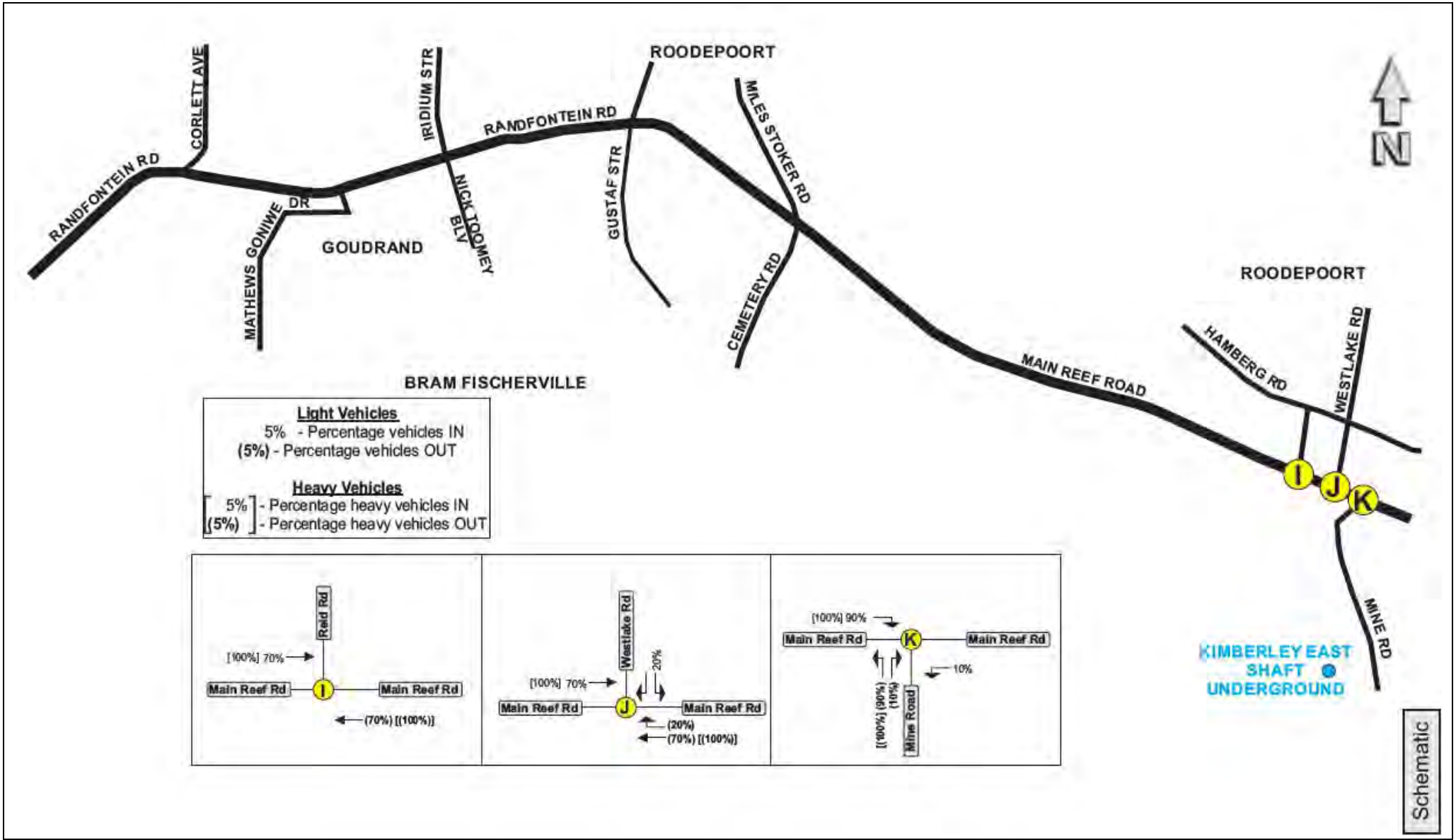


FIGURE B-8: PROJECTED VEHICLE TRIP DISTRIBUTION FOR THE PROPOSED MINING DEVELOPMENT (KIMBERLEY EAST UNDERGROUND)

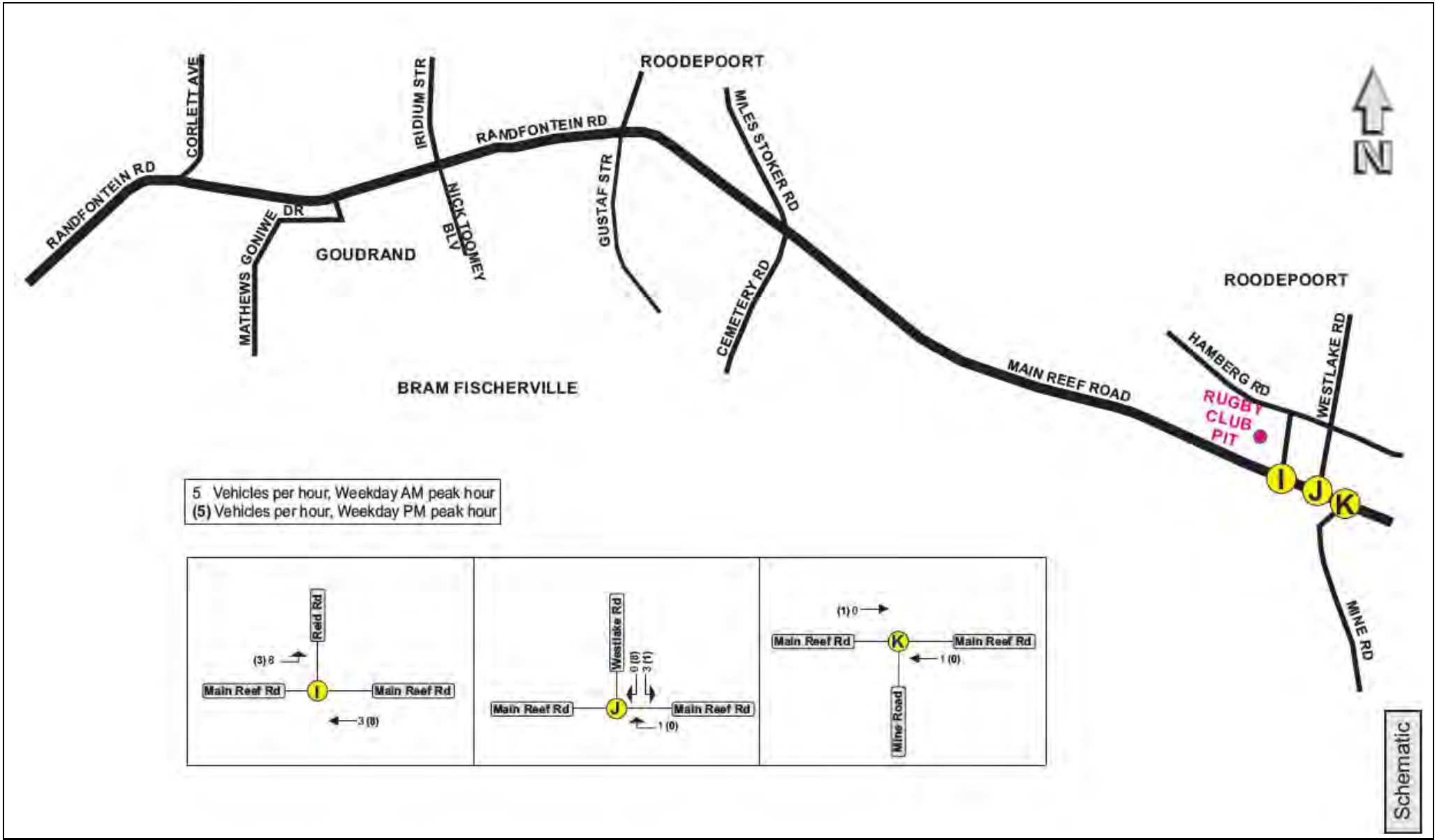


FIGURE B-9: PROJECTED VEHICLE TRIPS GENERATED BY THE PROPOSED MINING DEVELOPMENT (RUGBY CLUB PIT)

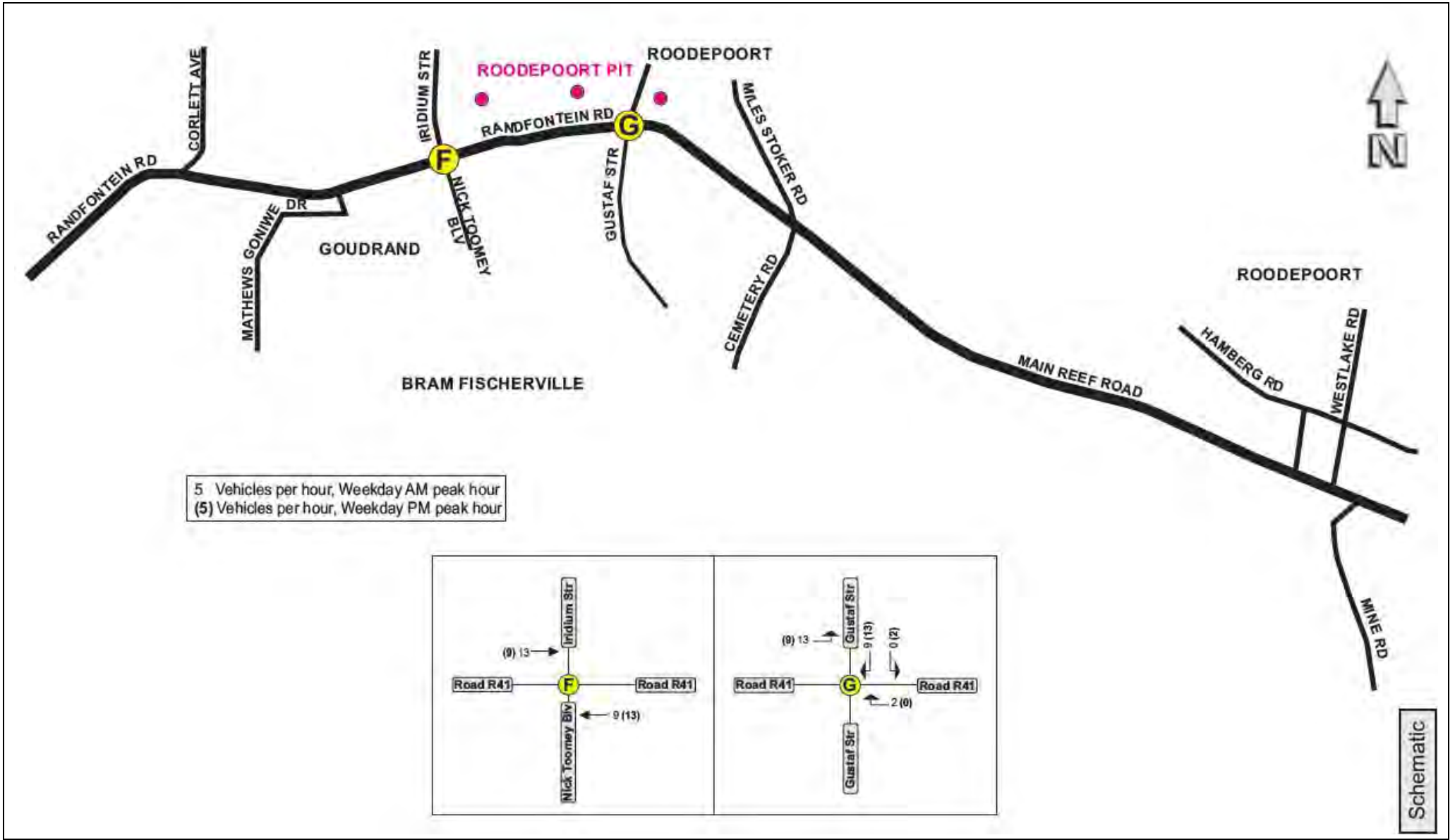


FIGURE B-10: PROJECTED VEHICLE TRIPS GENERATED BY THE PROPOSED MINING DEVELOPMENT (ROODEPOORT MAIN REEF PIT)

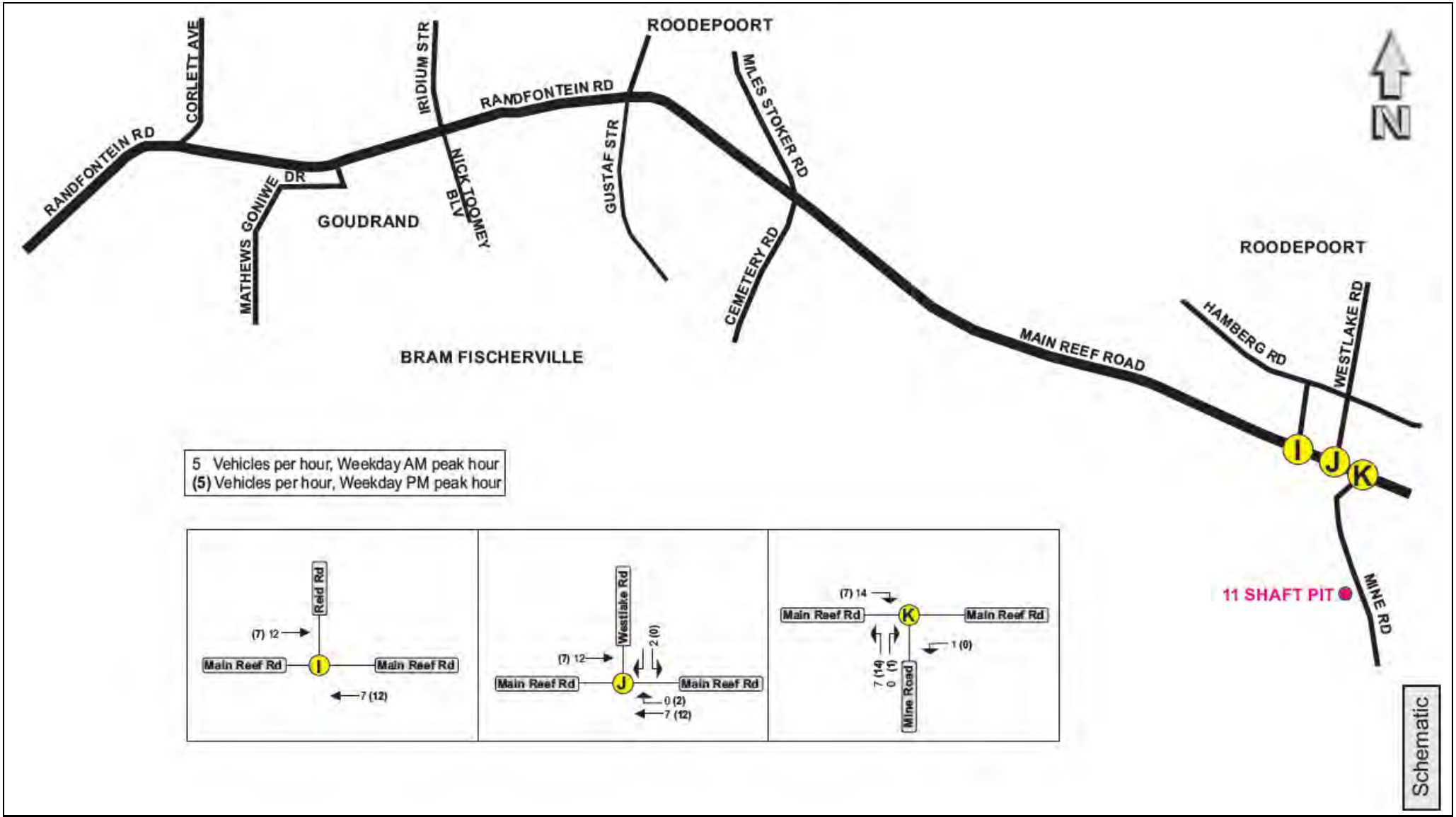


FIGURE B-11: PROJECTED VEHICLE TRIPS GENERATED BY THE PROPOSED MINING DEVELOPMENT (11 SHAFT MAIN REEF PIT)

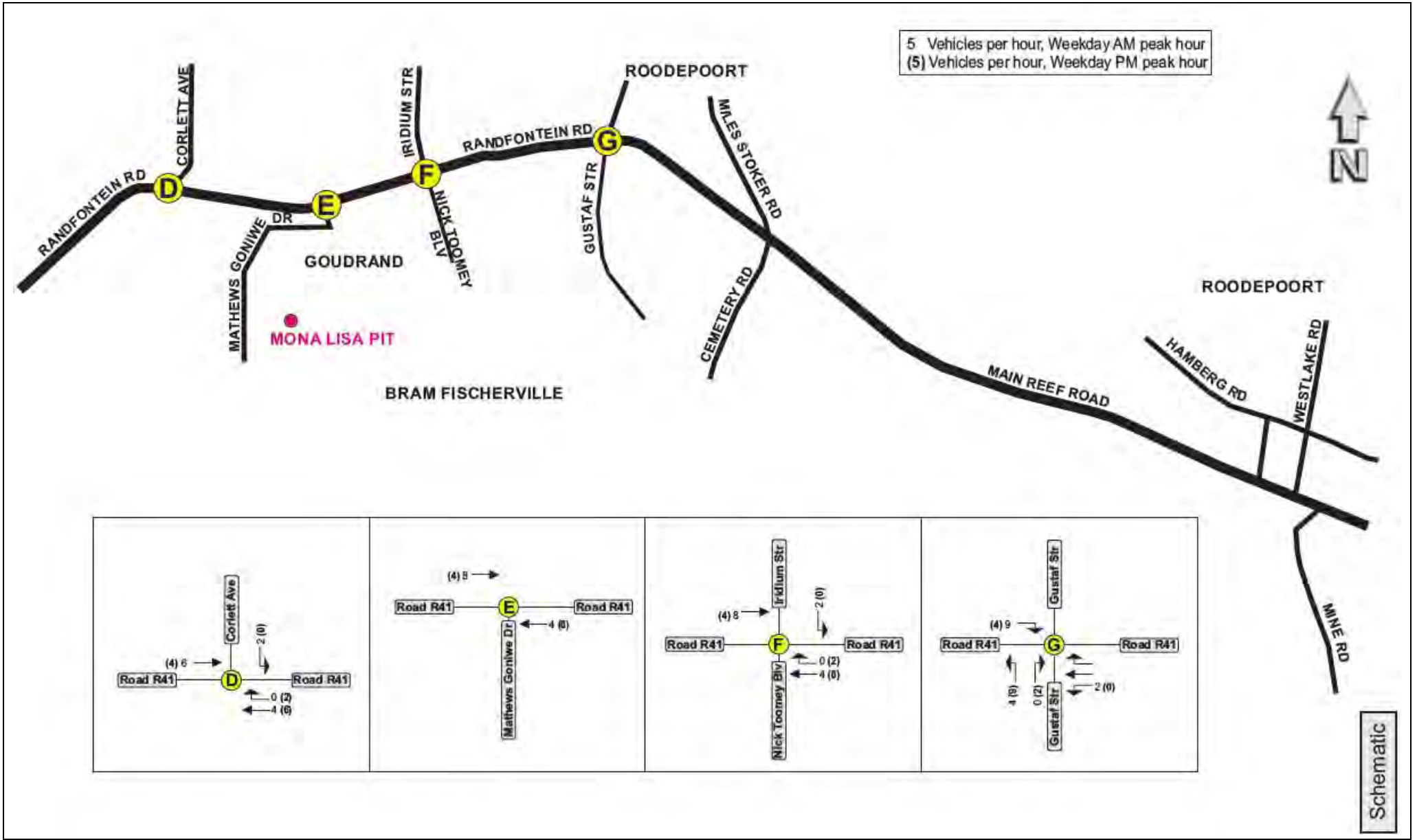


FIGURE B-12: PROJECTED VEHICLE TRIPS GENERATED BY THE PROPOSED MINING DEVELOPMENT (MONA LISA PIT)

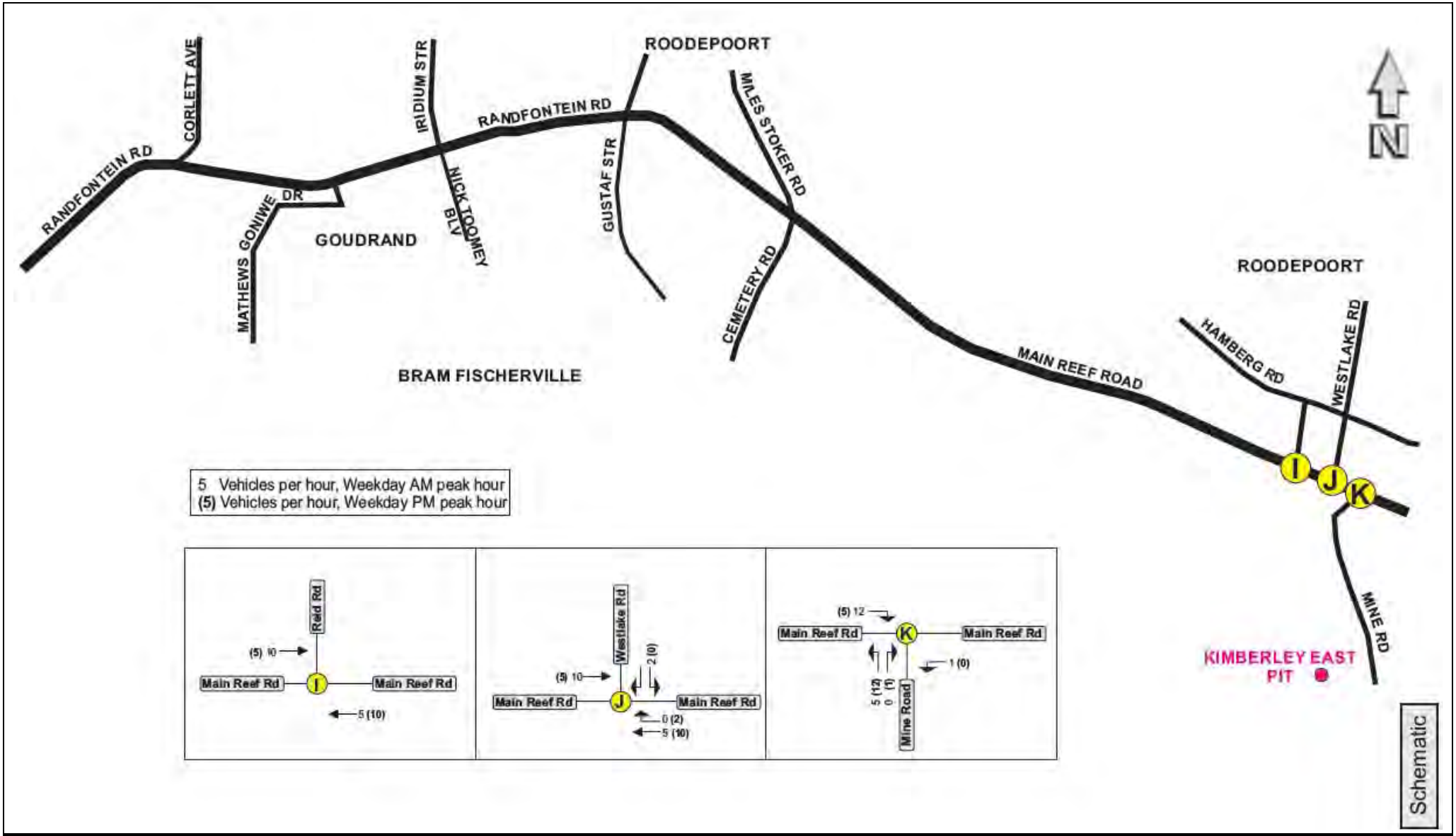


FIGURE B-13: PROJECTED VEHICLE TRIPS GENERATED BY THE PROPOSED MINING DEVELOPMENT (KIMBERLEY EAST PIT)

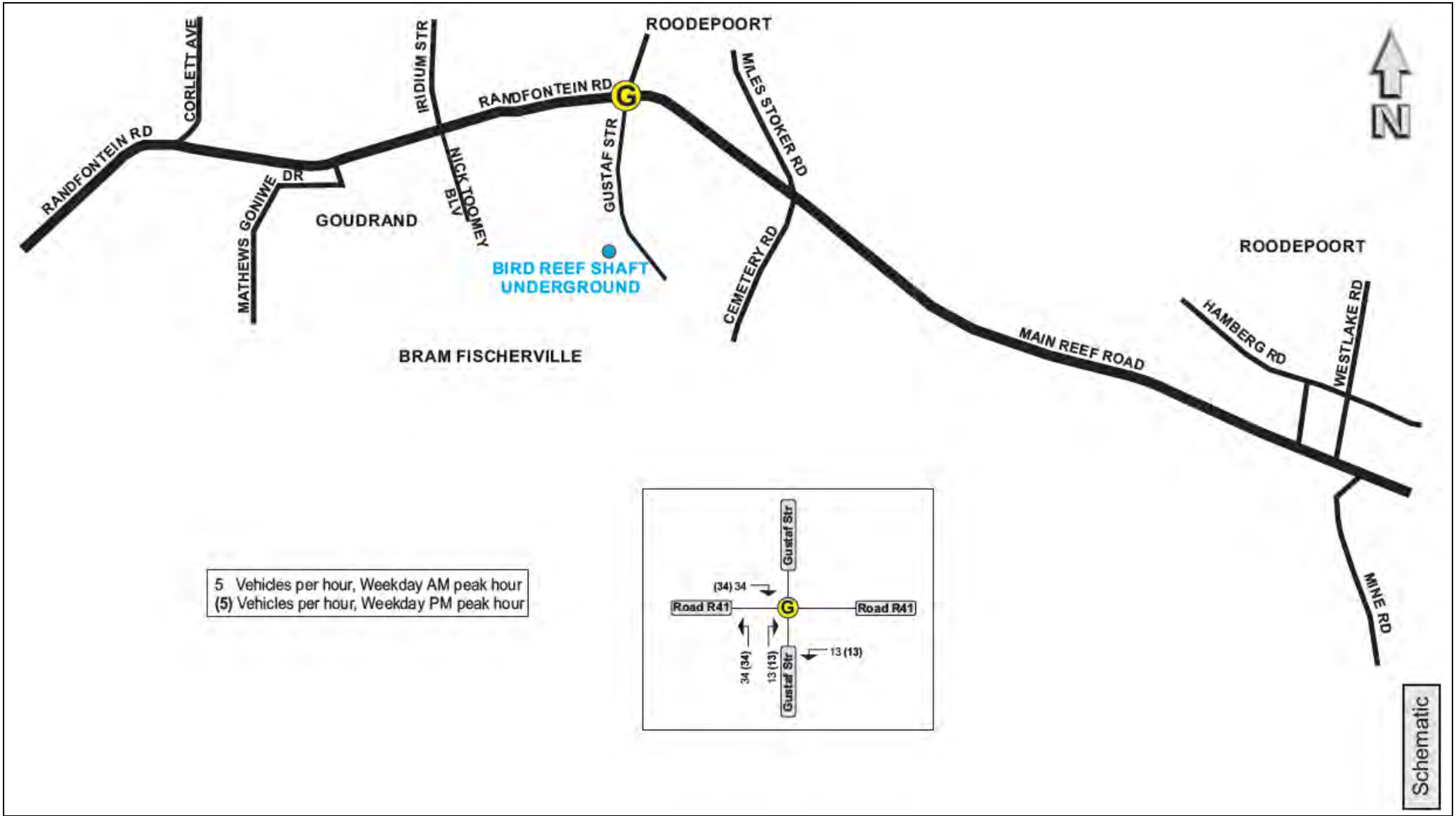


FIGURE B-14: PROJECTED VEHICLE TRIPS GENERATED BY THE PROPOSED MINING DEVELOPMENT (BIRD REEF UNDERGROUND)

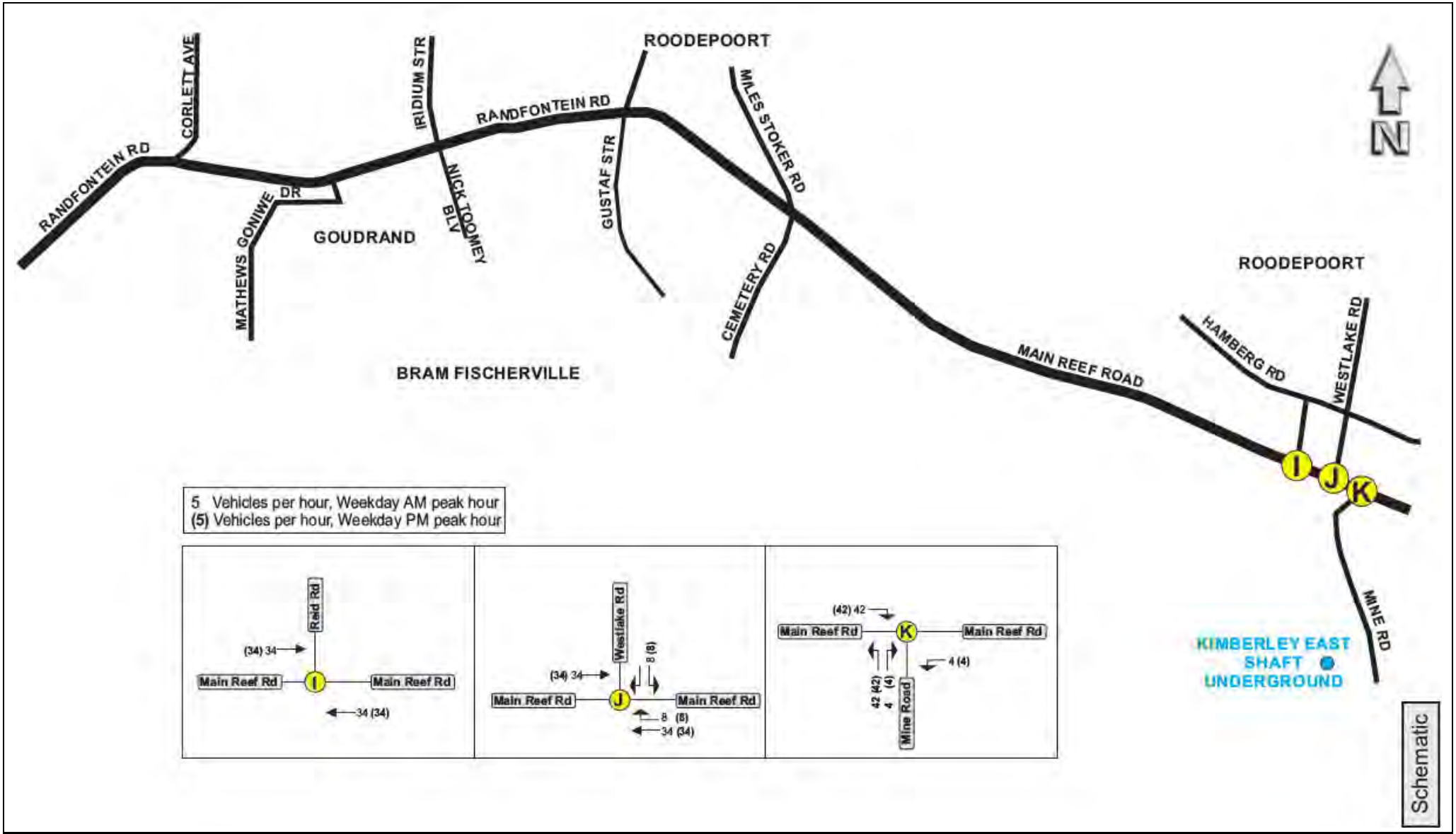


FIGURE B-15: PROJECTED VEHICLE TRIPS GENERATED BY THE PROPOSED MINING DEVELOPMENT (KIMBERLEY EAST UNDERGROUND)

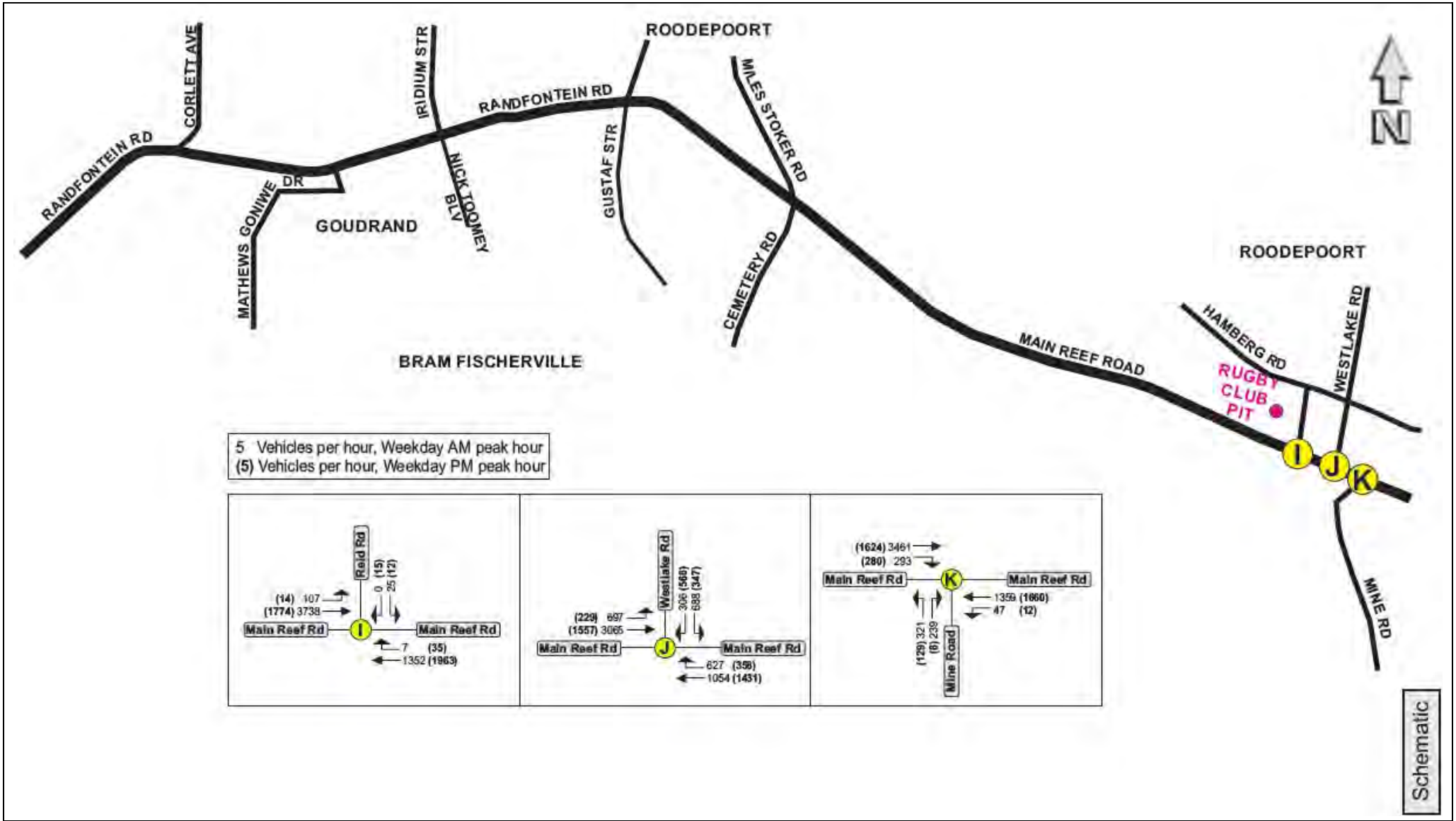


FIGURE B-16: PROJECTED 2019 PEAK HOUR TRAFFIC WITH THE PROPOSED MINING DEVELOPMENT (MINING PHASE 1) (SCENARIO 2)

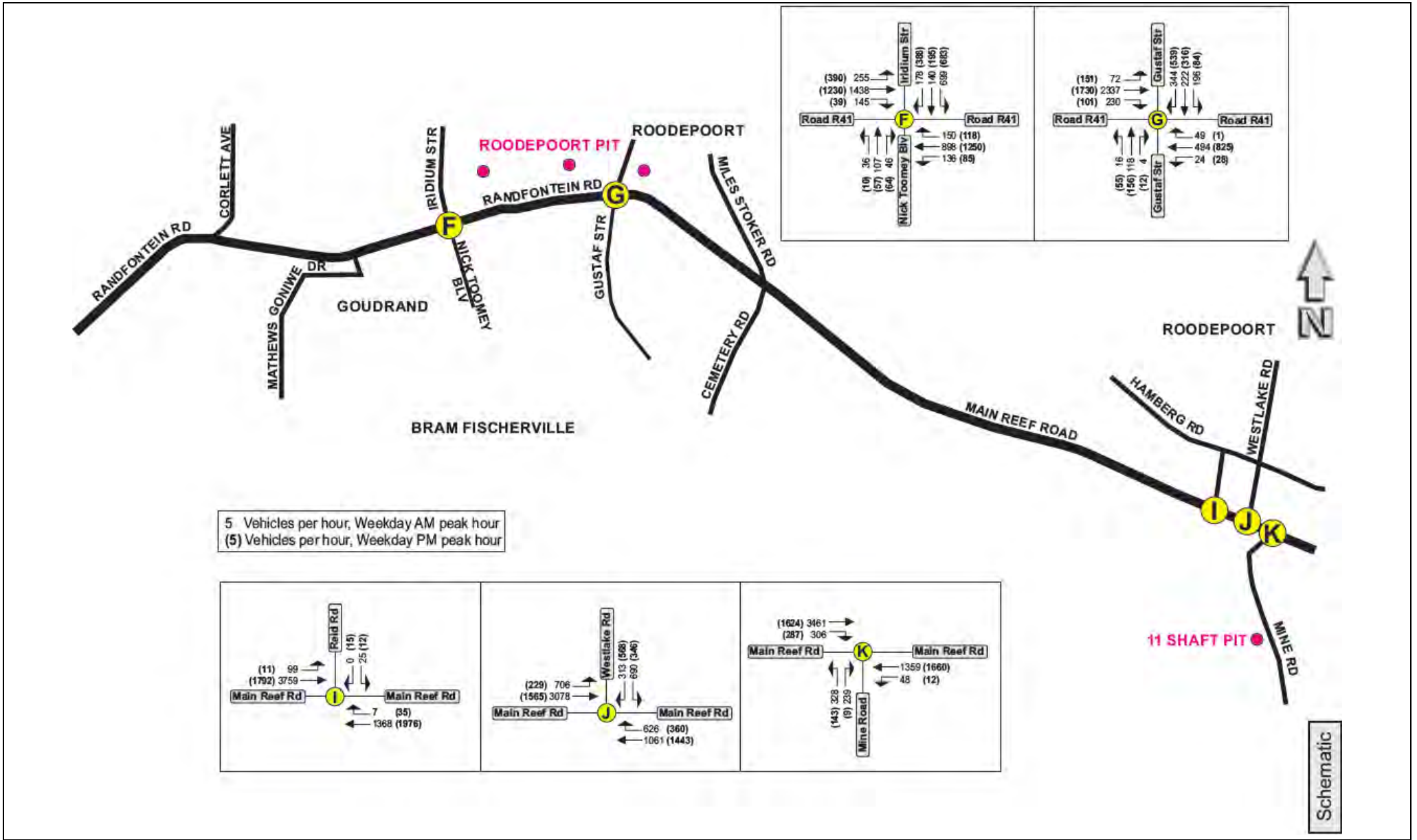


FIGURE B-17: PROJECTED 2019 PEAK HOUR TRAFFIC WITH THE PROPOSED MINING DEVELOPMENT (MINING PHASES 2 & 3) (SCENARIO 3)

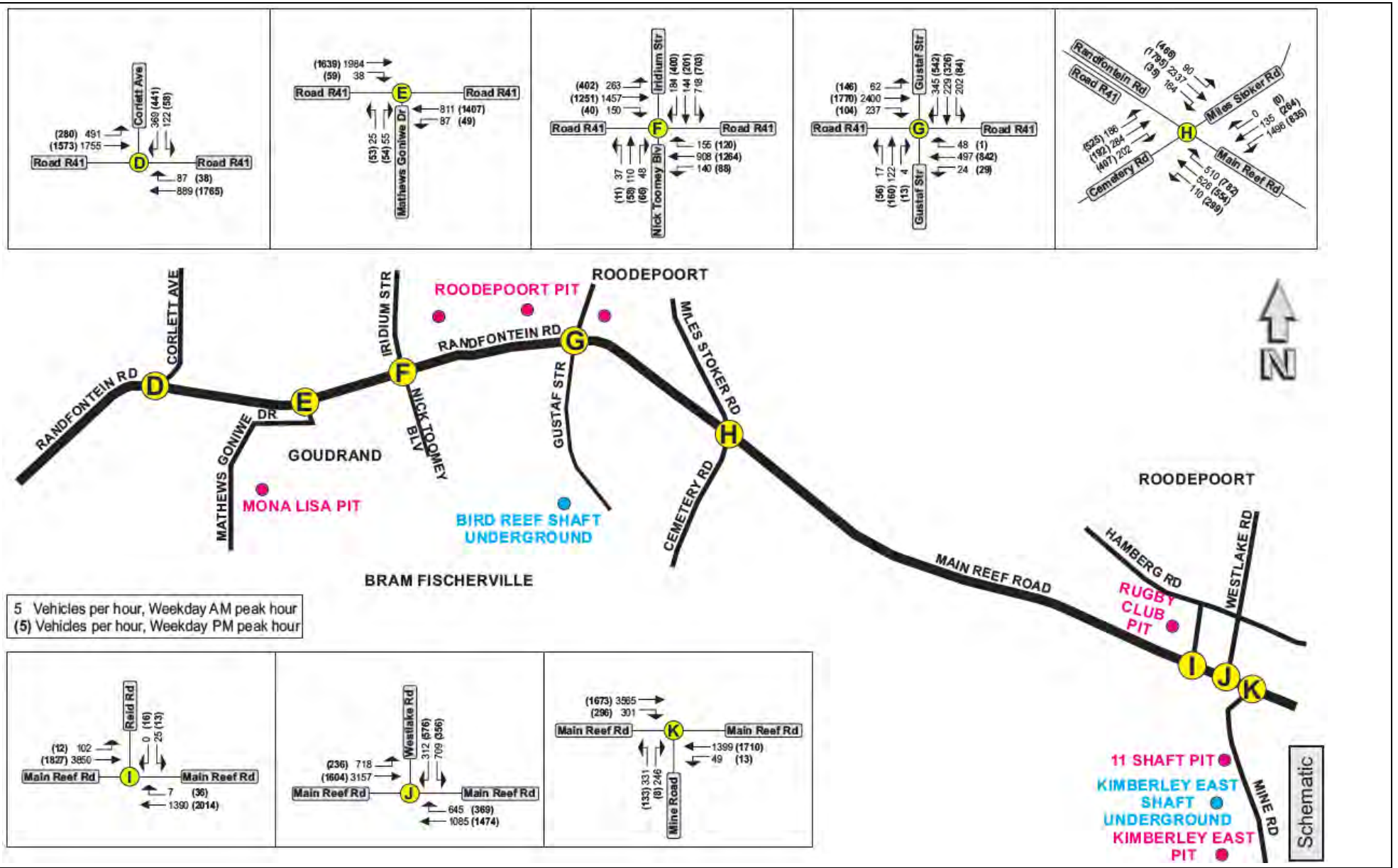


FIGURE B-18: PROJECTED 2020 PEAK HOUR TRAFFIC WITHOUT THE PROPOSED MINING DEVELOPMENT (SCENARIO 4)

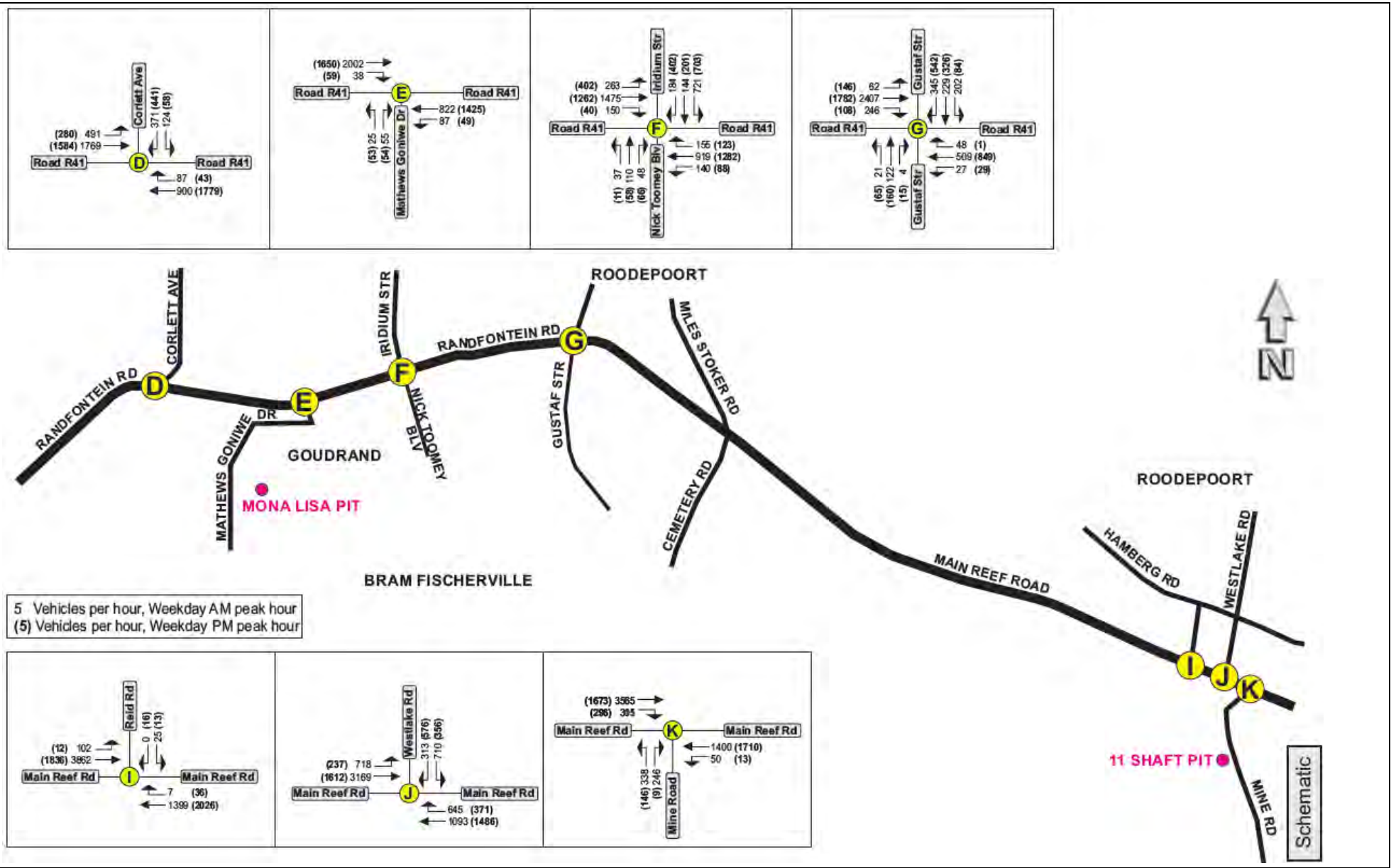


FIGURE B-19: PROJECTED 2020 PEAK HOUR TRAFFIC WITH THE PROPOSED MINING DEVELOPMENT (MINING PHASES 3 & 4) (SCENARIO 5)

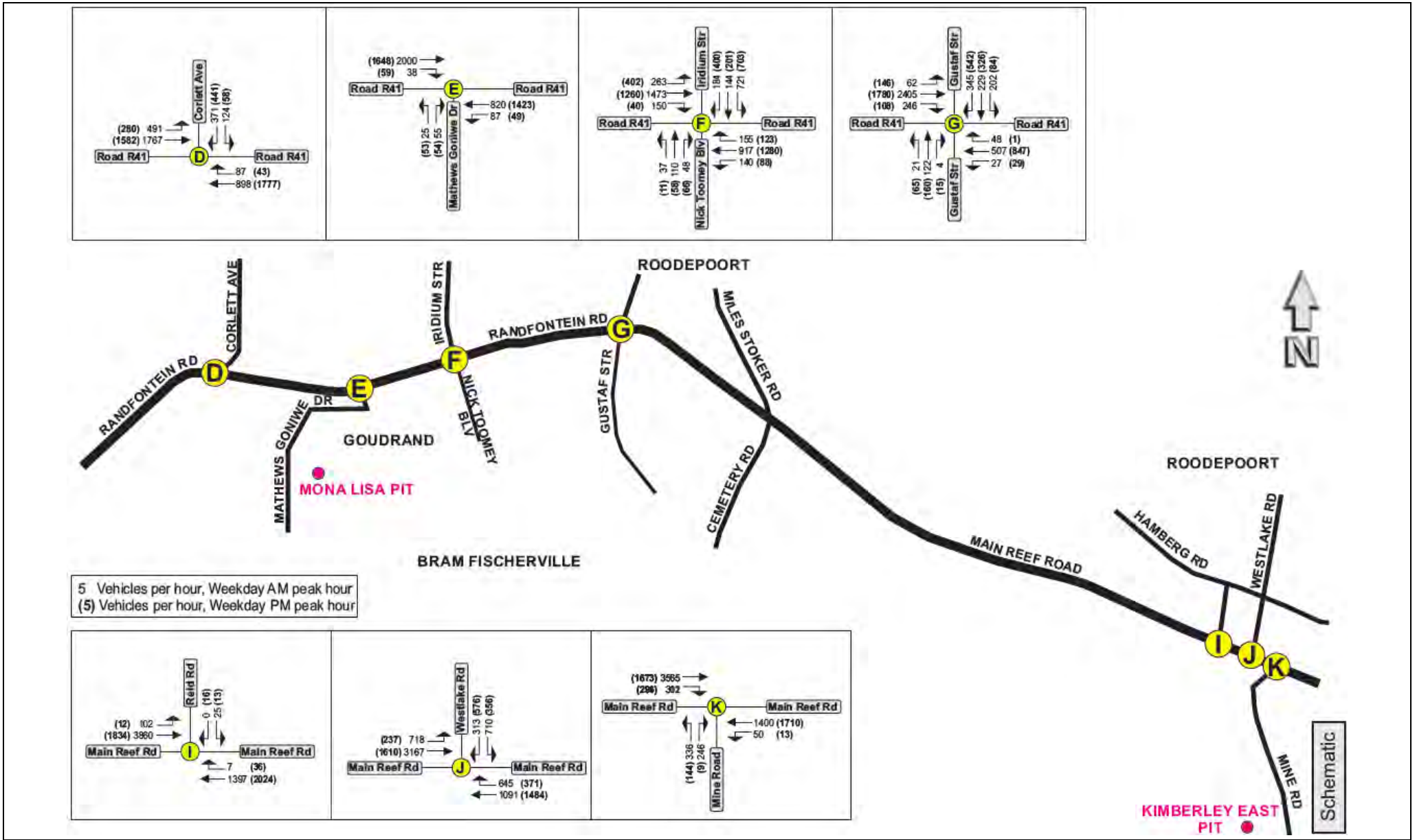


FIGURE B-20: PROJECTED 2020 PEAK HOUR TRAFFIC WITH THE PROPOSED MINING DEVELOPMENT (MINING PHASES 4 & 5) (SCENARIO 6)

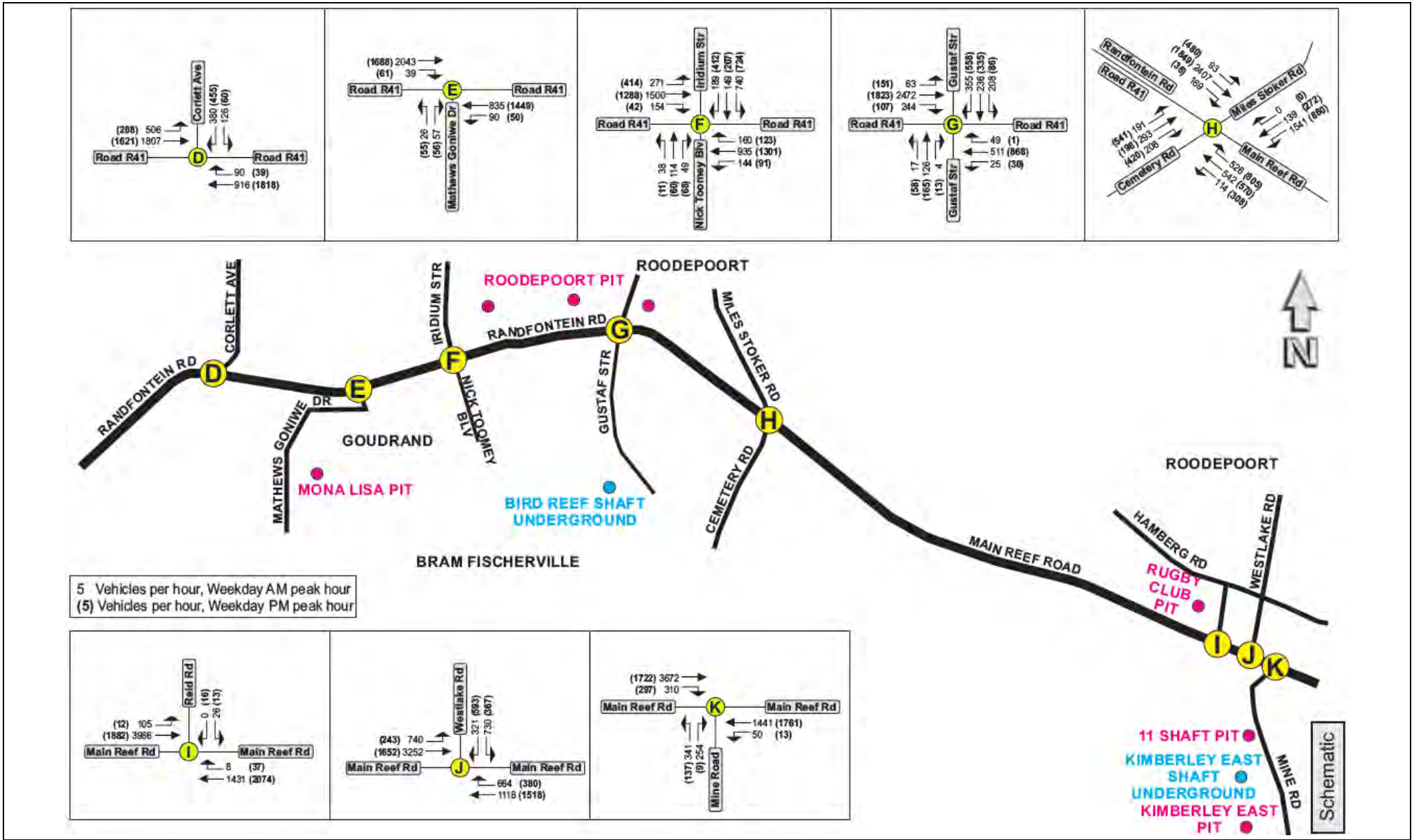


FIGURE B-21: PROJECTED 2021 PEAK HOUR TRAFFIC WITHOUT THE PROPOSED MINING DEVELOPMENT (SCENARIO 7)

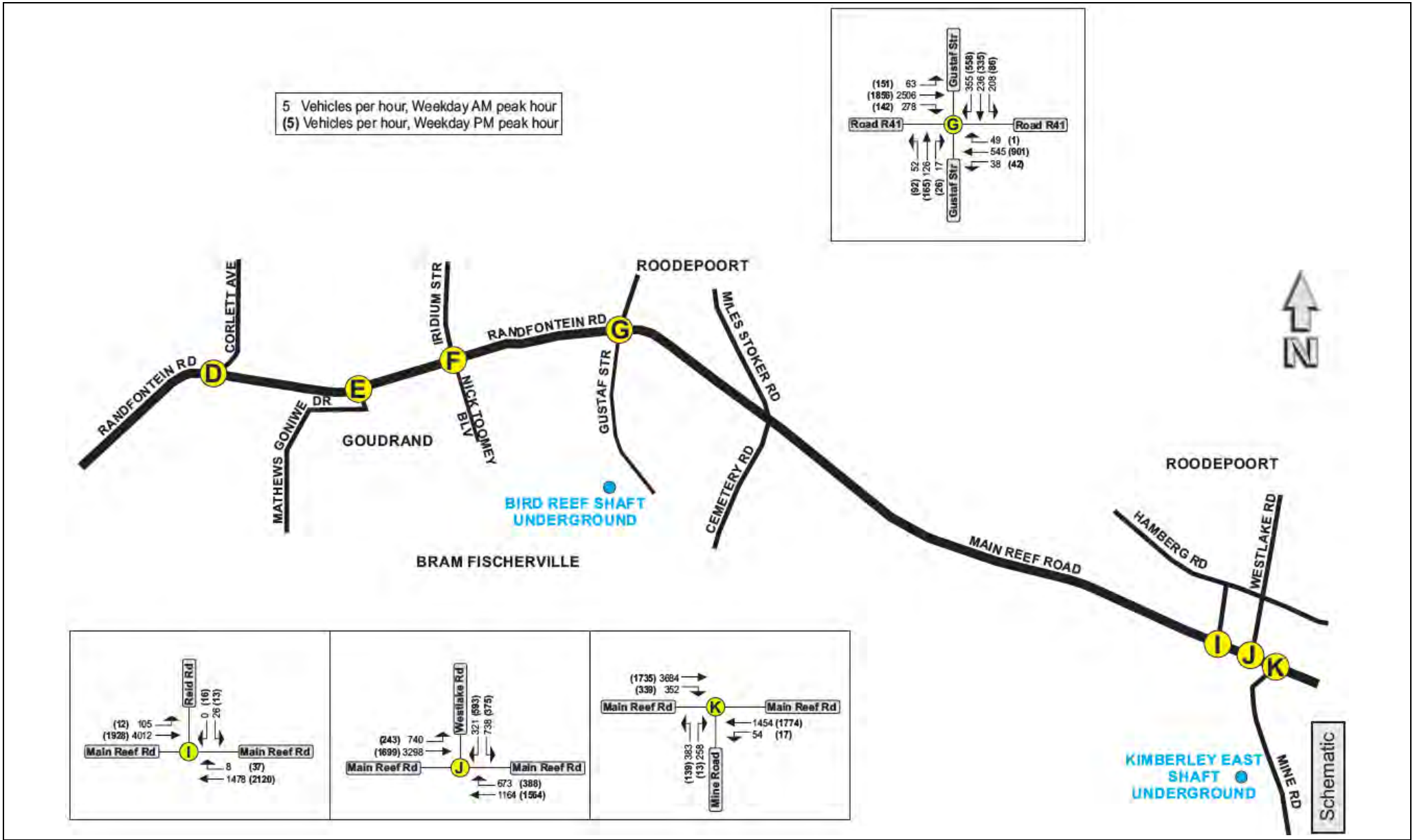


FIGURE B-22: PROJECTED 2021 PEAK HOUR TRAFFIC WITH THE PROPOSED MINING DEVELOPMENT (MINING PHASE 6) (SCENARIO 8)

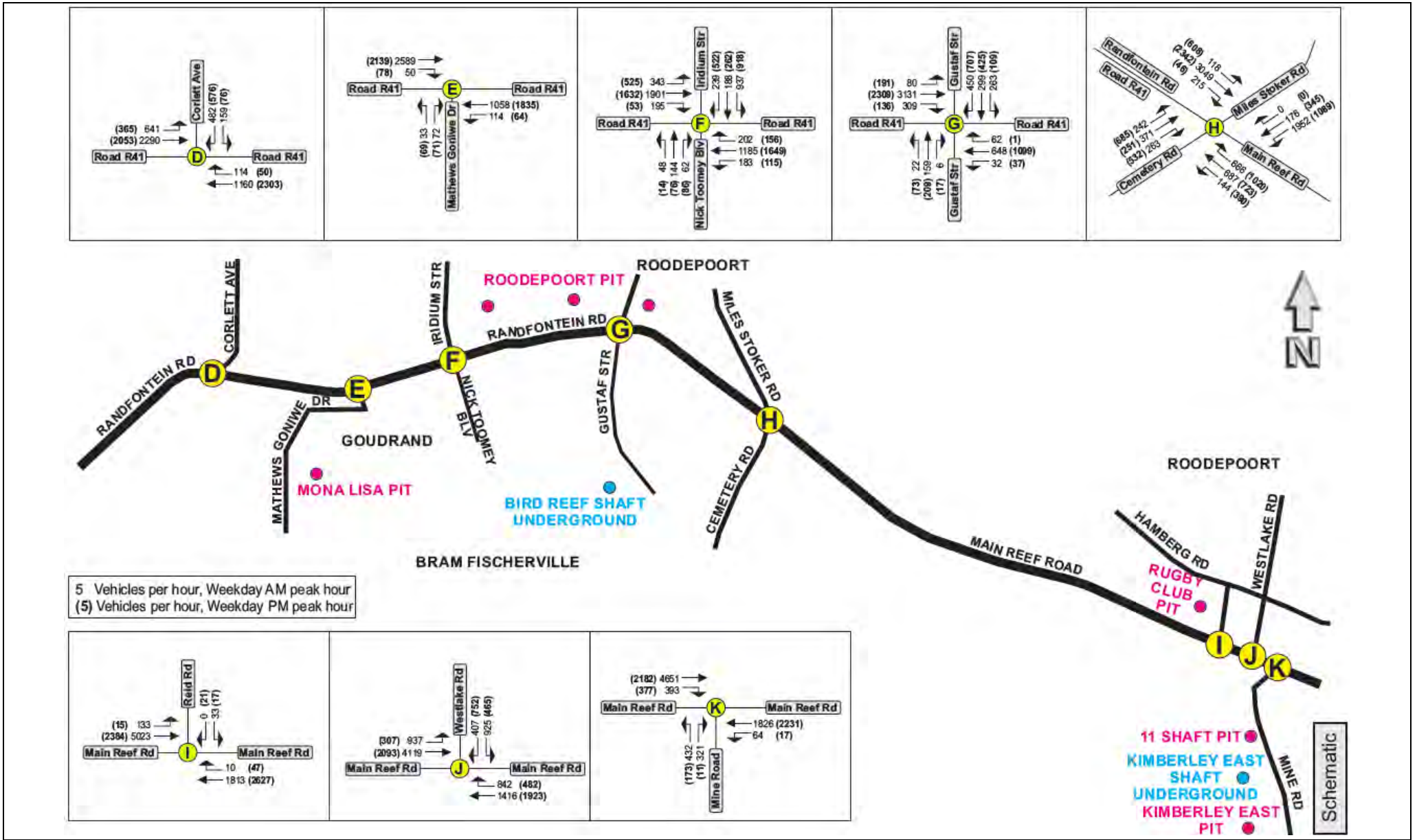


FIGURE B-23: PROJECTED 2029 PEAK HOUR TRAFFIC WITHOUT THE PROPOSED MINING DEVELOPMENT (SCENARIO 9)

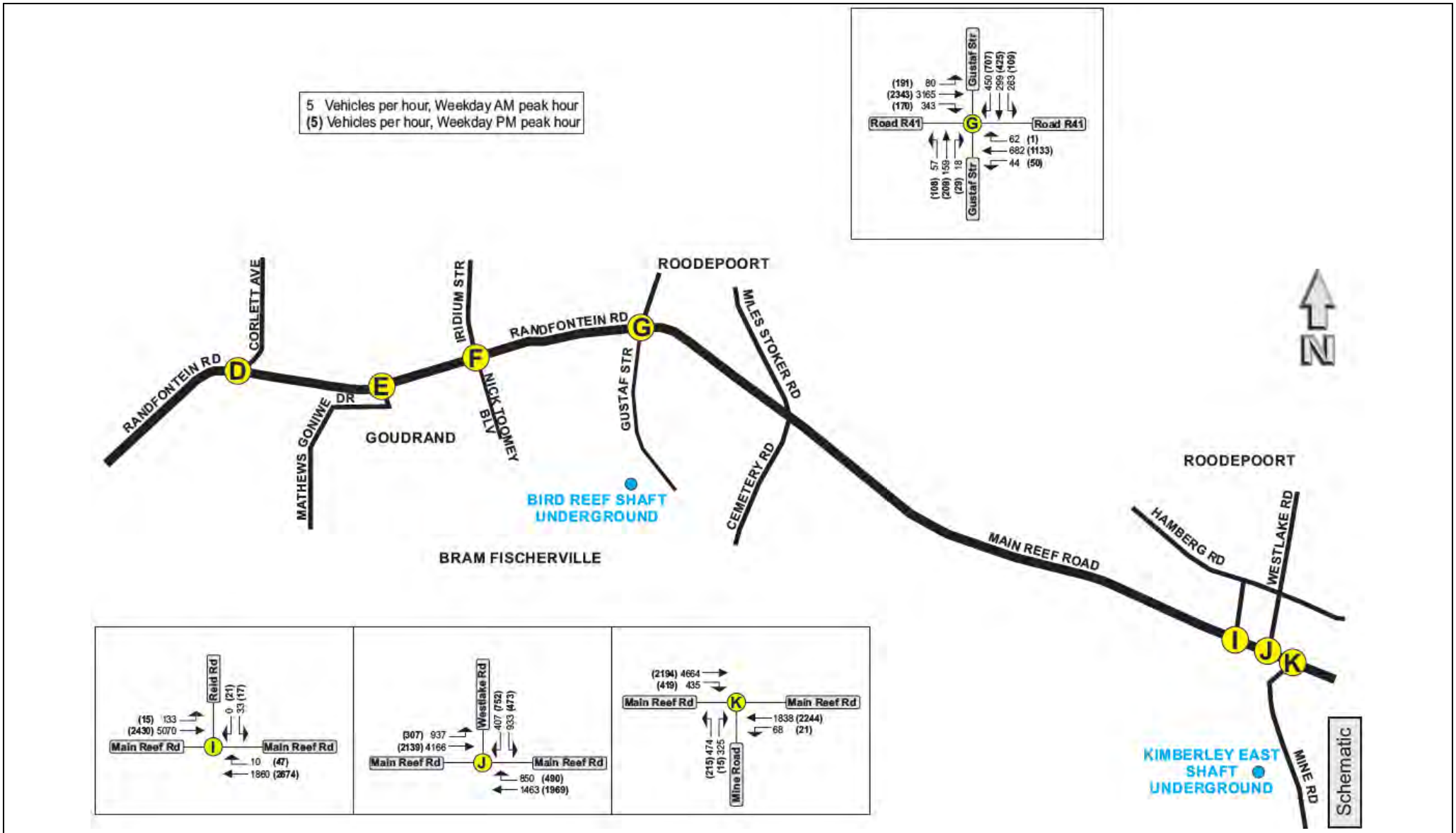


FIGURE B-24: PROJECTED 2029 PEAK HOUR TRAFFIC WITH THE PROPOSED MINING DEVELOPMENT (MINING PHASE 6) (SCENARIO 10)

APPENDIX C

SIDRA CALCULATION RESULTS

TABLE C-1: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2019 (BACKGROUND TRAFFIC) WITHOUT THE PROPOSED MINING DEVELOPMENT (SCENARIO 1)

***POINT D*: INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND CORLETTE AVENUE**

Type of intersection control: Traffic Light Signal Controlled

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Corlett Ave)	35.2	C	0.760	46.4	D	0.924
East (Road R41)	11.6	C	0.731	23.7	D	0.935
West (Road R41)	12.3	C	0.780	8.6	B	0.652
Intersection	**15.2**	**C**	**0.780**	**19.7**	**D**	**0.935**

***POINT E*: INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND MATHEWS GONIWE DRIVE**

Type of intersection control: Free-flow along Road R41

Levels of Service unacceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Road R41)	0.6	A	0.467	0.5	B	0.777
South (Mathews Goniwe Dr)	86664.8	F	10.093	10053.3	F	11.770
West (Road R41)	1.9	A	0.616	8.3	C	0.889
Intersection	**236.5**	**F**	**10.093**	**337.9**	**F**	**11.770**

***POINT E*: INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND MATHEWS GONIWE DRIVE**

Type of intersection control: Traffic Light Signal Control

With geometric upgrade

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Road R41)	3.1	A	0.302	4.4	A	0.518
South (Mathews Goniwe Dr)	48.0	B	0.630	45.6	B	0.615
West (Road R41)	5.0	C	0.741	5.3	B	0.632
Intersection	**5.6**	**C**	**0.741**	**6.2**	**B**	**0.632**

TABLE C-1: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2019 (BACKGROUND TRAFFIC) WITHOUT THE PROPOSED MINING DEVELOPMENT (SCENARIO 1) Continue...

***POINT F: INTERSECTION OF* RANDFONTEIN ROAD (ROAD R41), IRIDIUM STREET AND NICK TOOMEY BOULEVARD**

Type of intersection control: Traffic Light Signal

Levels of Service Unacceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Iridium Str)	1948.0	F	3.092	1949.5	F	3.090
East (Road R41)	1056.6	F	3.190	1243.9	F	3.143
South (Nick Toomey)	558.9	F	1.556	187.9	F	1.134
West (Road R41)	797.6	F	2.996	241.0	F	1.536
Intersection	**1138.0**	**F**	**3.190**	**1044.1**	**F**	**3.143**

***POINT F: INTERSECTION OF* RANDFONTEIN ROAD (ROAD R41), IRIDIUM STREET AND NICK TOOMEY BOULEVARD**

Type of intersection control: Traffic Light Signal

With Geometric Upgrades

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Iridium Str)	18.2	C	0.727	21.3	C	0.750
East (Road R41)	11.5	B	0.616	17.0	C	0.743
South (Nick Toomey)	34.6	C	0.503	21.3	C	0.750
West (Road R41)	12.1	C	0.724	16.3	B	0.693
Intersection	**14.4**	**C**	**0.727**	**18.5**	**C**	**0.750**

***POINT G: INTERSECTION OF* RANDFONTEIN ROAD (ROAD R41) AND GUSTAF STREET**

Type of intersection control: Traffic Light Signal

Levels of Service Unacceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Gustaf Str)	1195.4	F	2.265	1183.3	F	2.255
East (Road R41)	14.5	A	0.532	74.3	F	1.007
South (Gustaf Str)	25.8	A	0.298	20.8	A	0.355
West (Road R41)	1181.4	F	2.381	1105.5	F	2.237
Intersection	**986.2**	**F**	**2.381**	**841.6**	**F**	**2.255**

TABLE C-1: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2019 (BACKGROUND TRAFFIC) WITHOUT THE PROPOSED MINING DEVELOPMENT (SCENARIO 1) Continue...

***POINT G: INTERSECTION OF* RANDFONTEIN ROAD (ROAD R41) AND GUSTAF STREET**						
Type of intersection control: Traffic Light Signal						
With Geometric Upgrades						
Levels of Service Acceptable						
APPROACH	**FRIDAY (AM)**			**FRIDAY (PM)**		
	Delay	**Level of Service**	**Degree of Saturation**	**Delay**	**Level of Service**	**Degree of Saturation**
North (Gustaf Str)	27.1	B	0.695	24.5	B	0.633
East (Road R41)	9.3	A	0.427	13.2	A	0440
South (Gustaf Str)	36.9	A	0.416	32.0	A	0.538
West (Road R41)	11.5	C	0.718	15.1	B	0.632
Intersection	**14.9**	**C**	**0.718**	**17.9**	**B**	**0.633**

***POINT H: INTERSECTION OF* RANDFONTEIN ROAD (ROAD R41), MILES STOKER ROAD, MAIN REEF ROAD AND CEMETERY ROAD**						
Type of intersection control: Roundabout						
Levels of Service Unacceptable						
APPROACH	**FRIDAY (AM)**			**FRIDAY (PM)**		
	Delay	**Level of Service**	**Degree of Saturation**	**Delay**	**Level of Service**	**Degree of Saturation**
North (Miles Stoker)	121.7	F	22.281	250.6	F	43.684
East (Road R41)	2.6	A	0.268	3.2	A	0.406
South (Cemetery Rd)	130.7	F	1.405	510.4	F	3.471
West (Road R41)	979.2	F	2.846	1142.4	F	16.618
Intersection	**979.2**	**F**	**2.846**	**1142.4**	**F**	**16.618**

***POINT H: INTERSECTION OF* RANDFONTEIN ROAD (ROAD R41), MILES STOKER ROAD, MAIN REEF ROAD AND CEMETERY ROAD**						
Type of intersection control: Traffic Light Signal						
With Geometric Upgrades						
Levels of Service Acceptable						
APPROACH	**FRIDAY (AM)**			**FRIDAY (PM)**		
	Delay	**Level of Service**	**Degree of Saturation**	**Delay**	**Level of Service**	**Degree of Saturation**
North (Miles Stoker)	24.6	A	0.265	50.0	C	0.762
East (Road R41)	20.0	A	0.427	23.0	A	0.422
South (Cemetery Rd)	24.7	B	0.651	25.0	C	0.767
West (Road R41)	24.6	A	0.265	22.9	C	0.739
Intersection	**15.4**	**B**	**0.666**	**25.0**	**C**	**0.767**

TABLE C-1: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2019 (BACKGROUND TRAFFIC) WITHOUT THE PROPOSED MINING DEVELOPMENT (SCENARIO 1) Continue...

***POINT I: INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND REID ROAD**

Type of intersection control: Free-flow along Road R41

Levels of Service Unacceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Reid Rd)	610.6	F	1.273	1979.2	F	2.655
East (Road R41)	5.3	F	1.228	1.8	B	0.636
West (Road R41)	0.3	B	0.673	0.1	A	0.319
Intersection	**4.7**	**F**	**1.273**	**15.1**	**F**	**2.655**

***POINT J: INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND WESTLAKE ROAD**

Type of intersection control: Traffic Light Signal

Levels of Service Unacceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Westlake Rd)	168.4	F	1.141	42.3	C	0.846
East (Road R41)	136.8	F	1.363	14.7	C	0.837
West (Road R41)	270.1	F	1.308	34.7	C	0.862
Intersection	**219.6**	**F**	**1.363**	**28.3**	**C**	**0.862**

***POINT J: INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND WESTLAKE ROAD**

Type of intersection control: Traffic Light Signal

With Geometric Upgrades

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Westlake Rd)	18.3	C	0.799	21.9	A	0.540
East (Road R41)	15.8	C	0.810	12.5	A	0.537
West (Road R41)	19.3	C	0.810	19.6	A	0.549
Intersection	**18.2**	**C**	**0.810**	**17.2**	**A**	**0.549**

***POINT K: INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND MINE ROAD**

Type of intersection control: Free-flow along Road R41

Levels of Service Unacceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Road R41)	0.2	A	0.245	0.1	A	0.299
South (Mine Rd)	37596.2	F	42.426	707.3	F	1.638
West (Road R41)	107.0	F	2.430	406.3	F	3.979
Intersection	**3751.0**	**F**	**42.426**	**234.5**	**F**	**3.979**

TABLE C-1: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2019 (BACKGROUND TRAFFIC) WITHOUT THE PROPOSED MINING DEVELOPMENT (SCENARIO 1) Continue...

***POINT K*: *INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND MINE ROAD**						
Type of intersection control: Free-flow along Road R41						
With Geometric Upgrades						
Levels of Service acceptable						
APPROACH	**FRIDAY (AM)**			**FRIDAY (PM)**		
	Delay	**Level of Service**	**Degree of Saturation**	**Delay**	**Level of Service**	**Degree of Saturation**
East (Road R41)	18.0	B	0.734	14.1	B	0.681
South (Mine Rd)	16.5	B	0.768	7.1	A	0.073
West (Road R41)	1.5	A	0.724	2.6	A	0.696
Intersection	**7.0**	**A**	**0.768**	**8.0**	**A**	**0.696**

TABLE C-2: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2019 WITH THE PROPOSED MINING DEVELOPMENT (MINING PHASE 1)(SCENARIO 2)						
***POINT I*: INTERSECTION OF MAIN REEF ROAD (ROAD R41) AND REID ROAD**						
Type of intersection control: Free-flow along Road R41						
Levels of Service Unacceptable						
APPROACH	**FRIDAY (AM)**			**FRIDAY (PM)**		
	Delay	**Level of Service**	**Degree of Saturation**	**Delay**	**Level of Service**	**Degree of Saturation**
North (Reid Rd)	610.6	F	1.273	1979.2	F	2.655
East (Road R41)	5.3	F	1.228	1.8	B	0.636
West (Road R41)	0.3	B	0.673	0.1	A	0.319
Intersection	**4.7**	**F**	**1.273**	**15.1**	**F**	**2.655**
***POINT J*: INTERSECTION OF MAIN REEF ROAD (ROAD R41) AND WESTLAKE ROAD**						
Type of intersection control: Traffic Light Signal						
Levels of Service acceptable						
APPROACH	**FRIDAY (AM)**			**FRIDAY (PM)**		
	Delay	**Level of Service**	**Degree of Saturation**	**Delay**	**Level of Service**	**Degree of Saturation**
North (Westlake Rd)	18.5	C	0.807	22.0	A	0.548
East (Road R41)	15.8	C	0.811	12.5	A	0.537
West (Road R41)	19.3	C	0.810	19.6	A	0.549
Intersection	**18.3**	**C**	**0.811**	**17.3**	**A**	**0.549**
***POINT K*: INTERSECTION OF MAIN REEF ROAD (ROAD R41) AND MINE ROAD**						
Type of intersection control: Free-flow along Road R41						
Levels of Service acceptable						
APPROACH	**FRIDAY (AM)**			**FRIDAY (PM)**		
	Delay	**Level of Service**	**Degree of Saturation**	**Delay**	**Level of Service**	**Degree of Saturation**
East (Road R41)	18.0	B	0.734	14.1	B	0.681
South (Mine Rd)	16.5	B	0.768	7.1	A	0.073
West (Road R41)	1.5	A	0.724	2.6	A	0.696
Intersection	**7.0**	**A**	**0.768**	**8.0**	**A**	**0.969**

TABLE C-3: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2019 WITH THE PROPOSED MINING DEVELOPMENT (MINING PHASES 2 & 3)(SCENARIO 3)

***POINT F*: INTERSECTION OF RANDFONTEIN ROAD (ROAD R41), IRIDIUM STREET AND NICK TOOMEY BOULEVARD**

Type of intersection control: Traffic Light Signal

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Iridium Str)	18.2	C	0.727	21.3	C	0.750
East (Road R41)	11.5	B	0.618	17.7	C	0.757
South (Nick Toomey)	34.6	A	0.503	34.7	A	0.399
West (Road R41)	12.2	C	0.737	16.4	C	0.705
Intersection	**14.5**	**C**	**0.737**	**18.7**	**C**	**0.757**

***POINT G*: INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND GUSTAF STREET**

Type of intersection control: Traffic Light Signal

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Gustaf Str)	27.1	B	0.695	24.5	B	0.633
East (Road R41)	9.4	A	0.458	13.2	A	0.440
South (Gustaf Str)	36.9	A	0.416	32.0	A	0.538
West (Road R41)	11.6	C	0.725	15.1	B	0.632
Intersection	**15.0**	**C**	**0.725**	**17.9**	**B**	**0.633**

***POINT J*: INTERSECTION OF MAIN REEF ROAD (ROAD R41) AND WESTLAKE ROAD**

Type of intersection control: T Traffic Light Signal

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Westlake Rd)	18.6	C	0.814	22.0	A	0.548
East (Road R41)	15.2	C	0.800	12.6	A	0.541
West (Road R41)	20.2	C	0.825	19.5	A	0.552
Intersection	**18.6**	**C**	**0.825**	**17.3**	**A**	**0.552**

***POINT K*: INTERSECTION OF MAIN REEF ROAD (ROAD R41) AND MINE ROAD**

Type of intersection control: Free-flow along Road R41

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Road R41)	18.0	B	0.734	14.2	B	0.649
South (Mine Rd)	16.4	B	0.768	7.4	B	0.081
West (Road R41)	1.6	A	0.756	2.8	A	0.671
Intersection	**7.1**	**A**	**0.768**	**8.1**	**A**	**0.671**

TABLE C-4: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2020 WITHOUT THE PROPOSED MINING DEVELOPMENT (SCENARIO 4)

***POINT D:* INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND CORLETTE AVENUE**

Type of intersection control: Traffic Light Signal Controlled

With Intersection Upgrades

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Corlett Ave)	40.6	C	0.702	34.7	C	0.769
East (Road R41)	8.2	C	0.715	12.0	C	0.794
West (Road R41)	8.7	C	0.709	8.2	B	0.697
Intersection	**12.0**	**C**	**0.715**	**13.0**	**C**	**0.794**

***POINT E:* INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND MATHEWS GONIWE DRIVE**

Type of intersection control: Traffic Light Signal

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Road R41)	3.1	A	0.308	4.5	A	0.533
South (Mathews Goniwe Dr)	48.0	B	0.630	45.8	B	0.626
West (Road R41)	5.1	C	0.752	5.4	B	0.673
Intersection	**5.7**	**C**	**0.752**	**6.4**	**B**	**0.673**

***POINT J: INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND WESTLAKE ROAD**

Type of intersection control: T Traffic Light Signal

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Westlake Rd)	19.0	C	0.834	22.0	A	0.556
East (Road R41)	17.3	C	0.846	12.7	A	0.559
West (Road R41)	20.0	C	0.24	19.8	A	0.565
Intersection	**19.2**	**C**	**0.846**	**17.4**	**A**	**0.565**

***POINT K: INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND MINE ROAD**

Type of intersection control: Free-flow along Road R41

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Road R41)	17.7	B	0.740	14.0	B	0.686
South (Mine Rd)	16.3	B	0.775	7.1	A	0.075
West (Road R41)	2.2	A	0.801	3.0	A	0.732
Intersection	**8.5**	**A**	**0.801**	**8.1**	**A**	**0.732**

TABLE C-5: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2020 WITH THE PROPOSED MINING DEVELOPMENT (MINING PHASES 3 & 4)(SCENARIO 5)

***POINT D:* INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND CORLETTE AVENUE**

Type of intersection control: Traffic Light Signal Controlled

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Corlett Ave)	35.1	C	0.779	32.9	C	0.776
East (Road R41)	8.5	B	0.635	12.9	C	0.805
West (Road R41)	10.9	C	0.788	8.5	C	0.721
Intersection	**13.5**	**C**	**0.788**	**13.3**	**C**	**0.805**

***POINT E:* INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND MATHEWS GONIWE DRIVE**

Type of intersection control: Traffic Light Signal Controlled

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Road R41)	3.2	A	0.313	4.6	A	0.559
South (Mathews Goniwe Dr)	48.1	B	0.638	40.0	B	0.678
West (Road R41)	5.3	C	0.772	5.4	B	0.653
Intersection	**5.8**	**C**	**0.772**	**6.2**	**B**	**0.678**

***POINT J: INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND WESTLAKE ROAD**

Type of intersection control: T Traffic Light Signal

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Westlake Rd)	18.7	C	0.825	22.0	A	0.556
East (Road R41)	16.5	C	0.836	12.8	A	0.563
West (Road R41)	21.1	C	0.838	19.8	A	0.568
Intersection	**19.5**	**C**	**0.838**	**17.4**	**A**	**0.568**

***POINT K: INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND MINE ROAD**

Type of intersection control: Free-flow along Road R41

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Road R41)	17.7	B	0.741	14.4	B	0.668
South (Mine Rd)	16.2	B	0.775	7.3	A	0.093
West (Road R41)	2.0	A	0.838	3.0	A	0.693
Intersection	**7.2**	**A**	**0.838**	**8.3**	**A**	**0.693**

TABLE C-6: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2020 WITH THE PROPOSED MINING DEVELOPMENT (MINING PHASES 4 & 5)(SCENARIO 6)

***POINT D:* INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND CORLETTE AVENUE**

Type of intersection control: Traffic Light Signal Controlled

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Corlett Ave)	35.1	C	0.779	12.9	C	0.804
East (Road R41)	8.5	B	0.635	32.9	C	0.776
West (Road R41)	10.9	C	0.787	8.5	C	0.721
Intersection	**13.5**	**C**	**0.787**	**13.3**	**C**	**0.804**

***POINT E:* INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND MATHEWS GONIWE DRIVE**

Type of intersection control: Traffic Light Signal Controlled

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Road R41)	3.2	A	0.313	4.6	A	0.538
South (Mathews Goniwe Dr)	48.1	B	0.638	45.8	B	0.626
West (Road R41)	5.3	C	0.772	5.5	B	0.678
Intersection	**5.8**	**C**	**0.772**	**6.4**	**B**	**0.678**

***POINT J: INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND WESTLAKE ROAD**

Type of intersection control: T Traffic Light Signal

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Westlake Rd)	18.7	C	0.825	22.0	A	0.556
East (Road R41)	16.5	C	0.836	12.8	A	0.563
West (Road R41)	21.1	C	0.837	19.8	A	0.567
Intersection	**19.5**	**C**	**0.837**	**17.4**	**A**	**0.567**

***POINT K: INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND MINE ROAD**

Type of intersection control: Free-flow along Road R41

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Road R41)	17.7	B	0.741	14.4	B	0.668
South (Mine Rd)	16.2	B	0.775	7.3	A	0.082
West (Road R41)	1.9	A	0.833	3.0	A	0.693
Intersection	**7.2**	**A**	**0.833**	**8.3**	**A**	**0.693**

TABLE C-7: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2021 WITHOUT THE PROPOSED MINING DEVELOPMENT (SCENARIO 7)

***POINT D:* INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND CORLETTE AVENUE**

Type of intersection control: Traffic Light Signal Controlled

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Corlett Ave)	36.1	C	0.804	36.0	C	0.802
East (Road R41)	8.8	B	0.668	14.3	C	0.825
West (Road R41)	11.9	C	0.805	8.3	C	0.718
Intersection	**14.3**	**C**	**0.805**	**14.2**	**C**	**0.825**

***POINT E:* INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND MATHEWS GONIWE DRIVE**

Type of intersection control: Traffic Light Signal Controlled

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Road R41)	3.2	A	0.320	4.5	A	0.552
South (Mathews Goniwe Dr)	48.4	B	0.662	44.9	B	0.696
West (Road R41)	5.4	C	0.792	5.4	B	0.648
Intersection	**5.9**	**C**	**0.792**	**6.3**	**B**	**0.696**

***POINT G: INTERSECTION OF* RANDFONTEIN ROAD (ROAD R41) AND GUSTAF STREET**

Type of intersection control: Traffic Light Signal

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Gustaf Str)	27.9	C	0.743	25.2	B	0.660
East (Road R41)	9.6	A	0.476	13.8	A	0.466
South (Gustaf Str)	37.0	A	0.444	33.1	A	0.584
West (Road R41)	12.6	C	0.773	16.0	B	0.682
Intersection	**15.9**	**C**	**0.773**	**18.6**	**B**	**0.682**

TABLE C-7: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2021 WITHOUT THE PROPOSED MINING DEVELOPMENT (SCENARIO 7) Continue...

***POINT H: INTERSECTION OF* RANDFONTEIN ROAD (ROAD R41), MILES STOKER ROAD, MAIN REEF ROAD AND CEMETERY ROAD**

Type of intersection control: Roundabout

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Miles Stoker)	24.8	A	0.281	54.0	C	0.804
East (Road R41)	20.2	A	0.453	24.0	A	0.442
South (Cemetery Rd)	25.3	C	0.705	27.1	C	0.808
West (Road R41)	11.8	C	0.709	26.5	C	0.807
Intersection	**15.8**	**C**	**0.709**	**27.8**	**C**	**0.808**

***POINT J: INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND WESTLAKE ROAD**

Type of intersection control: T Traffic Light Signal

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Westlake Rd)	19.8	C	0.869	22.1	A	0.572
East (Road R41)	19.3	C	0.883	12.9	A	0.582
West (Road R41)	21.1	C	0.838	20.0	A	0.582
Intersection	**20.4**	**C**	**0.883**	**17.6**	**A**	**0.582**

***POINT K: INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND MINE ROAD**

Type of intersection control: Free-flow along Road R41

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Road R41)	18.4	B	0.763	14.6	B	0.688
South (Mine Rd)	16.7	B	0.800	7.4	A	0.078
West (Road R41)	1.9	A	0.831	3.1	A	0.706
Intersection	**7.4**	**A**	**0.831**	**8.5**	**A**	**0.706**

TABLE C-8: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2021 WITH THE PROPOSED MINING DEVELOPMENT (MINING PHASE 6)(SCENARIO 8)

***POINT G*: INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND GUSTAF STREET**

Type of intersection control: Traffic Light Signal

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Gustaf Str)	27.9	C	0.743	25.7	B	0.685
East (Road R41)	9.7	A	0.486	13.3	A	0.478
South (Gustaf Str)	21.9	A	0.444	30.0	A	0.577
West (Road R41)	12.3	C	0.757	15.9	B	0.664
Intersection	**15.6**	**C**	**0.757**	**18.5**	**B**	**0.685**

***POINT J*: INTERSECTION OF MAIN REEF ROAD (ROAD R41) AND WESTLAKE ROAD**

Type of intersection control: T Traffic Light Signal

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Westlake Rd)	20.1	C	0.880	22.2	A	0.591
East (Road R41)	17.7	C	0.854	12.6	A	0.592
West (Road R41)	27.5	C	0.894	19.6	A	0.591
Intersection	**23.8**	**C**	**0.894**	**17.3**	**A**	**0.592**

***POINT K*: INTERSECTION OF MAIN REEF ROAD (ROAD R41) AND MINE ROAD**

Type of intersection control: Free-flow along Road R41

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Road R41)	21.0	C	0.800	16.0	B	0.700
South (Mine Rd)	17.4	B	0.845	7.8	A	0.101
West (Road R41)	2.1	A	0.833	4.0	A	0.725
Intersection	**8.3**	**A**	**0.845**	**9.5**	**A**	**0.725**

TABLE C-9: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2029 WITHOUT THE PROPOSED MINING DEVELOPMENT (SCENARIO 9)						
***POINT G: INTERSECTION OF* RANDFONTEIN ROAD (ROAD R41) AND GUSTAF STREET**						
Type of intersection control: Traffic Light Signal						
Levels of Service Unacceptable						
APPROACH	**FRIDAY (AM)**			**FRIDAY (PM)**		
	Delay	**Level of Service**	**Degree of Saturation**	**Delay**	**Level of Service**	**Degree of Saturation**
North (Gustaf Str)	46.6	F	1.027	33.0	C	0.869
East (Road R41)	11.0	B	0.621	14.2	C	0.578
South (Gustaf Str)	35.9	A	0.539	34.6	C	0.740
West (Road R41)	79.7	F	1.027	28.9	C	0.889
Intersection	**62.7**	**F**	**1.027**	**27.0**	**C**	**0.889**
***POINT G: INTERSECTION OF* RANDFONTEIN ROAD (ROAD R41) AND GUSTAF STREET**						
Type of intersection control: Traffic Light Signal						
With Geometric Upgrading						
Levels of Service acceptable						
APPROACH	**FRIDAY (AM)**			**FRIDAY (PM)**		
	Delay	**Level of Service**	**Degree of Saturation**	**Delay**	**Level of Service**	**Degree of Saturation**
North (Gustaf Str)	46.8	E	0.997	32.6	C	0.847
East (Road R41)	11.1	C	0.702	12.8	C	0.369
South (Gustaf Str)	41.4	B	0.609	40.8	C	0.832
West (Road R41)	67.9	F	1.004	24.8	C	0.861
Intersection	**55.4**	**F**	**1.004**	**25.0**	**C**	**0.861**
***POINT H: INTERSECTION OF* RANDFONTEIN ROAD (ROAD R41), MILES STOKER ROAD, MAIN REEF ROAD AND CEMETERY ROAD**						
Type of intersection control: Traffic Light Signal						
Levels of Service Unacceptable						
APPROACH	**FRIDAY (AM)**			**FRIDAY (PM)**		
	Delay	**Level of Service**	**Degree of Saturation**	**Delay**	**Level of Service**	**Degree of Saturation**
North (Miles Stoker)	24.4	A	0.338	137.7	F	1.020
East (Road R41)	22.0	B	0.601	25.7	A	0.587
South (Cemetery Rd)	31.8	D	0.920	65.2	F	1.054
West (Road R41)	41.2	D	0.945	147.2	F	1.054
Intersection	**36.0**	**D**	**0.945**	**103.5**	**F**	**1.054**

TABLE C-9: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2029 WITHOUT THE PROPOSED MINING DEVELOPMENT (SCENARIO 9) Continue...

***POINT H: INTERSECTION OF* RANDFONTEIN ROAD (ROAD R41), MILES STOKER ROAD, MAIN REEF ROAD AND CEMETERY ROAD**

Type of intersection control: Traffic Light Signal

With Geometric Upgrades

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Miles Stoker)	59.3	C	0.709	62.8	C	0.818
East (Road R41)	27.5	A	0.524	25.5	C	0.585
South (Cemetery Rd)	34.3	C	0.752	29.5	C	0.837
West (Road R41)	15.1	C	0.744	27.7	C	0.822
Intersection	**21.7**	**C**	**0.752**	**29.8**	**C**	**0.837**

***POINT J: INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND WESTLAKE ROAD**

Type of intersection control: T Traffic Light Signal

Levels of Service Unacceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
North (Westlake Rd)	36.8	F	1.045	24.5	C	0.750
East (Road R41)	61.4	F	1.133	14.5	C	0.726
West (Road R41)	130.3	F	1.120	23.3	C	0.754
Intersection	**97.9**	**F**	**1.133**	**20.0**	**C**	**0.754**

***POINT K: INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND MINE ROAD**

Type of intersection control: Free-flow along Road R41

Levels of Service Unacceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Road R41)	35.9	D	0.907	21.6	C	0.815
South (Mine Rd)	28.2	C	0.953	7.9	A	0.098
West (Road R41)	9.2	F	1.075	5.7	A	0.822
Intersection	**17.6**	**F**	**1.075**	**12.9**	**B**	**0.822**

***POINT K: INTERSECTION OF* MAIN REEF ROAD (ROAD R41) AND MINE ROAD**

Type of intersection control: Free-flow along Road R41

With Geometric Upgrades

Levels of Service acceptable

APPROACH	FRIDAY (AM)			FRIDAY (PM)		
	Delay	Level of Service	Degree of Saturation	Delay	Level of Service	Degree of Saturation
East (Road R41)	13.4	B	0.691	11.2	B	0.688
South (Mine Rd)	18.6	B	0.694	7.7	A	0.098
West (Road R41)	1.7	A	0.837	3.6	A	0.711
Intersection	**6.3**	**A**	**0.837**	**7.2**	**A**	**0.711**

TABLE C-10: LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2029 WITH THE PROPOSED MINING DEVELOPMENT (MINING PHASE 6)(SCENARIO 10)						
***POINT G*: INTERSECTION OF RANDFONTEIN ROAD (ROAD R41) AND GUSTAF STREET**						
Type of intersection control: Traffic Light Signal						
Levels of Service acceptable						
APPROACH	**FRIDAY (AM)**			**FRIDAY (PM)**		
	Delay	**Level of Service**	**Degree of Saturation**	**Delay**	**Level of Service**	**Degree of Saturation**
North (Gustaf Str)	45.8	F	1.011	34.5	C	0.376
East (Road R41)	10.8	C	0.710	12.4	C	0.376
South (Gustaf Str)	37.0	B	0.616	37.1	C	0.823
West (Road R41)	78.6	F	1.021	27.7	C	0.880
Intersection	**61.5**	**F**	**1.021**	**26.5**	**C**	**0.880**
***POINT J*: INTERSECTION OF MAIN REEF ROAD (ROAD R41) AND WESTLAKE ROAD**						
Type of intersection control: Traffic Light Signal						
Levels of Service Unacceptable						
APPROACH	**FRIDAY (AM)**			**FRIDAY (PM)**		
	Delay	**Level of Service**	**Degree of Saturation**	**Delay**	**Level of Service**	**Degree of Saturation**
North (Westlake Rd)	36.8	F	1.045	24.5	C	0.750
East (Road R41)	61.4	F	1.133	14.5	C	0.726
West (Road R41)	130.3	F	1.120	23.3	C	0.754
Intersection	**97.9**	**F**	**1.133**	**20.0**	**C**	**0.754**
***POINT K*: INTERSECTION OF MAIN REEF ROAD (ROAD R41) AND MINE ROAD**						
Type of intersection control: Free-flow along Road R41						
Levels of Service acceptable						
APPROACH	**FRIDAY (AM)**			**FRIDAY (PM)**		
	Delay	**Level of Service**	**Degree of Saturation**	**Delay**	**Level of Service**	**Degree of Saturation**
East (Road R41)	13.5	B	0.696	12.0	B	0.723
South (Mine Rd)	18.0	B	0.702	7.7	A	0.122
West (Road R41)	2.0	A	0.839	4.3	A	0.756
Intersection	**6.5**	**A**	**0.839**	**7.9**	**A**	**0.756**

APPENDIX D

LEVEL OF SERVICE CRITERIA DESCRIPTION

TABLE D-1: LEVEL OF SERVICE CRITERIA DESCRIPTION FOR UNSIGNALISED INTERSECTIONS		
LEVEL OF SERVICE	**AVERAGE TOTAL DELAY (SEC/VEH)**	**PERFORMANCE EVALUATION**
A	≤ 5	Excellent
B	> 5 and ≤ 10	Very Good
C	>10 and ≤ 20	Good
D	>20 and ≤ 30	Average
E	>30 and ≤ 45	Poor
F	>45	Fail

TABLE D-2: LEVEL OF SERVICE CRITERIA DESCRIPTION FOR SIGNALISED INTERSECTIONS		
LEVEL OF SERVICE	**AVERAGE TOTAL DELAY (SEC/VEH)**	**PERFORMANCE EVALUATION**
A	≤ 5	Excellent
B	> 5 and ≤ 15	Very Good
C	> 15 and ≤ 25	Good
D	> 25 and ≤ 40	Average
E	> 40 and ≤ 60	Poor
F	> 60	Fail

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

APPENDIX E

COMMENTS BY INTERESTED AND AFFECTED PARTIES

COMMENTS BY INTERESTED AND AFFECTED PARTIES DURING CONSULTATION MEETINGS RELATED TO VEHICLE TRAFFIC				
Interested and Affected Parties. List the names of persons consulted in this column, and mark with an X where those who must be consulted were in fact consulted.		Date comments received	Issues raised	EAPs response to issues as mandated by the applicant and as updated for the scoping report
Cllr. Gert Niemand	X	Scoping meeting held at Witpoortjie on 4 April 2018	Then the concern from the town is the traffic impact once we are busy with the opencast and the amount of carriers that's going to be coming in and out. It will impact and what will the impact be?	A traffic specialist study will be conducted to address these comments. The findings of the study will be included into the EIA report. The specialist study terms of reference are included in Section 7 of the Scoping Report.
Zenobia Heldsinger: Chairperson My Florida Lake – Hamberg Residents Association	X	Comment sheet received at scoping meeting held on 4 April 2018 and E-mail received on 4 April 2018	Traffic congestion increases within and around areas affected.	A traffic specialist study will be conducted to address these comments. The findings of the study will be included into the EIA report. The specialist study terms of reference are included in Section 7 of the Scoping Report.
Tumi Ntsimane		Scoping meeting held in Braamfischerville on 5 April 2018	There are mines down the road. Will alternative new routes be provided to enter and exit the mined area?	No alternative access has been identified. Access roads will need to be established for the project. A specialist traffic assessment will be conducted that looks at how the mine traffic will impact on the road capacity and road safety.

COMMENTS BY INTERESTED AND AFFECTED PARTIES DURING CONSULTATION MEETINGS RELATED TO VEHICLE TRAFFIC				
Interested and Affected Parties. List the names of persons consulted in this column, and mark with an X where those who must be consulted were in fact consulted.		Date comments received	Issues raised	EAPs response to issues as mandated by the applicant and as updated for the scoping report
Elizabeth Stapelberg - property owner in Cresswell Park	X	E-mail received on 6 April 2018	You will be placing a huge burden on the traffic, quality of the already burdened roads. Surely your trucks and scrapers and whatever tools you use will magnify the abuse of the environment.	A traffic specialist study will be conducted to address these comments. The findings of the study will be included into the EIA report. The specialist study terms of reference are included in Section 7 of the Scoping Report.
E Sequeira	X	E-mail received on 12 April 2018	Our areas traffic is already overloaded, our roads are not build for this project, which will lead to more congestion from the big trucks transporting excess materials.	
Georginia South Resident's Forum Media	X	E-mail (with attachment) received on 7 May 2018	There will be serious traffic congestions during the time of mining as Main Reef, Albertina Sisulu and Ontdekkers Roads are the three lifelines for daily transportation	

APPENDIX F

SUMMARY OF IMPACT RATINGS

TABLE F-1: IMPACT RATING DUE TO THE PROPOSED MINING DEVELOPMENT (PHASE 1)

OPERATIONAL PHASE FOR THE RUGBY CLUB MAIN REEF PIT

RECEPTOR	ACTIVITY		IMPACT	BEFORE MITIGATION (Without proposed access intersection)						AFTER MITIGATION (With proposed access intersection)						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)	*L*	*VL*	*M*	*Low*	*L*	*Low*	*No mitigation measures required / recommended.*						See **Section 2.7** of the report, **Table 2.14** *(Road maintenance plan recommended)*
			2. Relevant intersections (need for additional lanes)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading of existing intersections required due to the proposed mining 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)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*All intersections are existing intersections. Proposed access intersection to be determined.*						*See **Section 2.7** of the report. Intersection spacing is deemed to be acceptable. Final spacing to be reviewed as part of detail design phase.*
			4. Vertical road alignment at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No problems envisaged with regards to vertical road alignment. No change in impact rating due to the proposed mining development.*
			5. Available sight distance at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*Sight distance to be determined as part of the detail design phase.*
			6. Speed limit at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*Speed limit at proposed access intersection deemed acceptable.*
			7. Relevant intersections (need for dedicated left- and right-turn lanes, **proposed access intersection**)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading required due to the proposed mining development.*
			8. Pedestrian movements (with reference to access roads and access intersections)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading required due to the proposed mining development.*
			9. Public transport loading and off-loading	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No change in facilities due to the proposed mining development.*						*In general public transport is readily available in the area.*

TABLE F-2: IMPACT RATING DUE TO THE PROPOSED MINING DEVELOPMENT (PHASE 2)																	
OPERATIONAL PHASE FOR THE ROODEPOORT MAIN REEF PIT																	
RECEPTOR	ACTIVITY		IMPACT	BEFORE MITIGATION (Without proposed access intersection)						AFTER MITIGATION (With proposed access intersection)						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)	*L*	*VL*	*M*	*Low*	*L*	*Low*	*No mitigation measures required / recommended.*						See **Section 2.7** of the report, **Table 2.14** *(Road maintenance plan recommended)*
			2. Relevant intersections (need for additional lanes)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading of existing intersections required due to the proposed mining 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)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*All intersections are existing intersections. Proposed access intersection to be determined.*						*See **Section 2.7** of the report. Intersection spacing is deemed to be acceptable. Final spacing to be reviewed as part of detail design phase.*
			4. Vertical road alignment at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No problems envisaged with regards to vertical road alignment. No change in impact rating due to the proposed mining development.*
			5. Available sight distance at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*Sight distance to be determined as part of the detail design phase.*
			6. Speed limit at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*Speed limit at proposed access intersection deemed acceptable.*
			7. Relevant intersections (need for dedicated left- and right-turn lanes, **proposed access intersection**)	*H*	*VH*	*L*	*High*	*H*	*High*	*H+*	*VH*	*L*	*High*	*H*	*High*	*Dedicated right-turn lanes at the proposed access intersection are highly recommended in terms of road safety.*
			8. Pedestrian movements (with reference to access roads and access intersections)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading required due to the proposed mining development.*
			9. Public transport loading and off-loading	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No change in facilities due to the proposed mining development.*						*In general public transport is readily available in the area.*

TABLE F-3: IMPACT RATING DUE TO THE PROPOSED MINING DEVELOPMENT (PHASE 3)																	
OPERATIONAL PHASE FOR THE 11 SHAFT PIT																	
RECEPTOR	ACTIVITY		IMPACT	BEFORE MITIGATION (Without proposed access intersection)						AFTER MITIGATION (With proposed access intersection)						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)	*L*	*VL*	*M*	*Low*	*L*	*Low*	*No mitigation measures required / recommended.*						See **Section 2.7** of the report, **Table 2.14** *(Road maintenance plan recommended)*
			2. Relevant intersections (need for additional lanes)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading of existing intersections required due to the proposed mining 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)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*All intersections are existing intersections. Proposed access intersection to be determined.*						*See **Section 2.7** of the report. Intersection spacing is deemed to be acceptable. Final spacing to be reviewed as part of detail design phase.*
			4. Vertical road alignment at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No problems envisaged with regards to vertical road alignment. No change in impact rating due to the proposed mining development.*
			5. Available sight distance at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*Sight distance to be determined as part of the detail design phase.*
			6. Speed limit at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*Speed limit at proposed access intersection deemed acceptable.*
			7. Relevant intersections (need for dedicated left- and right-turn lanes, **proposed access intersection**)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading required due to the proposed mining development.*
			8. Pedestrian movements (with reference to access roads and access intersections)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading required due to the proposed mining development.*
			9. Public transport loading and off-loading	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No change in facilities due to the proposed mining development.*						*In general public transport is readily available in the area.*

TABLE F-4: IMPACT RATING DUE TO THE PROPOSED MINING DEVELOPMENT (PHASE 4)																	
OPERATIONAL PHASE FOR THE MONA LISA PIT																	
RECEPTOR	ACTIVITY		IMPACT	BEFORE MITIGATION (Without proposed access intersection)						AFTER MITIGATION (With proposed access intersection)						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)	*L*	*VL*	*M*	*Low*	*L*	*Low*	*No mitigation measures required / recommended.*						See **Section 2.7** of the report, **Table 2.14** *(Road maintenance plan recommended)*
			2. Relevant intersections (need for additional lanes)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading of existing intersections required due to the proposed mining 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)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*All intersections are existing intersections. Proposed access intersection to be determined.*						*See **Section 2.7** of the report. Intersection spacing is deemed to be acceptable. Final spacing to be reviewed as part of detail design phase.*
			4. Vertical road alignment at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No problems envisaged with regards to vertical road alignment. No change in impact rating due to the proposed mining development.*
			5. Available sight distance at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*Sight distance to be determined as part of the detail design phase.*
			6. Speed limit at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*Speed limit at proposed access intersection deemed acceptable.*
			7. Relevant intersections (need for dedicated left- and right-turn lanes, **proposed access intersection**)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading required due to the proposed mining development.*
			8. Pedestrian movements (with reference to access roads and access intersections)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading required due to the proposed mining development.*
			9. Public transport loading and off-loading	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No change in facilities due to the proposed mining development.*						*In general public transport is readily available in the area.*

TABLE F-5: IMPACT RATING DUE TO THE PROPOSED MINING DEVELOPMENT (PHASE 5)																	
OPERATIONAL PHASE FOR THE KIMBERLEY REEF EAST PIT																	
RECEPTOR	ACTIVITY		IMPACT	BEFORE MITIGATION (Without proposed access intersection)						AFTER MITIGATION (With proposed access intersection)						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)	*L*	*VL*	*M*	*Low*	*L*	*Low*	*No mitigation measures required / recommended.*						See **Section 2.7** of the report, **Table 2.14** *(Road maintenance plan recommended)*
			2. Relevant intersections (need for additional lanes)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading of existing intersections required due to the proposed mining 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)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*All intersections are existing intersections. Proposed access intersection to be determined.*						*See **Section 2.7** of the report. Intersection spacing is deemed to be acceptable. Final spacing to be reviewed as part of detail design phase.*
			4. Vertical road alignment at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No problems envisaged with regards to vertical road alignment. No change in impact rating due to the proposed mining development.*
			5. Available sight distance at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*Sight distance to be determined as part of the detail design phase.*
			6. Speed limit at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*Speed limit at proposed access intersection deemed acceptable.*
			7. Relevant intersections (need for dedicated left- and right-turn lanes, **proposed access intersection**)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading required due to the proposed mining development.*
			8. Pedestrian movements (with reference to access roads and access intersections)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading required due to the proposed mining development.*
			9. Public transport loading and off-loading	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No change in facilities due to the proposed mining development.*						*In general public transport is readily available in the area.*

TABLE F-6: IMPACT RATING DUE TO THE PROPOSED MINING DEVELOPMENT (PHASE 6)																	
OPERATIONAL PHASE FOR THE BIRD REEF SHAFT AND KIMBERLEY REEF EAST SHAFT UNDERGROUND																	
RECEPTOR	ACTIVITY		IMPACT	BEFORE MITIGATION (Without proposed access intersection)						AFTER MITIGATION (With proposed access intersection)						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)	*L*	*H*	*M*	*Med*	*M*	*Med*	*No mitigation measures required / recommended.*						See **Section 2.7** of the report, **Table 2.14** *(Road maintenance plan recommended)*
			2. Relevant intersections (need for additional lanes)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading of existing intersections required due to the proposed mining 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)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*All intersections are existing intersections. Proposed access intersection to be determined.*						*See **Section 2.7** of the report. Intersection spacing is deemed to be acceptable. Final spacing to be reviewed as part of detail design phase.*
			4. Vertical road alignment at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No problems envisaged with regards to vertical road alignment. No change in impact rating due to the proposed mining development.*
			5. Available sight distance at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*Sight distance to be determined as part of the detail design phase.*
			6. Speed limit at proposed access intersection	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*Speed limit at proposed access intersection deemed acceptable.*
			7. Relevant intersections (need for dedicated left- and right-turn lanes, **proposed access intersection**)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading required due to the proposed mining development.*
			8. Pedestrian movements (with reference to access roads and access intersections)	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No upgrading required due to the proposed mining development.*
			9. Public transport loading and off-loading	*VL*	*VL*	*M*	*Low*	*L*	*Low*	*No change in facilities due to the proposed mining development.*						*In general public transport is readily available in the area.*

APPENDIX G

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	VVH
			CONSEQUENCE				

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

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

APPENDIX H

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

Council of South African Suid-Afrikaanse Raad vir Ingenieurswese Engineering

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

HJ Lotter

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