

**APPENDIX G5:  
TRAFFIC IMPACT ASSESSMENT REPORT**



# JOBURG PROPERTY COMPANY

## PROPOSED DEVELOPMENT – JABULANI PRECINCT PROJECT (2<sup>ND</sup> DRAFT)



## TRAFFIC IMPACT STUDY FEBRUARY 2010

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**TRAFFIC IMPACT STUDY FOR PROPOSED DEVELOPMENT -**

**JABULANI & JABULANI EXTENSION 1**

**(SECOND DRAFT)**

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## 1. INTRODUCTION

### 1.1 COMMISSION

Mariteng Management Solutions were appointed by Nicaud Companies 85 (Pty) Ltd, on behalf of Joburg Property Company (Pty) Ltd, to investigate the impact of the new housing project, which also include retail, an office, industrial and amphitheatre component, planned on Jabulani and Jabulani Extension 1, on the surrounding road network. The report document the findings of the study, and make recommendations regarding road upgrading that may be required due to the proposed development.

The location of the development in relation to the surrounding area is shown in **Figure 1**.

### 1.2 METHODOLOGY

Given the guideline document of the Department of Transport, entitled "*Manual for Traffic Impact Studies*"<sup>(1)</sup>, the following procedure was followed in the execution of the study:

- The extent of the study was determined by identifying the intersections in the vicinity of the development on which the traffic generated by the development may have a significant impact. The target years and peak scenarios to be analysed were also determined, based on the land-use and extent of the development.
- The existing traffic flow patterns were surveyed, where after the functioning of the intersections in the area was analysed. Recommendations were made on the present need for road upgrading, without the development.
- In the study, future traffic flow conditions were also taken into consideration, namely one target year (2014), i.e. 5 years beyond the base year (2009). Given the existing traffic, volumes and assuming a growth rate, the expected target year (2014) were determined, where after the intersections were again analysed and recommendations were made on the future road upgrading requirements.
- Given the extent of the development and using the applicable trip generation rates, as contained in the guideline document of the Department of Transport, entitled "**South African Trip Generation Rates**"<sup>(2)</sup> the expected number of trips that will be generated was determined.
- The trip distribution of the traffic that will be generated by the proposed development was derived from the existing traffic flow patterns, the location as well as the potential market area of the development in relation to the road network. For ease of reference the proposed development will be referred to as **with or proposed development scenario**.
- Given the trip distribution, the generated traffic was assigned to the road network together with the existing (2009) and estimated target year (2014) traffic volumes. The functioning of the intersections

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were again analysed and recommendations were made on the need for additional road upgrading necessary, due to the proposed development.

- As part of the study, the existing public transport infrastructure was also evaluated and where required upgrading to the existing infrastructure was recommended.
- The study also investigated the impact of future road network planned in the area, on the proposed development.

### **1.3 EXTENT OF STUDY AREA AND OTHER ASPECTS**

The extent of the study area was determined by identifying the intersections near the development on which the traffic generated by the development may have a significant impact. For the purposes of this study, the following intersections were analysed (also refer to **Figure 1**):

- Koma Street & Legogo Street – Stop controlled, with free flow on Koma Street
- Koma Street & Bolani Road - Signalised intersection
- Koma Street & Road A - Stop controlled, with free flow on Koma Street
- Bolani Road/Link Road & Jabulani Shopping Centre Access – 3-Way stop controlled intersection
- Link Road & Legogo Street - Stop controlled, with free flow on Link Road
- Link Road & Hostel Access - Stop controlled, with free flow on Link Road

Given the nature of the development, the following traffic scenarios were analysed:

- 2009 weekday morning, weekday afternoon and Saturday midday peak hour traffic without development
- 2014 weekday morning, weekday afternoon and Saturday midday peak hour traffic without development
- 2009 weekday morning, weekday afternoon and Saturday midday peak hour traffic with development
- 2014 weekday morning, weekday afternoon and Saturday midday peak hour traffic with development

### **1.4 CONTENTS OF REPORT**

Chapter 1 contains the introduction as well as the purpose of the study, the methodology that was followed and the extent of the study area.

Chapter 2 discusses the data collection and description of the existing (2009) situation in terms of the road layout, traffic volumes utilizing the road network, and the road upgrading that will be required.

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Chapter 3 addressed the expected growth of the existing traffic volumes; the expected traffic volumes that will utilize the road network by 2014, as well as the road upgrading that will be required.

Chapter 4 describes the extent of the proposed development and contains data on the expected number of trips that will be generated.

Chapter 5 describes the proposed township roads and the site access points for the main trip generators.

Chapter 6 discusses the trip distribution and assignment of the trips generated by the development.

Chapter 7 discusses the base year (2009) and target year (2014) traffic volumes on the adjacent roads after completion of the proposed development as well as the road upgrading required.

Chapter 8 evaluates the impact of the proposed township on the PWV road network – as per the Gauteng Transportation Infrastructure Act of 2001.

Chapter 9 contains an assessment of the existing public transport infrastructure within the study area, the impact of the proposed development on the infrastructure as well as any upgrading requirement to accommodate the new development.

Chapter 10 contains the conclusions and recommendations.

## **2. DATA COLLECTION AND DESCRIPTION OF EXISTING SITUATION**

### **2.1 PEAK HOUR TURNING MOVEMENT VOLUMES AT INTERSECTIONS**

Detailed traffic counts were carried out at the intersections, during the weekday morning (06:00 – 08:30), weekday afternoon (16:00 – 19:00) and Saturday midday (10:00 – 14:00) peak periods. The peak hour traffic volumes, at the intersections discussed in **Section 1.3**, are shown on **Figure 2** (refer to **Annexure A** for detailed traffic counts).

### **2.2 CAPACITY ANALYSIS OF INTERSECTIONS**

The existing peak hour traffic volumes were used to determine the levels-of-service (LOS) at which the intersection is presently operating. The capacity analysis were done according the method as contained in the **aaSIDRA<sup>(3)</sup>** capacity analysis computer package, which defines the operation of an intersection in terms of levels-of-service. The levels-of-service of a traffic light controlled intersection/roundabouts is defined in terms of average total vehicle delay (not average stop delay), where delay is a measure of driver discomfort, frustration, fuel consumption and lost travel time. However, for an unsignalised intersection the average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation.

The results of the analysis are summarised in **Table 1**, with detailed results attached in **Annexure B**.

**Table 1: Levels of Service at Intersections - Background Traffic (Base Year 2009)**

INTERSECTION	PEAK HOUR	TOTAL AVERAGE VEHICLE DELAY & LEVEL OF SERVICE (LOS)														
		NORTHBOUND			WESTBOUND			SOUTHBOUND			EASTBOUND			INTERSECTION		
		APPROACH			APPROACH			APPROACH			APPROACH			S	D	L
	S	D	L	S	D	L	S	D	L	S	D	L	S	D	L	
Koma & Legogo	AM	0.14	1.3	A	0.03	14.9	B	0.10	0.1	A	-	-	-	0.14	1.0	A
	PM	0.13	2.6	A	0.13	20.4	C	0.20	0.2	A	-	-	-	0.20	1.7	A
	SAT	0.17	3.0	A	0.23	23.2	C	0.21	0.2	A	-	-	-	0.23	2.3	A
Koma & Bolani	AM	0.38	25.6	C	0.37	12.6	B	0.36	26.0	C	0.74	16.3	B	0.74	19.6	B
	PM	0.50	27.8	C	0.74	16.7	B	0.46	27.4	C	0.81	20.1	C	0.81	21.8	C
	SAT	0.97	36.3	D	0.70	18.0	B	0.67	29.6	C	1.00	18.0	B	1.00	24.4	C
Koma & Access Road A (Flats)	AM	0.20	1.6	A	0.12	22.3	C	0.13	0.1	A	-	-	-	0.20	1.4	A
	PM	0.18	2.1	A	0.10	22.4	C	0.16	0.4	A	-	-	-	0.18	1.7	A
	SAT	0.22	2.0	A	0.17	25.2	D	0.16	0.3	A	-	-	-	0.22	1.8	A
Bolani/Link & Jabulani Shopping Centre Access	AM	0.06	19.7	C	0.38	16.3	C	-	-	-	0.92	31.7	D	0.92	26.3	D
	PM	0.78	28.4	D	0.82	28.5	D	-	-	-	0.87	25.9	D	0.87	27.4	D
	SAT	0.76	26.8	D	0.66	21.5	C	-	-	-	0.89	28.5	D	0.89	25.9	D
Link & Legogo	AM	0.29	28.1	D	0.21	6.0	A	0.04	17.3	C	0.35	3.1	A	0.35	5.6	A
	PM	0.74	58.7	F	0.34	5.9	A	0.15	29.3	D	0.29	7.7	A	0.75	10.5	A
	SAT	0.77	53.4	F	0.28	5.6	A	0.09	20.8	C	0.32	5.6	A	0.78	10.1	B
Link & Hostel Access	AM	-	-	-	0.23	7.1	A	0.03	20.1	C	0.39	0.1	A	0.40	2.8	A
	PM	-	-	-	0.45	8.6	A	0.15	26.9	D	0.33	0.3	A	0.45	5.5	A
	SAT	-	-	-	0.36	8.3	A	0.08	22.1	C	0.37	0.1	A	0.37	4.4	A
<b>WITH PROPOSED ROAD UPGRADE</b>																
Koma & Bolani	AM	0.37	25.5	C	0.37	10.8	B	0.36	25.9	C	0.53	14.2	B	0.53	18.4	B
	PM	0.43	27.5	C	0.72	14.5	B	0.48	27.2	C	0.44	16.4	B	0.72	20.1	C
	SAT	0.86	35.6	D	0.86	30.4	C	0.69	33.5	C	0.59	17.8	B	0.86	28.7	B
Link & Legogo	AM	0.06	12.5	B	0.23	5.7	A	0.02	11.3	B	0.47	6.0	A	0.50	6.3	A
	PM	0.07	14.4	B	0.40	5.9	A	0.04	11.5	B	0.40	6.0	A	0.40	6.4	A
	SAT	0.14	14.0	B	0.32	5.8	A	0.04	11.4	B	0.47	6.6	A	0.50	7.0	A

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

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From **Table 1** it can be concluded that:

**Koma Street & Bolani Road**

The eastbound approach on Bolani Road, experience a high degree of Saturation, during the Saturday midday peak hour. During the site visit it was also observed that a large number of vehicles cross the red signal face as a result of long queues developing on certain approaches.

**Link Road & Legogo Street**

The northbound approach on Legogo Street operates at a LOS E, during the weekday afternoon and Saturday midday peak hours respectively.

**2.3 PROPOSED ROAD IMPROVEMENT REQUIREMENT – BACKGROUND TRAFFIC (BASE YEAR 2009)**

In order to determine the required road upgrading, a level-of service E or worse on any approach at an intersection was accepted as the stage when road upgrading will be implemented. Based on the results summarised in **Table 1**, the following road upgrading is required for the base year (also refer to **Annexure C** for schematic layout of road upgrading):

**Koma Street & Bolani Road**

- Provide an additional right-turn lane (storage capacity = 70m) on the eastbound and westbound approaches of Bolani Road.
- Change the existing shared left and through lane on the westbound approach of Bolani Road to a shared through and slip lane.
- Optimise the signal settings.

**Link Road & Legogo Street**

- Convert the existing stop controlled intersection to a traffic circle.

**3. FUTURE BACKGROUND TRAFFIC VOLUMES ON ADJACENT ROAD NETWORK**

**3.1 GROWTH RATE PER ANNUM**

For the purpose of this study, an annual growth rate of 2.0% was considered reasonable for the study area. The growth rate was used to determine the expected future target year (2014) through traffic volumes from the base year (2009) volumes. Therefore the annual growth rate compounded over 5 years, yield an expected increase of 10.04% in the traffic volumes between 2009 and 2014.

### 3.2 FUTURE PEAK HOUR TURNING VOLUMES AT THE INTERSECTIONS

Given the existing weekday morning, weekday afternoon and Saturday midday peak hour traffic volumes, refer to **Figure 2**, and the projected growth rate as discussed in **Section 3.1**, the expected future target year (2014) peak hour traffic volumes were calculated, and is shown on **Figure 3**.

### 3.3 CAPACITY ANALYSIS OF THE INTERSECTIONS

Given the expected future target year (2014) peak hour traffic volumes, refer to **Figure 3**, the expected levels of service at which the intersections will be operating are summarised in **Table 2**, with detailed results appended in **Annexure B**.

**Table 2: Levels of Service at Intersections – Background Traffic (Target Year 2014)**

INTERSECTION	PEAK HOUR	TOTAL AVERAGE VEHICLE DELAY & LEVEL OF SERVICE (LOS)														
		NORTHBOUND			WESTBOUND			SOUTHBOUND			EASTBOUND			INTERSECTION		
		APPROACH			APPROACH			APPROACH			APPROACH			S	D	L
	S	D	L	S	D	L	S	D	L	S	D	L	S	D	L	
Koma & Legogo	AM	0.19	1.4	A	0.04	15.7	C	0.12	0.1	A	-	-	-	0.16	1.1	A
	PM	0.15	3.0	A	0.18	23.0	C	0.22	0.2	A	-	-	-	0.22	2.0	A
	SAT	0.17	3.0	A	0.23	23.2	C	0.21	0.2	A	-	-	-	0.23	2.3	A
Koma & Bolani/Link	AM	0.38	25.9	C	0.40	11.3	B	0.40	26.3	C	0.59	14.8	A	0.59	18.9	B
	PM	0.50	28.1	B	0.79	17.1	B	0.53	27.8	C	0.49	17.7	B	0.79	21.6	B
	SAT	0.97	41.3	D	0.97	52.7	D	0.77	33.0	C	0.69	21.0	C	0.97	36.8	D
Koma & Access Road A (Flats)	AM	0.22	1.8	A	0.14	24.6	C	0.14	0.1	A	-	-	-	0.22	1.6	A
	PM	0.20	2.4	A	0.14	25.2	D	0.18	0.4	A	-	-	-	0.20	1.9	A
	SAT	0.24	2.4	A	0.23	30.4	D	0.18	0.3	A	-	-	-	0.25	2.2	A
Bolani/Link & Jabulani Shopping Centre Access	AM	0.08	19.8	B	0.47	17.0	B	-	-	-	>1.0	>50	F	>1.0	>50	F
	PM	0.86	34.4	D	0.90	37.5	E	-	-	-	0.96	38.1	E	0.96	37.1	E
	SAT	0.84	31.8	D	0.72	23.5	C	-	-	-	0.98	46.6	E	0.98	35.5	E
Link & Legogo	AM	0.07	12.8	B	0.25	5.7	A	0.03	12.1	B	0.52	6.1	A	0.52	6.4	A
	PM	0.09	15.0	B	0.44	5.9	A	0.04	12.1	B	0.44	6.1	A	0.46	6.4	A
	SAT	0.17	14.4	B	0.35	5.8	A	0.05	12.3	B	0.53	6.8	A	0.53	7.1	A
Link & Hostel Access	AM	-	-	-	0.26	9.2	A	0.04	22.4	C	0.43	0.1	A	0.43	3.6	A
	PM	-	-	-	0.50	11.3	B	0.22	33.6	D	0.37	0.3	A	0.50	7.1	A
	SAT	-	-	-	0.40	10.8	B	0.12	26.1	D	0.40	0.1	A	0.40	5.7	A

**Table 2 continues...**

WITH UPGRADING																
Bolani/Link &	AM	0.07	19.8	B	0.50	16.6	B	-	-	-	0.95	36.3	E	0.95	29.3	D
Jabulani Shopping	PM	0.78	28.4	D	0.96	43.6	E	-	-	-	0.83	23.0	C	0.96	31.8	D
Centre Access	SAT	0.84	31.9	D	0.83	26.4	D	-	-	-	0.91	30.1	D	0.91	29.4	D

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

From **Table 2** it can be concluded that:

**Bolani Road/Link Road & Jabulani Shopping Centre Access**

The eastbound and westbound approaches on Bolani Road/Link Road will operate a LOS F, during the respective peak hours.

**3.4 ROAD IMPROVEMENT REQUIREMENTS – BACKGROUND TRAFFIC (TARGET YEAR 2014)**

In order to determine the required road upgrading, a level-of-service E or worse on any approach at an intersection was accepted at the stage when road upgrading will be implemented. Based on the results summarised in **Table 2**, even with the road upgrading proposed hereafter (also refer to **Annexure C** for schematic layout of road upgrading), the intersection will still experience some delays in 2014:

**Koma Street & Bolani Road**

- Provide additional through lanes (storage capacity = 90m) on the eastbound and westbound approaches of Bolani Road/Link Road. In order to accommodate the through lanes, it should be extend downstream of the intersection for a distance of 90m (excluding tapered section).

Note for the Base Year (2009) With Development scenario, a traffic circle is proposed at the above intersection. It is suggested that the above upgrades be replace with a traffic circle.

**4. TRIP GENERATION BY THE PROPOSED DEVELOPMENT**

**4.1 DESCRIPTION OF PROPOSED DEVELOPMENT**

This application address the impact of the development planned for the Jabulani Precinct, situated on Erven 2532, 2586, 2587, 2588, 2591, 2592, 2593, 2594, 2597, 2599 and 2600 – Jabulani Extension 1, as well as Erven 2194, 2331 and 2332 - Jabulani. Based on the information provided by the town planner the initial land use application applied for is shown in **Annexure D**. However, subsequent to this a revised and more practical development package was agreed to, and is summarised as follows (also refer to **Annexure E** for layout):

- 
- Residential – 4 350 dwelling units
  - Retail – 25 125m<sup>2</sup> GLA
  - Offices – 20 000m<sup>2</sup> GLA
  - Amphitheatre – The facility will be divided in three arenas, with a total seating capacity of 670 (main arena = 400 seats; middle arena = 180 seats; and a smaller arena with 90 seats).
  - Industrial - Two industrial sites are also planned within the boundaries of the study area. The 1<sup>st</sup> site is located on Area D (refer to **Annexure E** for location), with a site size of 18 683m<sup>2</sup>, and a development potential of 1.2 FAR. This equates to a total development of 22 420m<sup>2</sup> GLA. The 2<sup>nd</sup> site is located on Area G (refer to **Annexure E** for location), with a site size of 20 383m<sup>2</sup>, and a development potential of 1.2 FAR. This equates to a total development of 24 460m<sup>2</sup> GLA.

**Note** although not part of this application, a 300 bed district hospital and clinic is currently under construction, directly east of the proposed development/study area. The access to the site will be from Bolani Road/Link Road, directly opposite the Jabulani Shopping Centre access. Thus for the purpose of this application the impact of this land use was also included as part of this study.

#### 4.2 MODAL SPLIT

As indicated the proposed development is located in the Jabulani area, with a very low car ownership, and in an area where residents are extensively dependent on the public transport system (bus, taxi and train) for daily commuting. The demand for public transport usage is confirmed in the **Gauteng Household Survey**<sup>(4)</sup>, April 2004. The data from the survey was also used to determine the modal split for the study area, and in turn the expected trip generation for the respective land uses. The proposed development is located in Region D (previously Region 6) and based on the findings of the household survey 65.4% of the person trips generated make use of public transport.

The modal split for the area can be summarised as follows:

- Rail – 11.4%
  - Taxis – 50.5%
  - Buses – 3.9%
  - Private vehicles – 23.9%
  - Walk – 10.4%
- } 65.4%

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### 4.3 TRIP GENERATION BY PROPOSED DEVELOPMENT

The trip generation rates for the land uses are based on the data contained in the guideline document of the Department of Transport entitled “*South African Trip Generation Rates<sup>(2)</sup>*” as well as the findings of the *Gauteng Household Survey<sup>(4)</sup>*, and is summarised hereafter.

#### **Residential**

- Weekday morning peak hour: 2.42 person trips/household, with a directional split of 35:65 (in:out).
- Weekday afternoon peak hour: 2.42 person trips/household (assumed the reverse of the AM Peak), with a directional split of 65:35 (in:out).

#### **Business - Retail**

- Weekday afternoon peak hour: 5.64 vehicle trips/100m<sup>2</sup> GLA, with a directional split of 50:50 (in:out).
- Saturday midday peak hour: 9.76 vehicle trips/100m<sup>2</sup>, GLA, with a directional split of 50:50 (in:out).

As indicated the proposed development will be located within an area highly depended on public transport. The above vehicle trips were converted to person trips which were used as the basis to calculate the private trips, public transport trips and walking trips.

#### **Business - Offices**

- Weekday morning peak hour: 4.0 person trips/100m<sup>2</sup> GLA, with a directional split of 75:25 (in:out).
- Weekday afternoon peak hour: 4.0 person trips/100m<sup>2</sup> GLA, with a directional split of 25:75 (in:out).

The person trips were used as the basis to calculate the private trips, public transport trips and walking trips.

#### **Business - Industrial**

- Weekday morning peak hour: 0.6 vehicle trips/100m<sup>2</sup> GLA, with a directional split of 70:30 (in:out).
- Weekday afternoon peak hour: 0.6 vehicle trips/100m<sup>2</sup> GLA, with a directional split of 30:70 (in:out).

The above vehicle trips were converted to person trips, which were used as the basis to calculate the private trips, public transport trips and walking trips.

#### **Amphitheatre**

The main trip generation peak for this land use falls outside the typical weekday morning, weekday afternoon and Saturday morning peak hours of the adjacent road network. Activities at the amphitheatre typically take

place during the evenings (after the peak) or on weekends when the traffic demand on the road network is relatively low compare to that of the weekday morning and afternoon.

The “*South African Trip Generation Rates<sup>(2)</sup>*” makes no provision for the trip generation characteristics for this land use. In the absence thereof the following assumptions were drawn:

- All three arenas can be occupied simultaneously with a total capacity of 670 seats.
- Assuming a vehicle occupancy rate of 1.75 persons/vehicle, it equates to a potential trip generation of 383 vehicles. It was also assumed that the worst case scenario will be after the event, when at least 70% of all spectator/delegates departures from the venue. This equates to a maximum traffic flow of 268 vehicles with a directional split of 100:0 (out:in).
- Given the extent of this land use and the trip generation characteristics, compare to that of the residential, retail, office and industrial uses, no further assessment was considered necessary.

The total trip generation for the development is summarised in **Table 3**, with detailed calculations appended in **Annexure F**.

**Table 3: Total Private Vehicle Trip Generation**

DESCRIPTION	MORNING PEAK HOUR			AFTERNOON PEAK HOUR			SATURDAY PEAK HOUR		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Residential	245	454	699	454	245	699	-	-	-
Retail	-	-	-	87	88	175	151	152	303
Office	40	13	53	13	40	53	-	-	-
Industrial (Area D)	6	3	9	3	6	9	-	-	-
Industrial (Area G)	7	3	10	3	7	10	-	-	-
TOTAL	298	473	771	560	386	946	151	152	303

From **Table 3**, it can be concluded that the impact of the main trip generators on the external road network is 771 (AM Peak), 946 (PM Peak) and 303 (SAT Peak) peak hour trips. Note this does not include the expected additional trips that will be generated by the 300 bed hospital (latent rights).

## **5. TOWNSHIP ROAD NETWORK AND ACCESS POINTS**

The proposed township layout was superimposed on an aerial photo of the study area, and is attached in **Annexure G** (Mariteng Plan No 160-10-01). The plan indicates the respective developments, access arrangements, as well as possible roads to serve the respective land uses.

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The proposed layout prepared by AFRITECTS Architects (also refer to Mariteng Plan 160-10-01) was evaluated and the following comments are provided:

- Provide two additional accesses points on Legogo Street, namely Access Point 1 and 2.
- Close two access points on Link Road, with only Access Point 3 and 4 to remain open. This includes the re-alignment of Access Point 4.
- Investigate the possible extension of Road A, to tie-in with the extension of Legogo Street.
- No additional intersection to be provided from Road B, at Koma Street.
- Road B to tie-in with the existing road serving the Metro Rail Station.
- Re-align Access Road 5, to tie in with Legogo Street, directly opposite the existing access serving Jabulani Shopping Centre.
- Re-design the parking layout facing onto Legogo Street (between Access Point 5 and 6), to provide access to these individual parking bays from an internal service road.

Further to the above, the proposed application comprises of several development packages, which most likely will be developed in phases. It is recommended that the architect along with the traffic engineer prepare an overall master plan for the respective developments, addressing the individual access arrangements, parking layouts, etc. The layout plan should also include paved sidewalks. The final plan can then be submitted as an addendum to the JRA, for final approval.

## **6. TRIP DISTRIBUTION AND ASSIGNMENT – PROPOSED DEVELOPMENT**

### **6.1 TRIP DISTRIBUTION**

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

- The location of the development in relation to main central business districts, and
- The existing traffic flows on the adjacent road network during the respective peak hours.

The expected trip distributions of the generated traffic are shown in **Figure 4**.

### **6.2 TRIP ASSIGNMENT**

Given the trip distributions, the expected traffic volumes that will be generated by the development, were assigned to the road network (refer to **Figure 4**). The assigned traffic volumes were added to the base year (2009) and target year (2014) traffic volumes, to yield the total estimated traffic volumes as shown on

Figures 5 and 6 for the base year and target year.

## 7. ANALYSIS OF INTERSECTIONS – WITH DEVELOPMENT

### 7.1 CAPACITY ANALYSIS OF INTERSECTIONS

The base year (2009) and expected target year (2014) peak hour traffic volumes, including the trips generated by the proposed development, as shown on Figures 5 and 6 were used to determine the levels-of-service at which the intersection will operate.

The **aaSIDRA**<sup>(3)</sup> capacity analysis model was again used to determine the LOS. For the purpose of this study, it was assumed that the road upgrading recommended for the **Background Traffic** scenarios have been implemented for the base year (2009) and the target year (2014) respectively. Tables 4 and 5 contain a summary of the **aaSIDRA** analysis results for the base year (2009) and target year (2014), with detailed results appended in Annexure B.

**Table 4: Levels of Service at Intersections – With Development (Base Year 2009)**

INTERSECTION	PEAK HOUR	TOTAL AVERAGE VEHICLE DELAY & LEVEL OF SERVICE (LOS)														
		NORTHBOUND			WESTBOUND			SOUTHBOUND			EASTBOUND			INTERSECTION		
		APPROACH			APPROACH			APPROACH			APPROACH					
		S	D	L	S	D	L	S	D	L	S	D	L	S	D	L
Koma & Legogo	AM	0.17	1.6	A	0.43	23.7	C	0.12	1.1	A	-	-	-	0.43	3.6	A
	PM	0.14	3.2	A	0.53	31.2	D	0.20	1.3	A	-	-	-	0.54	4.2	A
	SAT	0.17	2.8	A	0.28	24.5	C	0.20	0.4	A	-	-	-	0.27	2.7	A
Koma & Bolani/Link	AM	0.54	27.4	C	0.53	12.3	B	0.41	26.6	C	0.61	15.6	B	0.61	19.6	B
	PM	0.92	33.4	C	0.87	24.4	C	0.49	27.8	C	0.60	19.6	B	0.92	25.5	C
	SAT	0.86	31.5	C	0.74	17.5	C	0.57	29.2	C	0.68	18.0	B	0.86	23.1	C
Koma & Access Road A (Flats)	AM	0.23	0.9	A	0.75	30.1	D	0.16	0.8	A	-	-	-	0.75	4.7	A
	PM	0.20	1.5	A	0.54	27.8	D	0.21	1.3	A	-	-	-	0.54	3.9	A
	SAT	0.22	0.4	A	0.16	21.2	C	0.16	0.3	A	-	-	-	0.22	1.1	A
Bolani/Link & Jabulani Shopping Centre Access	AM	0.02	11.1	B	0.38	5.2	A	0.01	14.5	B	0.50	4.7	A	0.50	5.1	A
	PM	0.41	14.4	B	0.60	6.3	A	0.10	19.2	B	0.69	6.5	A	0.70	7.9	A
	SAT	0.30	11.1	B	0.39	5.6	A	0.01	13.1	B	0.49	6.1	A	0.50	7.0	A
Link & Legogo	AM	0.42	13.3	B	0.39	6.7	A	0.25	17.9	B	0.76	11.4	B	0.76	10.6	B
	PM	0.56	18.0	B	0.64	8.8	A	0.29	16.8	B	0.81	13.5	B	0.81	12.3	B
	SAT	0.31	12.6	B	0.39	6.4	A	0.10	11.8	B	0.56	7.9	A	0.60	8.1	A

**Table 4 continues...**

Link & Hostel Access	AM	-	-	-	0.30	14.1	B	0.06	29.1	D	0.50	0.1	A	0.50	5.5	A
	PM	-	-	-	0.60	18.6	C	0.43	>50	F	0.42	0.2	A	0.61	11.7	B
	SAT	-	-	-	0.38	9.2	A	0.09	23.5	C	0.38	0.1	A	0.38	4.9	A

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

From **Table 4**, it can be concluded that all the intersections, with the exception of the Link Road/Hostel Access intersection will be operating at acceptable LOS, during the weekday morning, afternoon and Saturday midday peak hours.

**Table 5: Levels of Service at Intersections – With Development (Target Year 2014)**

INTERSECTION	PEAK HOUR	TOTAL AVERAGE VEHICLE DELAY & LEVEL OF SERVICE (LOS)														
		NORTHBOUND			WESTBOUND			SOUTHBOUND			EASTBOUND			INTERSECTION		
		APPROACH			APPROACH			APPROACH			APPROACH					
		S	D	L	S	D	L	S	D	L	S	D	L	S	D	L
Koma & Legogo	AM	0.18	1.8	A	0.56	28.2	D	0.13	1.1	A	-	-	-	0.56	4.2	A
	PM	0.15	3.8	A	0.62	33.9	D	0.22	1.3	A	-	-	-	0.62	4.6	A
	SAT	0.18	3.0	A	0.31	26.4	D	0.21	0.4	A	-	-	-	0.31	2.8	A
Koma & Bolani/Link	AM	0.59	27.8	C	0.56	12.8	B	0.44	26.8	C	0.65	16.1	B	0.65	20.0	B
	PM	1.00	32.7	C	0.95	40.8	D	0.54	28.3	C	0.75	21.5	C	1.00	31.7	C
	SAT	1.00	33.8	C	0.81	21.5	C	0.67	30.1	C	0.75	20.0	B	1.00	25.5	C
Koma & Access Road A (Flats)	AM	0.24	0.9	A	0.82	34.0	D	0.16	0.8	A	-	-	-	0.82	5.3	A
	PM	0.22	1.5	A	0.69	34.4	D	0.22	1.3	A	-	-	-	0.69	4.4	A
	SAT	0.24	0.4	A	0.23	24.7	C	0.18	0.3	A	-	-	-	0.24	1.3	A
Bolani/Link & Jabulani Shopping Centre Access	AM	0.02	11.7	B	0.42	5.2	A	0.02	15.6	B	0.55	4.7	A	0.55	5.1	A
	PM	0.52	17.5	B	0.67	6.6	A	0.13	22.0	C	0.77	6.8	A	0.80	8.7	A
	SAT	0.36	11.7	B	0.43	5.7	A	0.02	14.0	B	0.55	6.3	A	0.55	7.3	A
Link & Legogo	AM	0.49	15.0	B	0.43	6.8	A	0.33	20.2	C	0.86	16.4	B	0.87	13.3	B
	PM	0.69	24.3	C	0.73	10.3	B	0.38	20.1	C	0.92	21.8	C	0.92	17.1	B
	SAT	0.36	13.2	B	0.43	6.5	A	0.12	13.0	B	0.63	8.2	A	0.63	8.5	A

**Table 5 continues...**

Link & Hostel Access	AM	-	-	-	0.33	19.8	C	0.08	36.0	E	0.55	0.0	A	0.55	7.6	A
	PM	-	-	-	0.67	27.8	D	0.81	>50	F	0.46	0.2	A	0.83	18.3	C
	SAT	-	-	-	0.42	12.1	B	0.14	28.3	D	0.42	0.1	A	0.42	6.4	A
Legogo & Access No. 1	AM	0.06	1.5	A	0.09	11.9	B	0.05	1.9	A	-	-	-	0.09	4.3	A
	PM	0.08	2.6	A	0.06	12.5	B	0.09	2.1	A	-	-	-	0.09	3.5	A
	SAT	0.04	0.5	A	0.01	11.5	B	0.04	0.7	A	-	-	-	0.04	1.2	A
Legogo & Access No. 2	AM	0.06	2.1	A	0.08	11.7	B	0.05	1.4	A	-	-	-	0.08	4.3	A
	PM	0.09	2.9	A	0.05	12.2	B	0.07	1.8	A	-	-	-	0.09	3.5	A
	SAT	0.05	0.8	A	0.01	11.4	B	0.04	0.7	A	-	-	-	0.05	1.5	A
Link & Access No. 3	AM	0.05	26.4	D	0.83	11.5	B	0.39	32.3	D	0.51	0.3	A	0.83	7.1	A
	PM	0.06	37.9	E	0.58	0.8	A	0.29	34.7	D	0.47	0.6	A	0.60	1.8	A
	SAT	0.06	24.3	C	0.40	0.2	A	0.06	24.7	C	0.43	0.1	A	0.43	0.7	A
Link & Access No. 4	AM	0.18	32.5	D	0.40	4.1	A	0.13	28.2	D	0.53	0.1	A	0.53	3.0	A
	PM	0.20	48.3	E	0.62	0.5	A	0.12	32.8	D	0.46	0.2	A	0.62	1.2	A
	SAT	0.05	23.9	C	0.40	0.2	A	0.05	24.3	C	0.43	0.1	A	0.43	0.6	A
Legogo & Access No. 5	AM	0.08	1.8	A	0.31	14.8	B	0.06	3.9	A	0.02	12.3	B	0.31	7.3	A
	PM	0.06	2.6	A	0.59	27.0	D	0.16	5.8	A	0.10	11.6	B	0.59	10.0	A
	SAT	0.03	3.9	A	0.19	14.7	B	0.12	7.1	A	0.10	11.0	B	0.19	8.9	A

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

From **Table 5**, it can be concluded that:

**Link Road & Hostel Access**

The southbound approach on the Hostel Access will operate a LOS E, during the weekday morning and weekday afternoon peak hours respective.

**Link Road & Access No 3**

The northbound approach on the side road will operate a LOS E, during the weekday afternoon peak hour.

**Link Road & Access No 4**

The northbound approach on the side road will operate a LOS E, during the weekday afternoon peak hour.

**7.2 PROPOSED ROAD IMPROVEMENT REQUIREMENTS (WITH DEVELOPMENT)**

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

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**Tables 4 and 5**, is based on the road upgrades shown schematically in **Annexure C**.

It should be noted that once the BRT System is implemented along Link Road (refer to **Section 9.2** for further discussion of the planned system), the intersections between Legogo Street and the Hostel Access will be limited to left-in and left-out movements. This will improve the LOS at these intersections and therefore no road upgrades are proposed at these intersections.

## **8. GAUTENG TRANSPORTATION INFRASTRUCTURE ACT EVALUATION**

The application was also evaluated in terms of the Gauteng Transport Infrastructure Act of 2001. Based on the provincial road network planning (PWV Road Master Plan) (refer to **Annexure H**), the development will not be affected by any future provincial roads. In light of this no further evaluation was required in this regard.

## **9. PUBLIC TRANSPORT INFRASTRUCTURE EVALUATION**

### **9.1 EXISTING PUBLIC TRANSPORT INFRASTRUCTURE**

The existing road network serving the study area carries a high number of taxis and to a lesser extent buses. This is confirmed in the classified traffic counts carried out at the Link Road/Legogo Street intersection. The traffic count results indicate that taxis make up approximately 35% and 27% of the weekday morning and afternoon traffic. Further to this the following public transport facilities are provided (refer to **Annexure I**):

- A taxi rank (capacity for approximately 72 taxis) is provided within the parking area of the Jabulani Shopping Centre.
- Informal taxi stops are also provided along Bolani Road/Link Road, between Legogo Street and Koma Street.
- A Metro Rail Station is also located within walking distance of the proposed development.

From the above it is clear that the area is well served from a public transport viewpoint.

### **9.2 PROPOSED PUBLIC TRANSPORT INFRASTRUCTURE**

As indicated in **Section 9.1** the area is well served from a public transport perspective. In addition to this a Bus Rapid Transport (BRT) System is also planned along Bolani Road/Link Road. Based on the current planning the BRT will terminate directly east of the study area. Discussions were also held with Mr. T Drew (Vela VKE Engineer) and the status of the system can be summarised as follows (also refer to Mariteng Plan 160-10-01):

- The operational plan makes provision for 40 buses during the morning and afternoon peak demand.
- A preliminary design has been completed for the BRT System. The engineer also indicated that no

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clear instruction has been given on the design concept to accommodate the termination of the system.

- Two BRT Stations are planned for the study area marked Station A and Station B. With regards to Station A the engineer indicated that insufficient road reserve is available to accommodate the station.
- The provision of a BRT Depot/terminus is also considered – see area marked Area C. No details of the facility are available.
- The construction of the BRT route will only commence after 2010.
- The construction of the BRT facility will limit the movements at the intersections to left-in and left-out. This will result in the reassignment of traffic, and in turn will improve the capacity of those intersections to be converted to a left-in and left-out.
- The BRT System will reduce the existing taxi traffic volumes, but not necessarily prohibit taxi movements, on Bolani Road/Link Road. This will result in an increase in the capacity of the road network.

Based on the above the proposed public transport infrastructure planned for the area will be sufficient to accommodate the existing as well as the future demands.

As indicated some aspect for the termination of the BRT System in the area is still outstanding. As part of this application the following suggestions are proposed:

- Provide a traffic circle at the Link Road/Legogo Street intersection. This will accommodate the turn-around movement of the buses.
- Replace the proposed BRT Station (A and B) with a single BRT Station at point C.
- Find a more suitable location for the proposed bus drop off/loading zone proposed on Legogo Street, directly south of Link Road.

The above proposals will have to be submitted to the relevant role players for evaluation and approval.

## **10. MOTIVATION FOR RELAXATION OF PARKING REQUIREMENTS**

The proposed development is earmarked for a mixed land use, which includes a “Res 3” multi storey dwelling component. The average size of these units is 43m<sup>2</sup>. The development targets the lower income or entry level housing population of the housing market. A smaller portion of the tenants/owners will have their own vehicle when compared to the middle income group. In terms of the **Gauteng Household Travel Survey**<sup>(4)</sup> it is confirmed that the vehicle ownership for the study area is only 0.3 cars per household. The demand for parking will thus be substantially lower compare to that of a similar middle to upper market residential development.

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In addition to the above, surveys were also carried out at two similar housing developments, located within the CBD of Johannesburg. These two multi storey residential developments are Brickfield (349 units with 137 parking bays – 0.39 bays/unit) and Legae (192 units with 68 parking bays – 0.35 bays/unit). The developments are located in Newton, with access from Gwigwi Mrwebi Street, between Ntemi Piliso Street and Miriam Makeba Street.

Based on information obtain from the discussions held with the caretaker it is clear that the demand for parking is slightly higher compare to that provided. The caretaker indicated that approximately 17 residents are on the waiting list for parking at Brickfield and only 3 at Legae. Based on this the actual demand for parking at Brickfield is 154 bays or 0.44 bays/unit, and 71 bays or 0.37 bays/unit.

In light of the above, and as part of this application, the local authority is requested to support a conservative parking ratio of 0.5 bays/unit for the “Res 3” multi storey dwelling units.

## 11. CONCLUSIONS AND RECOMMENDATIONS

### 11.1 CONCLUSIONS

The following the findings of this study, it can be concluded:

- i The intersections listed in **Section 1.3**, of this report, forms part of the study area identified for this application.
- ii Proposed road network upgrading **Base Year 2009 – Background Traffic:** The road upgrading requirements to accommodate the existing traffic demand is shown schematically in **Annexure C**.
- iii For the purpose of this study an annual growth rate of 2.0% was considered reasonable for the study area.
- iv Proposed road network upgrading **Target Year 2014 – Background Traffic:** The road upgrading requirements to accommodate the expected traffic demand is schematically shown in **Annexure C**.
- v This application address the impact of the development planned for the Jabulani Precinct, situated on Erven 2532, 2586, 2587, 2588, 2591, 2592, 2593, 2594, 2597, 2599 and 2600 – Jabulani Extension 1, as well as Erven 2194, 2331 and 2332 - Jabulani. Based on the information provided the extent of the development can be summarised as follows (refer to **Annexure E** for township layout/land use description, as well as Mariteng Plan 160-10-01):
  - Residential – 4 350 dwelling units
  - Retail – 25 125m<sup>2</sup> GLA
  - Offices – 20 000m<sup>2</sup> GLA

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- Industrial - Two industrial sites are also planned within the boundaries of the study area. The 1<sup>st</sup> site is located on Area D (refer to **Annexure E** for location), with a site size of 18 683m<sup>2</sup>, and a development potential of 1.2 FAR. This equates to a total development of 22 420m<sup>2</sup> GLA. The 2<sup>nd</sup> site is located on Area G (refer to **Annexure E** for location)), with a site size of 20 383m<sup>2</sup>, and a development potential of 1.2 FAR. This equates to a total development of 24 460m<sup>2</sup> GLA.
  - Amphitheatre – The facility will be divided in three areas, with a total seating capacity of 670 (main arena = 400 seats; middle arena = 180 seats; and a smaller arena with 90 seats).

The total private vehicle trip generation for the development is 771 (AM Peak), 946 (PM Peak) and 303 (SAT Peak) peak hour trips. Note this does not include the expected trip generation for the 300 bed hospital (latent rights).

- vi The proposed township layout was superimposed on an aerial photo of the study area, and is attached in **Annexure G** (Mariteng Plan No 160-10-01). The plan indicates the respective developments, access arrangements, as well as possible roads to serve the respective land uses.
- vii **Impact of Proposed Development:** The road network upgrading requirements to accommodate the impact of the proposed development is schematically shown in **Annexure C**.
- viii **Infrastructure Act Evaluation:** The application was also evaluated in terms of the Gauteng Transport Infrastructure Act of 2001. Based on the provincial road network planning (PWV Road Master Plan) (refer to **Annexure I**), the development will not be affected by any future provincial roads. In light of this no further evaluation was required in this regard.
- ix **Public Transport Infrastructure:** The development is located in an area served well by taxis, and to a lesser extent by buses. A BRT route is also planned along Link Road, which will further improve the public transport network for the area.

## 11.2 RECOMMENDATIONS

In light of the findings of this study, it is recommended that:

- i From a traffic flow viewpoint the proposed development for the Jabulani Precinct, situated on Erven 2532, 2586, 2587, 2588, 2591, 2592, 2593, 2594, 2597, 2599 and 2600 – Jabulani Extension 1, as well as Erven 2194, 2331 and 2332 - Jabulani, is supported.
- ii A preliminary plan was prepared by AFRITECTS Architects (as shown on Mariteng Plan 160-10-01), for the various development packages. As part of the approval of the study the following aspects should be addressed, during the detail planning of the project:
  - Provide two additional access points on Legogo Street, namely Access Point 1 and 2.

- 
- Close two access points on Link Road, with only Access Point 3 and 4 to remain open. This includes the re-alignment of Access Point 4.
  - Investigate the possible extension of Road A, to tie-in with the extension of Legogo Street.
  - No additional intersection to be provided from Road B, at Koma Street.
  - Road B to tie-in with the existing road serving the Metro Rail Station.
  - Re-align Access Road 5, to tie in with Legogo Street, directly opposite the existing access serving Jabulani Shopping Centre.
  - Re-design the parking layout facing onto Legogo Street (between Access Point 5 and 6), to provide access to these individual parking bays from an internal service road.

Further to the above, the proposed application comprises of several development packages, which most likely will be developed in phases. It is recommended that the architect along with the traffic engineer prepare an overall master plan for the respective developments, addressing the individual access arrangements, parking layouts, etc. The layout plan should also include paved sidewalks. The final plan can then be submitted as an addendum to the JRA, for final approval.

- iii The road network improvements as shown schematically in **Annexure C** should be implemented as part of the approval of this application. The cost to undertake the work should be paid **in lieu** of the normal bulk service contributions levied by the authority towards roads and stormwater.
- iv The local authority supports a conservative parking ratio of 0.5 bays/unit for the “Res 3” multi storey type dwelling units.
- v The following amendments be investigated as part of the approval of the application:
  - Provide a traffic circle at the Link Road/Legogo Street intersection. This will accommodate the turn-around movement of the buses.
  - Replace the proposed BRT Station (A and B) with a single BRT Station at point C.
  - Find a more suitable location for the proposed bus drop off/loading zone proposed on Legogo Street, directly south of Link Road.

The above proposals will have to be submitted to the relevant role players for evaluation and approval.

## 12. REFERENCES

1. Wepener DA, Engelbrecht RJ and Kruger P; **Manual for Traffic Impact Studies**; PR93/635; Department of Transport; Pretoria (1995).

2. Stander HJ, Kruger P, Coetzee JL, and Lambrecht TJ; **South African Trip Generation Rates**; 2<sup>nd</sup> Edition; Report Number PR 92/228; Department of Transport; Directorate: Transport Economic Analysis; Pretoria (March 1994).
3. Australian Research Board Ltd; **aaSidra Version 3.2**; Victoria; Australia; January 2007.
4. Gauteng Department of Transport; **Gauteng Household Travel Survey**; April 2004.

## **FIGURES**

FIGURE 1: LOCALITY PLAN

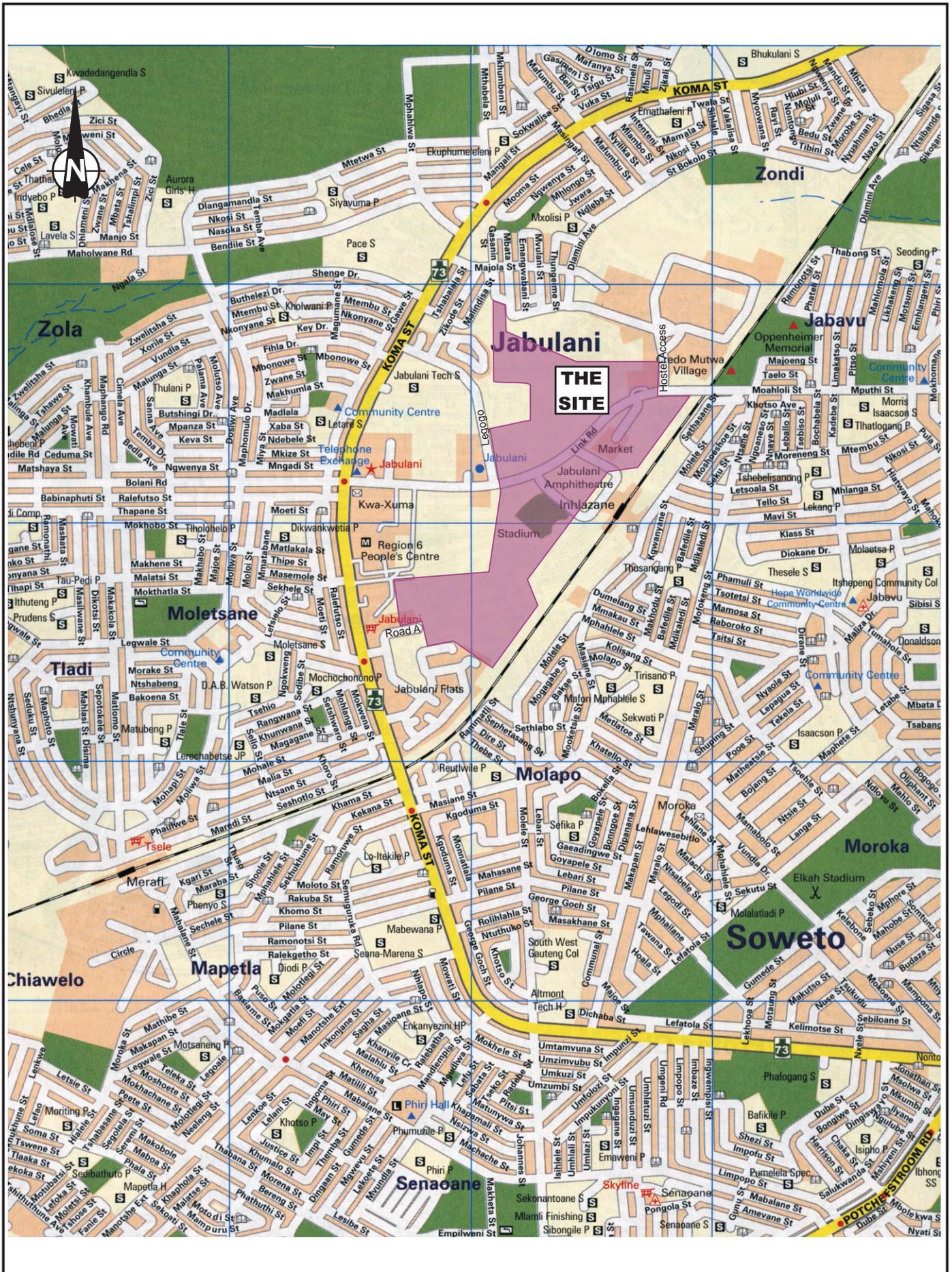
FIGURE 2: EXISTING PEAK HOUR TRAFFIC VOLUMES (BACKGROUND TRAFFIC)

FIGURE 3: ESTIMATED (2014) PEAK HOUR TRAFFIC VOLUMES (BACKGROUND TRAFFIC)

FIGURE 4: TOTAL TRIP ASSIGNMENT (VEHICLES/HR)

FIGURE 5: ESTIMATED (2009) PEAK HOUR TRAFFIC VOLUMES (WITH DEVELOPMENT)

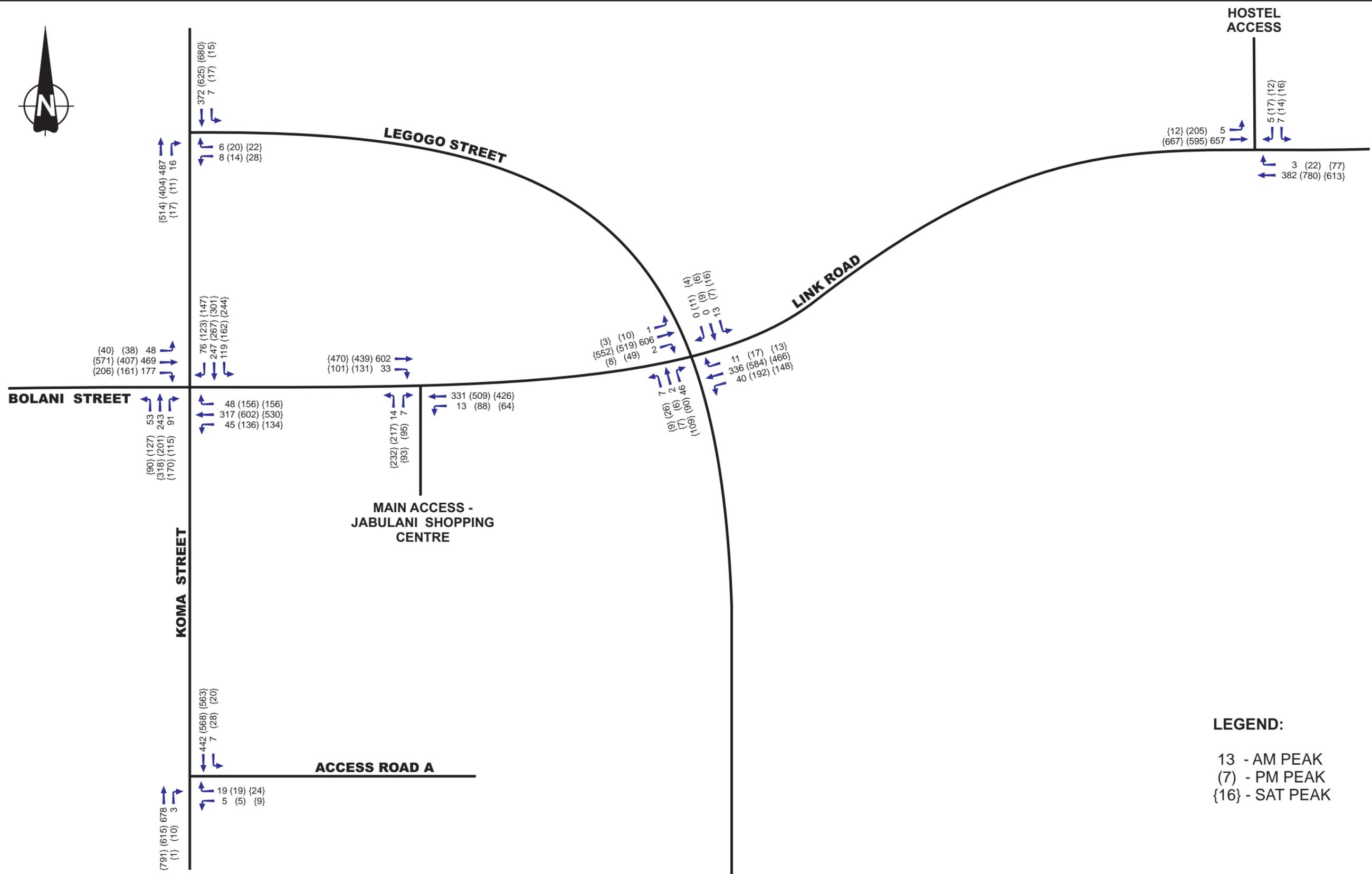
FIGURE 6: ESTIMATED (2014) PEAK HOUR TRAFFIC VOLUMES (WITH DEVELOPMENT)




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**JABULANI PROJECT**  
**LOCALITY PLAN**

**FIGURE**  
**1**



**LEGEND:**

- 13 - AM PEAK
- (7) - PM PEAK
- {16} - SAT PEAK



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1453

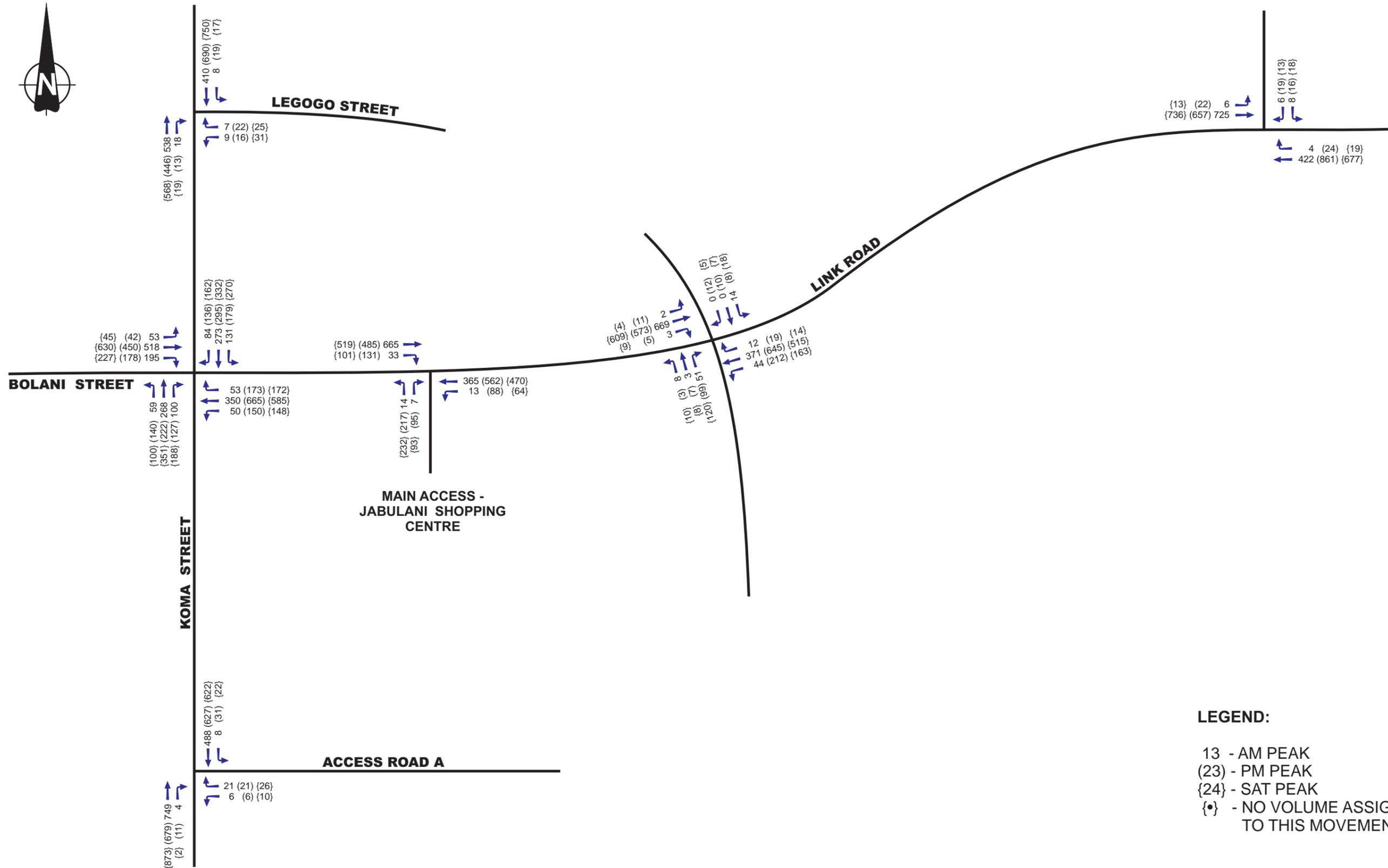
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**JABULANI PROJECT**

**EXISTING PEAK HOUR TRAFFIC  
VOLUMES (BACKGROUND TRAFFIC)**

**FIGURE**

**2**



**LEGEND:**

- 13 - AM PEAK
- (23) - PM PEAK
- {24} - SAT PEAK
- {•} - NO VOLUME ASSIGNED TO THIS MOVEMENT



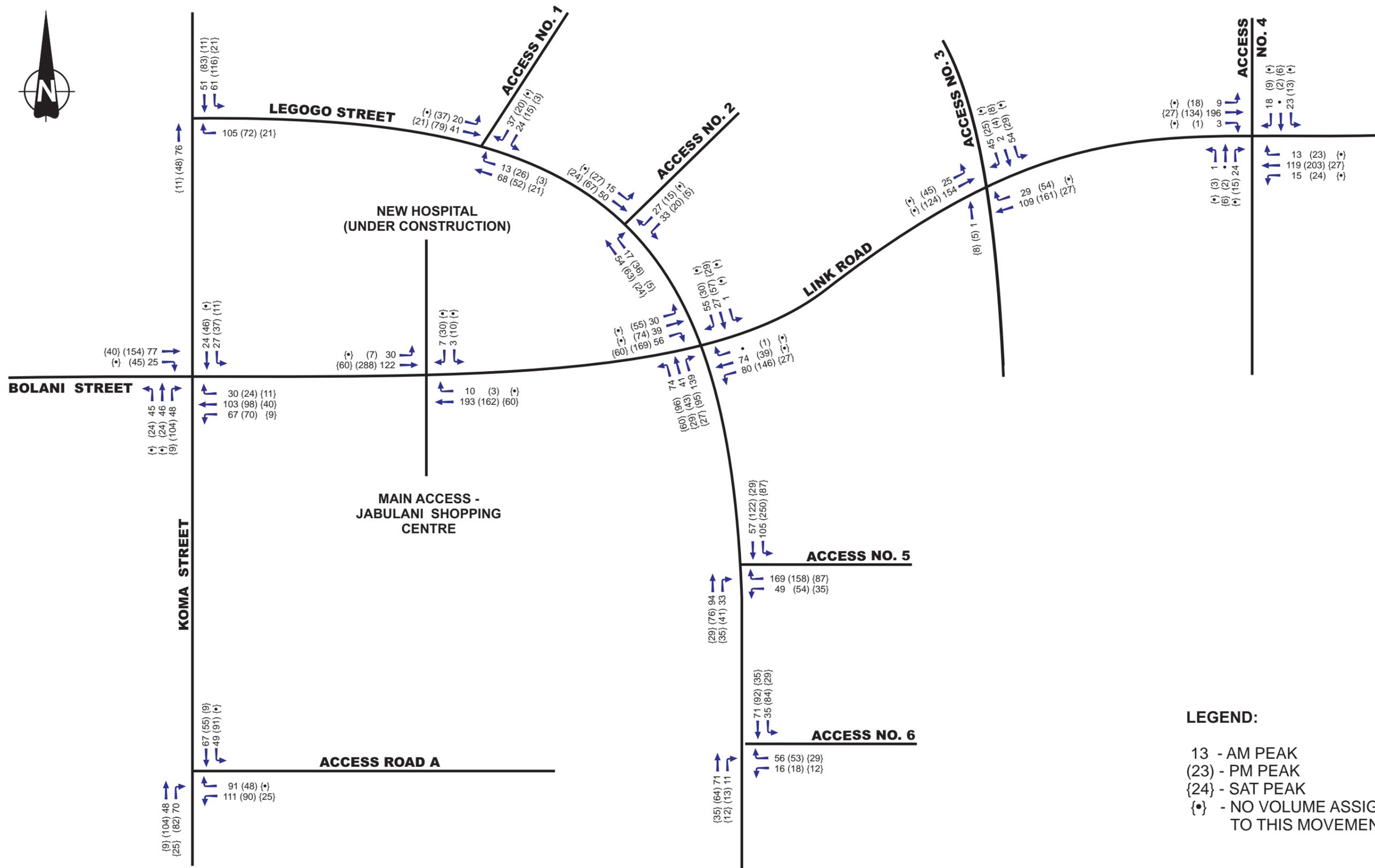
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1453  
Tel: 011 902 4075  
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**JABULANI PROJECT**

**ESTIMATED (2014) PEAK HOUR TRAFFIC VOLUMES  
(BACKGROUND TRAFFIC)**

**FIGURE**

**3**



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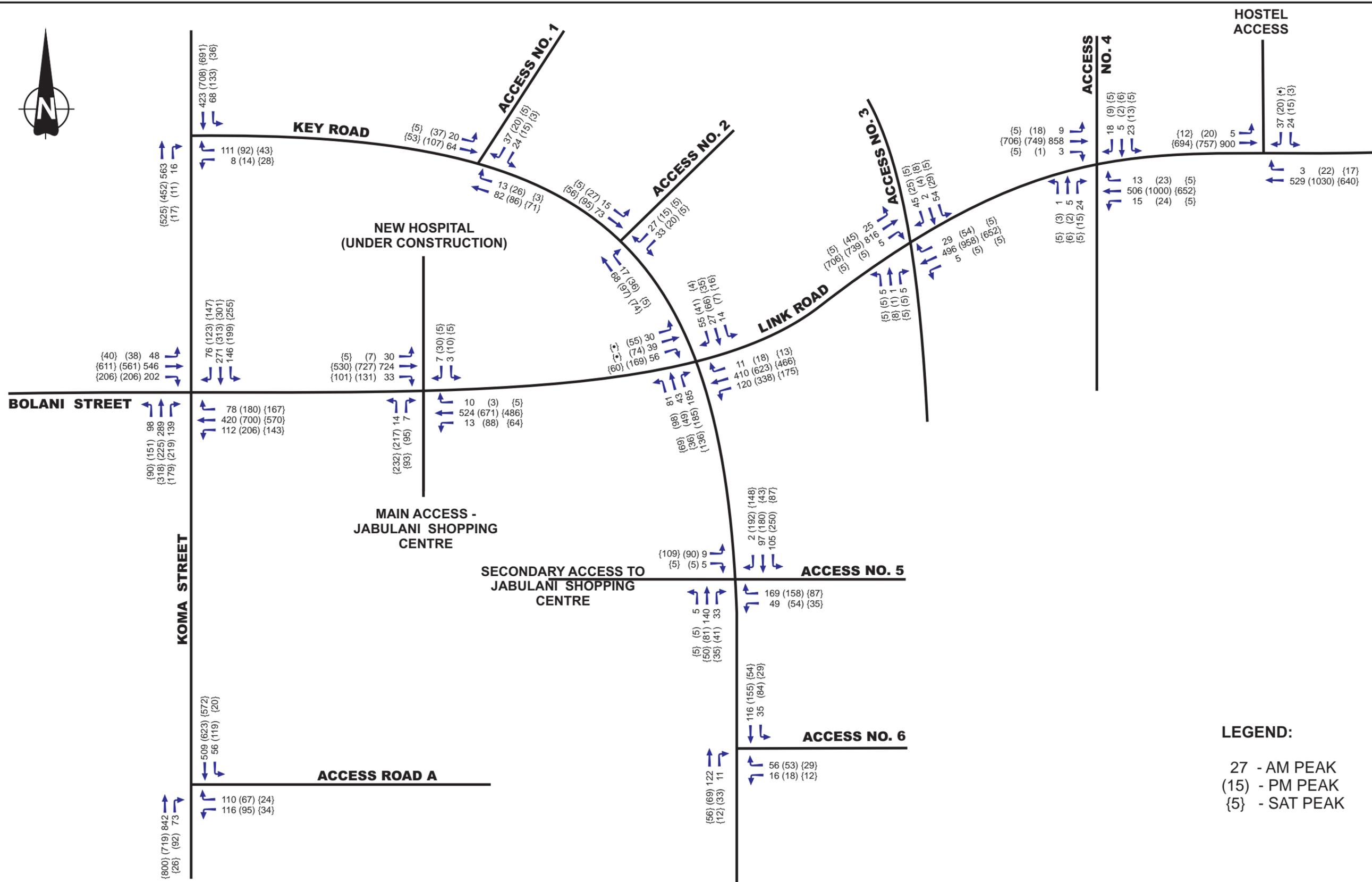
Tel: 011 902 4075  
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**JABULANI PROJECT**

**TOTAL TRIP ASSIGNMENT (VEHICLES/HR)**

**FIGURE**

**4**



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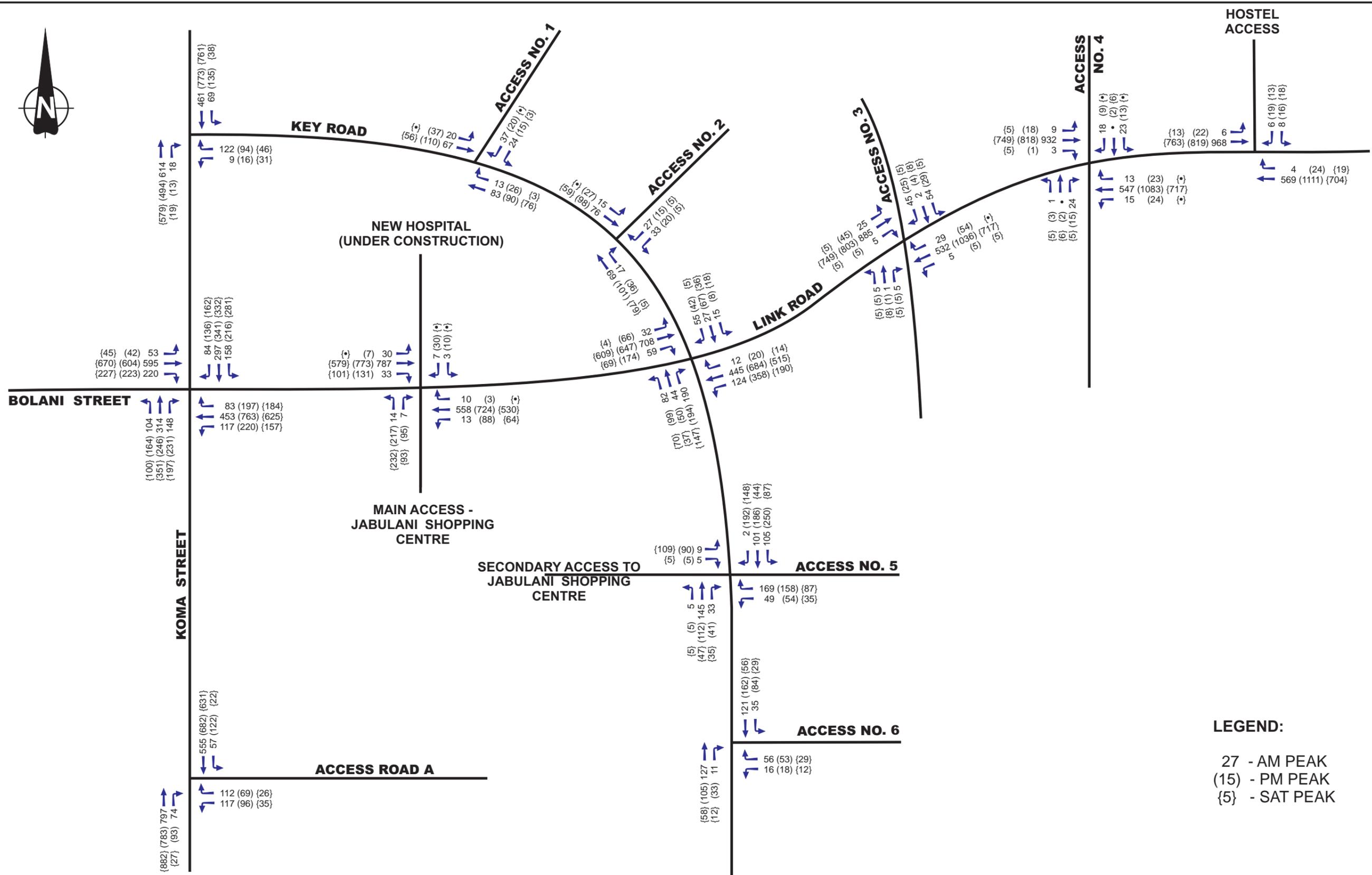
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**JABULANI PROJECT**

**ESTIMATED (2009) PEAK HOUR TRAFFIC VOLUMES  
(WITH DEVELOPMENT)**

**FIGURE**

**5**



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**JABULANI PROJECT**

**ESTIMATED (2014) PEAK HOUR TRAFFIC VOLUMES  
(WITH DEVELOPMENT)**

**FIGURE**

**6**

**ANNEXURE A:**

**DETAILED TRAFFIC COUNTS**  
**(DATA AVAILABLE ON REQUEST)**

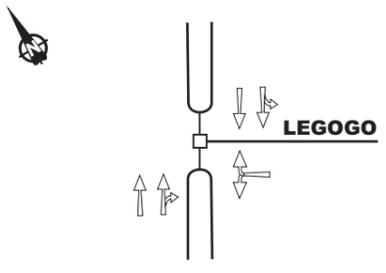
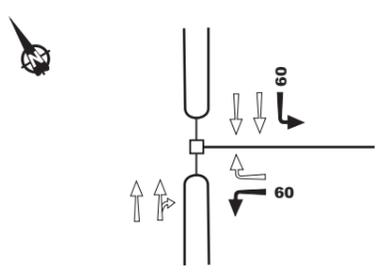
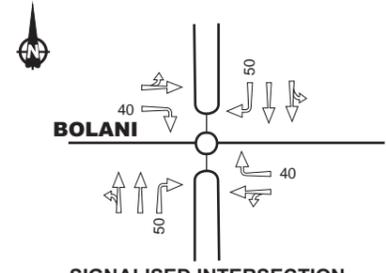
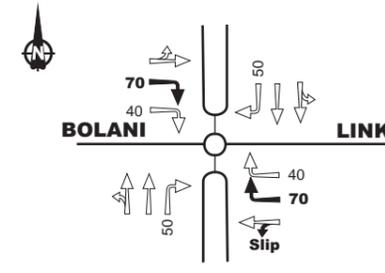
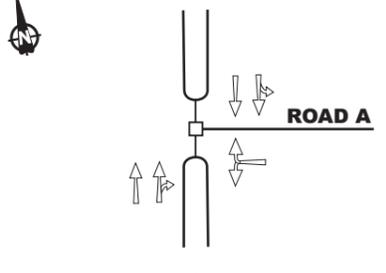
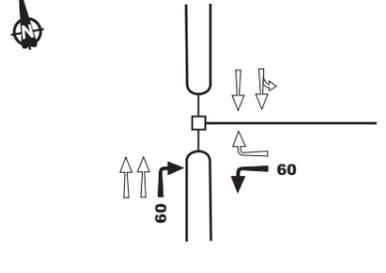
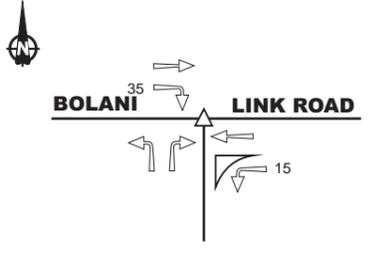
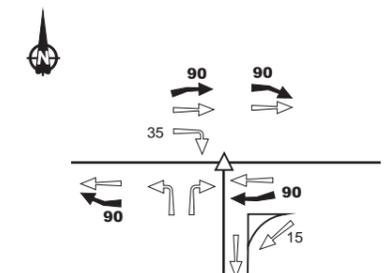
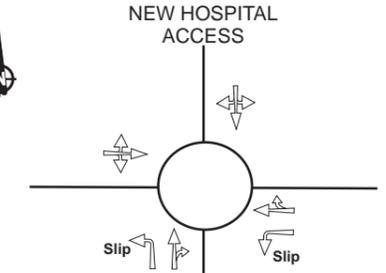
**ANNEXURE B:**

**CAPACITY ANALYSIS RESULTS**  
**(DATA AVAILABLE ON REQUEST)**

**ANNEXURE C:**

**SCHEMATIC LAYOUT:**

**PROPOSED ROAD NETWORK UPGRADES**

DESCRIPTION	EXISTING LAYOUT	BACKGROUND TRAFFIC		WITH DEVELOPMENT	
		BASE YEAR 2009	TARGET YEAR 2014	BASE YEAR 2009	TARGET YEAR 2014
KOMA ROAD & LEGOGO STREET	 <p>STOP CONTROLLED WITH FREE FLOW ON KOMA</p>	No road upgrading required.	No road upgrading required.		No road upgrading required.
KOMA ROAD & BOLANI STREET	 <p>SIGNALISED INTERSECTION</p>	 <p>OPTIMISE SIGNAL SETTINGS</p>	No road upgrading required.	No road upgrading required.	No road upgrading required.
KOMA ROAD & ROAD A	 <p>STOP CONTROLLED WITH FREE FLOW ON KOMA</p>	No road upgrading required.	No road upgrading required.		Traffic signal can only be installed once Moliwe Street has been realigned
BOLANI / LINK & SHOPPING CENTRE ACCESS	 <p>3-WAY STOP CONTROLLED</p>	No road upgrading required.		 <p>NEW HOSPITAL ACCESS</p> <p>CONVERT 3-WAY CONTROL TO TRAFFIC CIRCLE</p>	No road upgrading required.

**JABULANI DEVELOPMENT**

**SCHEMATIC LAYOUT: PROPOSED ROAD NETWORK UPGRADING**

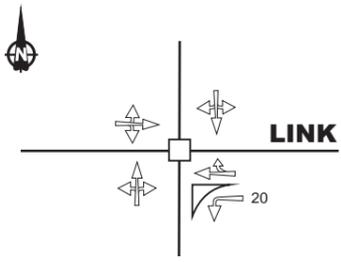
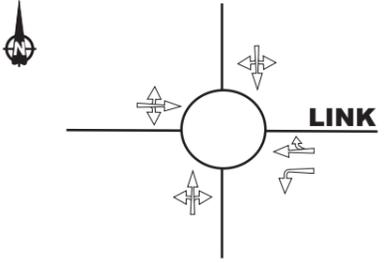
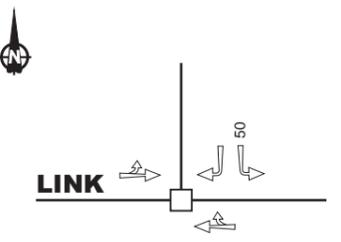
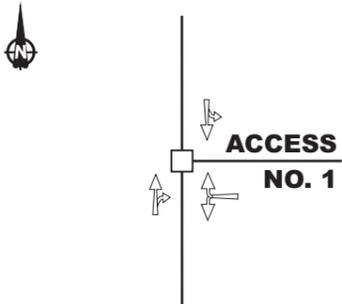
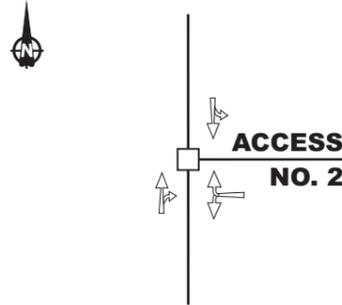
**FIGURE**

**C1**



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DESCRIPTION	EXISTING LAYOUT	BACKGROUND TRAFFIC		WITH DEVELOPMENT	
		BASE YEAR 2009	TARGET YEAR 2014	BASE YEAR 2009	TARGET YEAR 2014
LINK ROAD & LEGOGO STREET	 <p>STOP CONTROLLED WITH FREE FLOW ON LINK</p>	No road upgrading required.	No road upgrading required.	 <p>CONVERT 3-WAY CONTROL TO TRAFFIC CIRCLE</p>	No road upgrading required.
LINK ROAD & HOSTEL ACCESS	 <p>STOP CONTROLLED WITH FREE FLOW ON LINK</p>	No road upgrading required.	No road upgrading required.	No road upgrading required.	No road upgrading required.
LEGOGO STREET & ACCESS NO. 1	/	/	/		No road upgrading required.
LEGOGO STREET & ACCESS NO. 2	/	/	/		No road upgrading required.

**JABULANI DEVELOPMENT**

**SCHEMATIC LAYOUT: PROPOSED ROAD NETWORK UPGRADING**

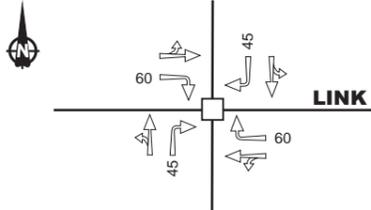
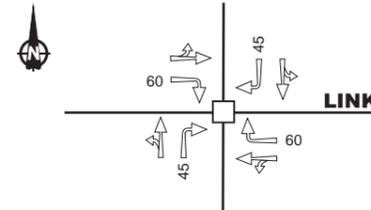
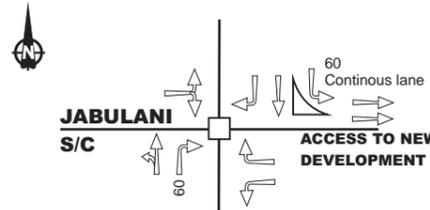
**FIGURE**

**C2**



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1453

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Cell: 082 854 7358

DESCRIPTION	EXISTING LAYOUT	BACKGROUND TRAFFIC		WITH DEVELOPMENT	
		BASE YEAR 2009	TARGET YEAR 2014	BASE YEAR 2009	TARGET YEAR 2014
LINK ROAD & ACCESS NO. 3				 <p>STOP CONTROL WITH FREE FLOW ON LINK. NOTE THE INTERSECTION MAY BE CONVERTED TO A LEFT-IN AND LEFT-OUT ONCE THE BRT SYSTEM IS COMPLETED</p>	No road upgrading required.
LINK ROAD & ACCESS NO. 4				 <p>STOP CONTROL WITH FREE FLOW ON LINK. NOTE THE INTERSECTION MAY BE CONVERTED TO A LEFT-IN AND LEFT-OUT ONCE THE BRT SYSTEM IS COMPLETED</p>	No road upgrading required.
LEGOGO STREET & ACCESS NO. 5				 <p>STOP CONTROL WITH FREE FLOW ON LEGOGO</p>	No road upgrading required.
LEGOGO STREET & ACCESS NO. 6				 <p>STOP CONTROL WITH FREE FLOW ON LEGOGO</p>	No road upgrading required.

**JABULANI DEVELOPMENT**

**SCHEMATIC LAYOUT: PROPOSED ROAD NETWORK UPGRADING**

**FIGURE**

**C3**



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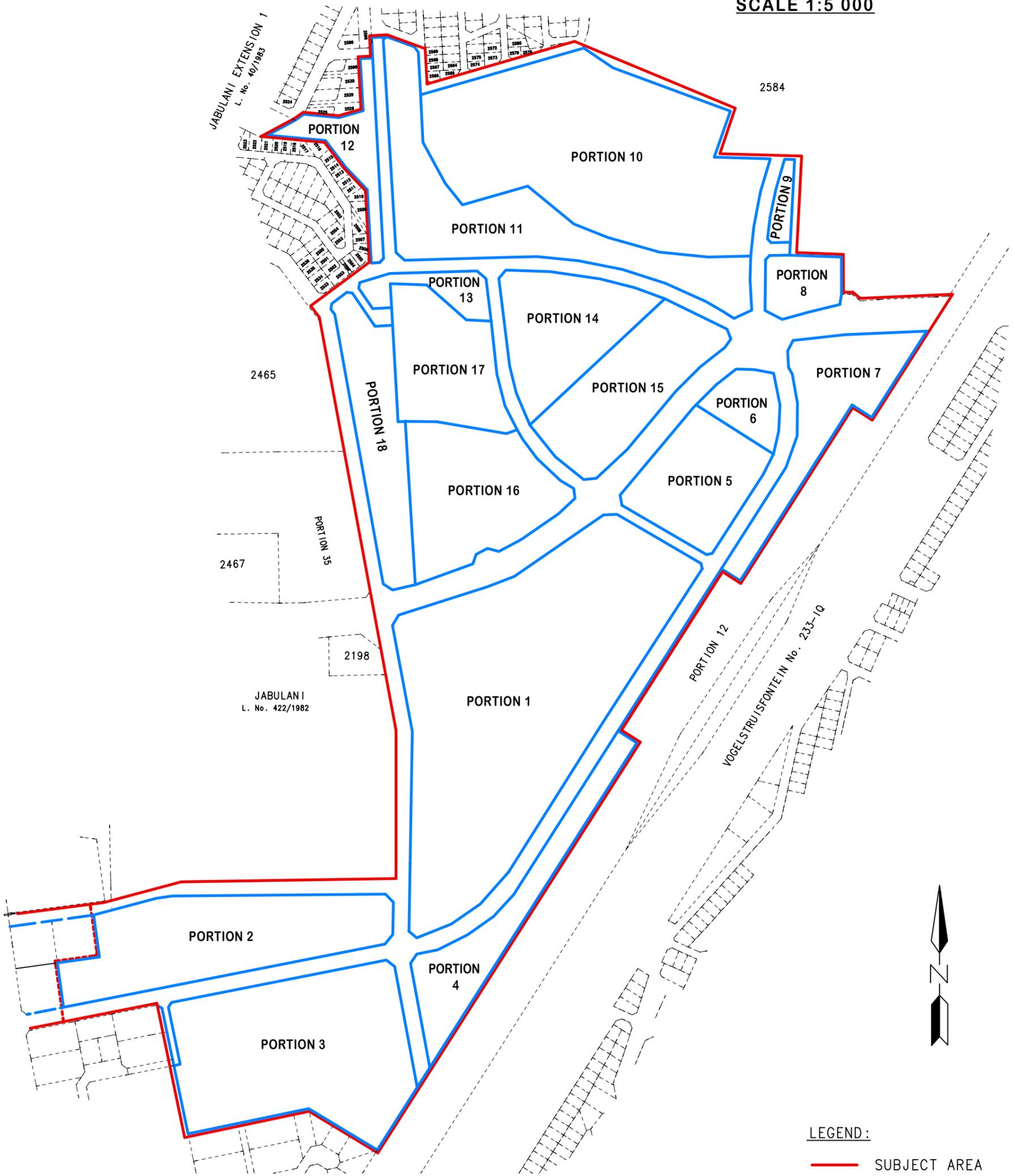
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**ANNEXURE D:**  
**INITIAL LAND USE SCHEDULE**

# JABULANI PRECINCT URBAN DESIGN

JABULANI EXTENSION 1  
L. No. 40/1983

SCALE 1:5 000



**LEGEND:**

- SUBJECT AREA
- PROPOSED PORTIONS

JABULANI URBAN DESIGN - LAND PARCELS & DEVELOPMENT CONTROLS

PTN No.	SIZE (m <sup>2</sup> )	ZONING.	LAND USES	HEIGHT	COVERAGE (%)	FAR
1	103891	BUSINESS	RETAIL / COMMERCIAL GROUND FLOOR; OFFICES UPPER STOREYS	5	50	1,8
2	36694	BUSINESS	RETAIL / COMMERCIAL GROUND FLOOR; OFFICES UPPER STOREYS	4	70	1,5
3	51995	BUSINESS	30% RETAIL / OFFICES; 70% RESIDENTIAL / STORM WATER ATTENUATION POND	4	60	1,5
4	18683	BUSINESS	RETAIL / COMMERCIAL GROUND FLOOR; OFFICES / RESIDENTIAL UPPER STOREYS	3	60	1,2
5	19411	BUSINESS	RETAIL / COMMERCIAL	3	70	1,2
6	6659	BUSINESS	RETAIL / COMMERCIAL	6	70	1,2
7	20383	BUSINESS	RETAIL / COMMERCIAL GROUND FLOOR; OFFICES / RESIDENTIAL UPPER STOREYS	6	60	1,2
8	9506	BUSINESS	RETAIL / COMMERCIAL GROUND FLOOR; OFFICES UPPER STOREYS	6	60	1,2
9	2344	POS	PUBLIC PARK			
10	72593	POS	PUBLIC PARK			
11	36482	RESIDENTIAL	RESIDENTIAL	5	60	1,2
12	8492	POS	PUBLIC PARK			
13	5444	RESIDENTIAL	RESIDENTIAL	3	50	1,5
14	21936	RESIDENTIAL	RESIDENTIAL	3	50	1,5
15	24609	BUSINESS	50% OFFICES / 50% RESIDENTIAL	5	60	1,5
16	28110	BUSINESS	30% OFFICES / 70% RESIDENTIAL	4	60	1,5
17	20193	MUNICIPAL	WATER RESERVOIR	1	80	0,8
18	19562	POS	PUBLIC PARK			

**WESPLAN & ASSOCIATE**  
ASSOCIATES  
KONSULTANT STADS- EN STREEKBEPLANNERS  
TOWN AND REGIONAL PLANNING CONSULTANTS

Wesplangebou/Building  
H/v. / Cor. Fontein & Von Brandis St.  
Krugersdorp  
Email: wesplan@techcomp.co.za  
Postbus/P.C. Box 7149, Krugersdorp-Noord/North 1741

Tel.: 011-953-1082/3  
Sel./Cell: 082 416 9323  
Woon/Res.: 011-660-9376  
Fax: 011-953-1083

**ANNEXURE E:**  
**FINAL LAND USE SCHEDULE**



**ANNEXURE F:**  
**DETAILED TRIP GENERATION CALCULATIONS**

# Jabulani Project

## Residential

### Person trip generation

Description	No of Units						Trips/ House Hold	No of Person Trips
	Dwelling Units	-	-	-	-	Total		
Area A	180	0	0	0	0	180	2.42	436
Area B	690	0	0	0	0	690	2.42	1670
Area C	980	0	0	0	0	980	2.42	2372
Area K	2500	0	0	0	0	2500	2.42	6050
-	0	0	0	0	0	0	2.42	0
-	0	0	0	0	0	0	2.42	0
TOTAL	4350	0	0	0	0	4350	-	10527

### Modal split

Description	Percentage
Private vehicles	23.9%
Taxis	50.4%
Buses	3.9%
Walk & Train	21.8%
	100%

Assume person walk to train station.

### Vehicle trip generation

Description	Total Person Trips	Occupancy Rate			Private Vehicles	Public Transport		Total Trip (Veh/hr)	Walking	Directional Split	
		Private Vehicles	Taxis	Buses		Taxis	Buses			Total Vehicle Trips (Trips Assigned to Road)	
		(Persons/modal)								35%	65%
Area A	436				29	15	0	44	95	15	28
Area B	1670				111	56	1	168	364	59	109
Area C	2372				157	80	2	239	517	84	155
Area K	6050	3.6	15	60	402	203	4	609	1319	213	396
-	0				0	0	0	0	0	0	0
-	0				0	0	0	0	0	0	0
Total	10527	-	-	-	699	354	7	1059	2295	371	689

# Jabulani Project

## Retail Complex - Located in Area A

Extend of site (m<sup>2</sup>) 25125

<b>Community Centre</b>
-------------------------

<b>Access : Legogo Street</b>
-------------------------------

Floor area ratio (FAR) 1

Extend of dev (m<sup>2</sup>) 25125

### Trip generation - South African Trip Generation Rates document

#### Trip generation rates (trips/100m<sup>2</sup> GLA)

PM Peak	5.64	Used average trip generation factor.
Sat Peak	9.76	

#### No of vehicle trips

PM Peak	1416	SAY	1416
SAT Peak	2453		2453

#### Vehicle occupancy

Taxi occupancy	15
Traditional black area vehicle occupancy	3.6
Traditional white area vehicle occupancy	1.86
Buses	30

#### Modal split

Taxi	14.1%	100.0%
Car	23.9%	
Bus	2.0%	
Walk	60.0%	

#### Final trip generation

Modal	No of person trips/modal		No of vehicle trips/Modal	
	PM Peak	SAT Peak	PM Peak	SAT Peak
Taxi	371	643	25	43
Car	629	1090	175	303
Bus	53	91	2	3
Walk	1580	2738	-	-
TOTAL	2634	4563	201	349

Directional split	PM	Taxi	Car	Bus
Inbound	50%	12	87	1
Outbound	50%	12	87	1
Directional split	SAT	Taxi	Car	Bus
Inbound	50%	21	151	2
Outbound	50%	21	151	2

# Jabulani Project

## Office Complex - Located in Area A

Extend of site (m<sup>2</sup>) 20000

Floor area ratio (FAR) 1

Extend of dev (m<sup>2</sup>) 20000

Trip generation - South African Trip Generation Rates document

Trip generation rates (persons/100m<sup>2</sup> GLA)

AM Peak	4.00	High density residential area, assume similar trip rate to that applied for CBD scenarios.
PM Peak	4.00	

No of trips

AM Peak	800	SAY	800
PM Peak	800		800

Vehicle occupancy

Taxi occupancy	15
Vehicle occupancy	3.6
Buses	30

Modal split

Taxi	50.4%	100.0%
Car	23.9%	
Bus	3.9%	
Walk	21.8%	

Final trip generation

Modal	No of person trips/modal		No of vehicle trips/Modal	
	AM Peak	PM Peak	AM Peak	PM Peak
Taxi	403	403	27	27
Car	191	191	53	53
Bus	31	31	1	1
Walk	174	174	-	-
TOTAL	800	800	81	81

Directional split	AM Peak	Taxi	Car	Bus
Inbound	75%	20	40	1
Outbound	25%	7	13	0
Directional split	PM Peak	Taxi	Car	Bus
Inbound	25%	7	13	0
Outbound	75%	20	40	1

# Jabulani Project

## Industrial Site - Located in Area D

Extend of site (m<sup>2</sup>) 18683

Floor area ratio (FAR) 1.2

Extend of dev (m<sup>2</sup>) 22419.6

Trip generation - South African Trip Generation Rates document

Trip generation rates (persons/100m<sup>2</sup> GLA)

AM Peak	0.60	Use "small" industrial rate, assuming site will be developed for individual emerging enterprises.
PM Peak	0.60	

No of trips

AM Peak	135	SAY	135
PM Peak	135		135

Vehicle occupancy

Taxi occupancy	15
Vehicle occupancy	3.6
Buses	30

Modal split

Taxi	50.4%	100.0%
Car	23.9%	
Bus	3.9%	
Walk	21.8%	

Final trip generation

Modal	No of person trips/modal		No of vehicle trips/Modal	
	AM Peak	PM Peak	AM Peak	PM Peak
Taxi	68	68	5	5
Car	32	32	9	9
Bus	5	5	0	0
Walk	29	29	-	-
TOTAL	135	135	14	14

Directional split	AM Peak	Taxi	Car	Bus
Inbound	70%	3	6	0
Outbound	30%	1	3	0
Directional split	PM Peak	Taxi	Car	Bus
Inbound	30%	1	3	0
Outbound	70%	3	6	0

# Jabulani Project

## Industrial Site - Located in Area G

Extend of site (m<sup>2</sup>)                      20383

Floor area ratio (FAR)                      1.2

Extend of dev (m<sup>2</sup>)                      24459.6

### Trip generation - South African Trip Generation Rates document

#### Trip generation rates (persons/100m<sup>2</sup> GLA)

AM Peak	0.60	Use "small" industrial rate, assuming site will be developed for individual businesses.
PM Peak	0.60	

#### No of trips

AM Peak	147	SAY	147
PM Peak	147		147

#### Vehicle occupancy

Taxi occupancy	15
Vehicle occupancy	3.6
Buses	30

#### Modal split

Taxi	50.4%	100.0%
Car	23.9%	
Bus	3.9%	
Walk	21.8%	

#### Final trip generation

Modal	No of person trips/modal		No of vehicle trips/Modal	
	AM Peak	PM Peak	AM Peak	PM Peak
Taxi	74	74	5	5
Car	35	35	10	10
Bus	6	6	0	0
Walk	32	32	-	-
TOTAL	147	147	15	15

Directional split	AM Peak	Taxi	Car	Bus
Inbound	70%	3	7	0
Outbound	30%	1	3	0
Directional split	PM Peak	Taxi	Car	Bus
Inbound	30%	1	3	0
Outbound	70%	3	7	0

# Jabulani Project

## Hospital Site - Latent Rights

Extend of dev (No of beds) 300

Trip generation - South African Trip Generation Rates document

Trip generation rates (trips/bed)

AM Peak	2.10
PM Peak	2.60

No of trips

AM Peak	630	SAY	630
PM Peak	780		780

Vehicle occupancy

Taxi occupancy	15
Vehicle occupancy	3.6
Buses	30

Modal split

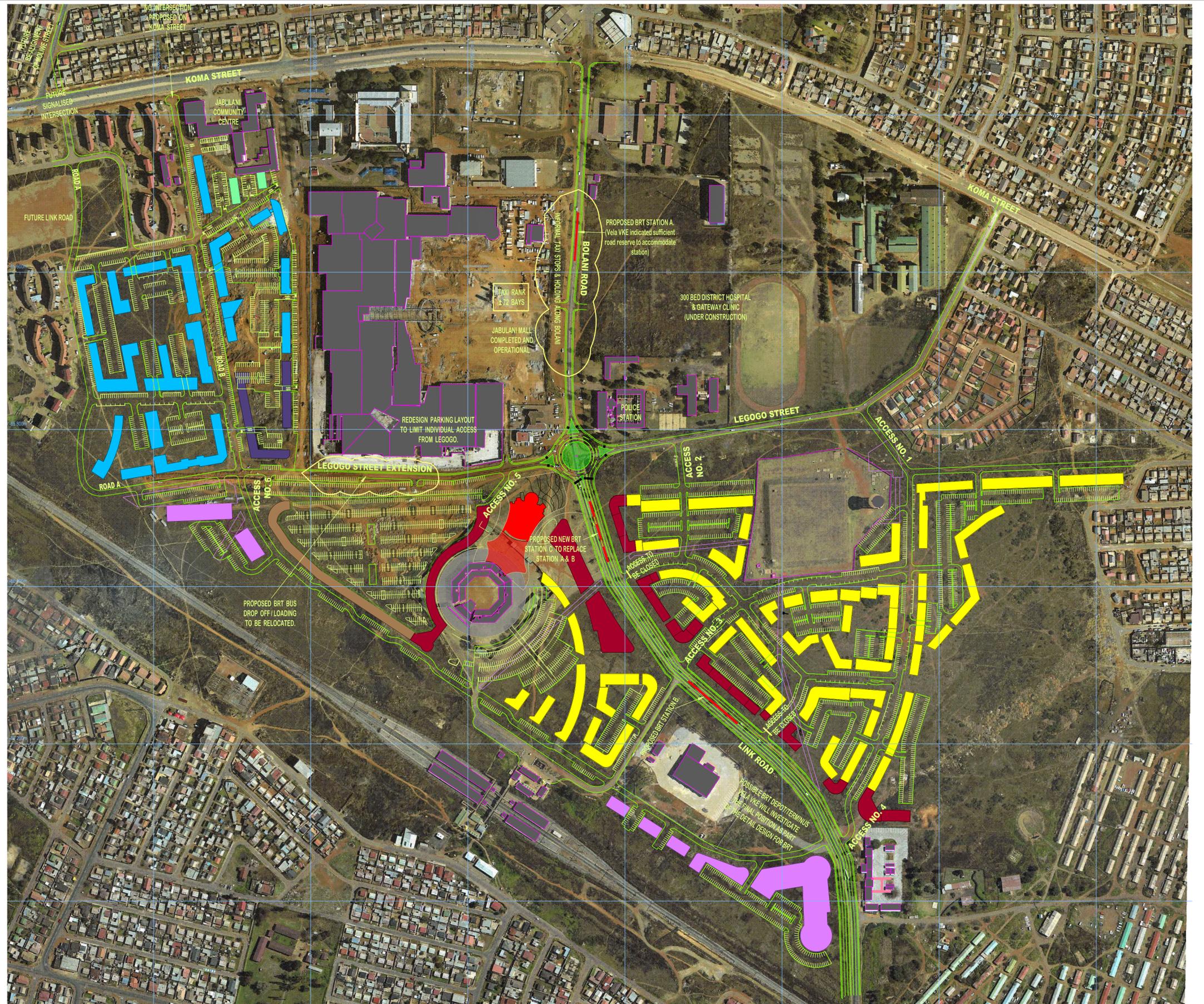
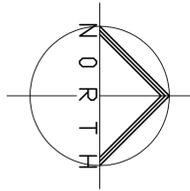
Taxi	50.4%	100.0%
Car	23.9%	
Bus	3.9%	
Walk	21.8%	

Final trip generation

Modal	No of person trips/modal		No of vehicle trips/Modal	
	AM Peak	PM Peak	AM Peak	PM Peak
Taxi	318	393	21	26
Car	151	186	42	52
Bus	25	30	1	1
Walk	137	170	-	-
TOTAL	630	780	64	79

Directional split	AM Peak	Taxi	Car	Bus
Inbound	75%	16	31	1
Outbound	25%	5	10	0
Directional split	PM Peak	Taxi	Car	Bus
Inbound	35%	9	18	0
Outbound	65%	17	34	1

**ANNEXURE G:**  
**PROPOSED DEVELOPMENT & ACCESS**  
**ARRANGEMENTS**  
**(MARITENG PLAN 160-10-01)**

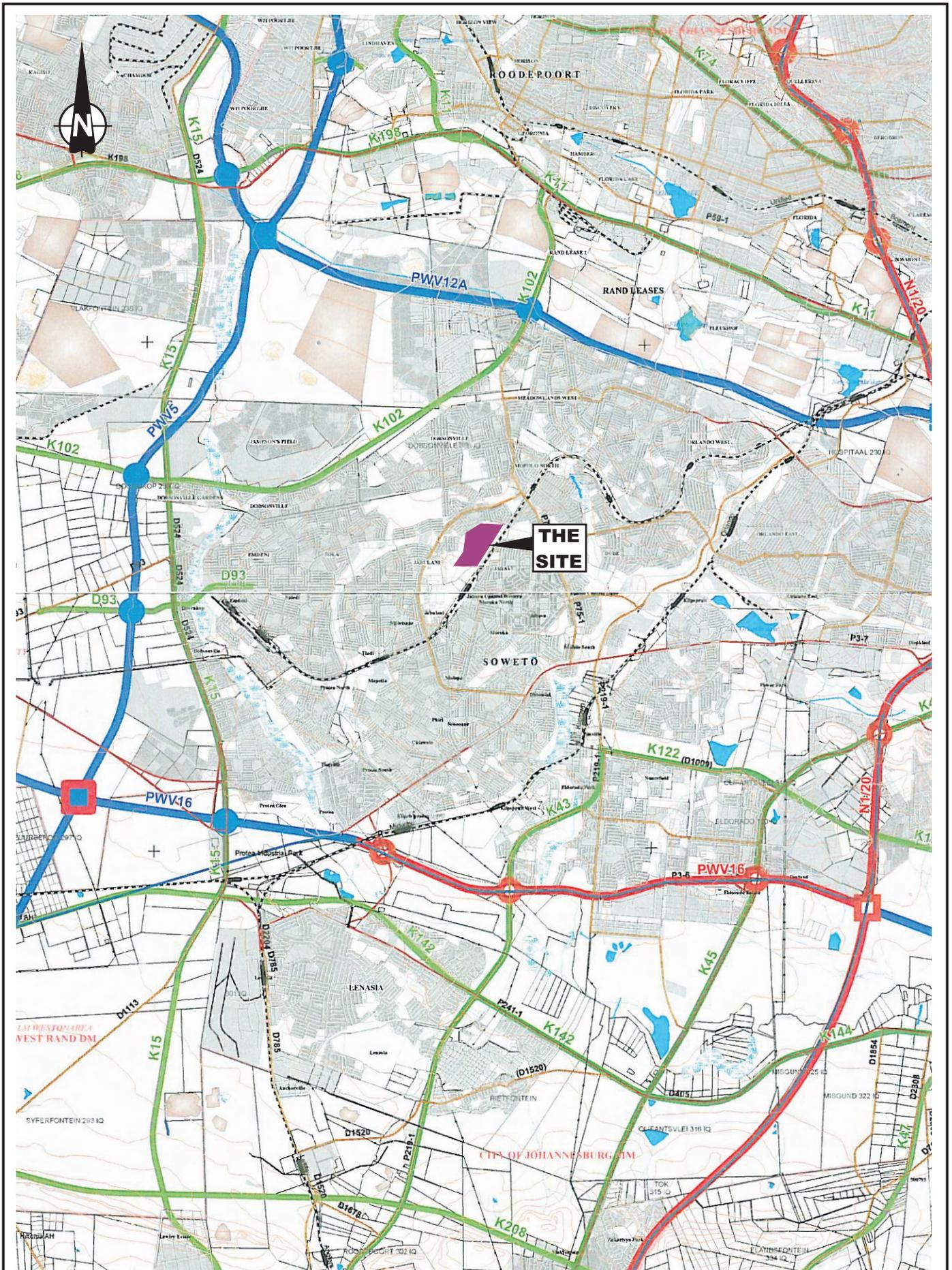


- 1 Storey residential/mixed use
- 2 Storey residential/mixed use
- 3 Storey residential/mixed use
- 4 Storey residential/mixed use
- 5 Storey residential/mixed use
- 6 Storey residential/mixed use
- Retail/Commercial/Offices
- Commercial/Light industrial
- To be determined

**JABULANI PROJECT**

**PROPOSED DEVELOPMENT LAYOUT AND ACCESS ARRANGEMENTS**

**ANNEXURE H:**  
**PWV ROAD NETWORK**




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**JABULANI PROJECT**

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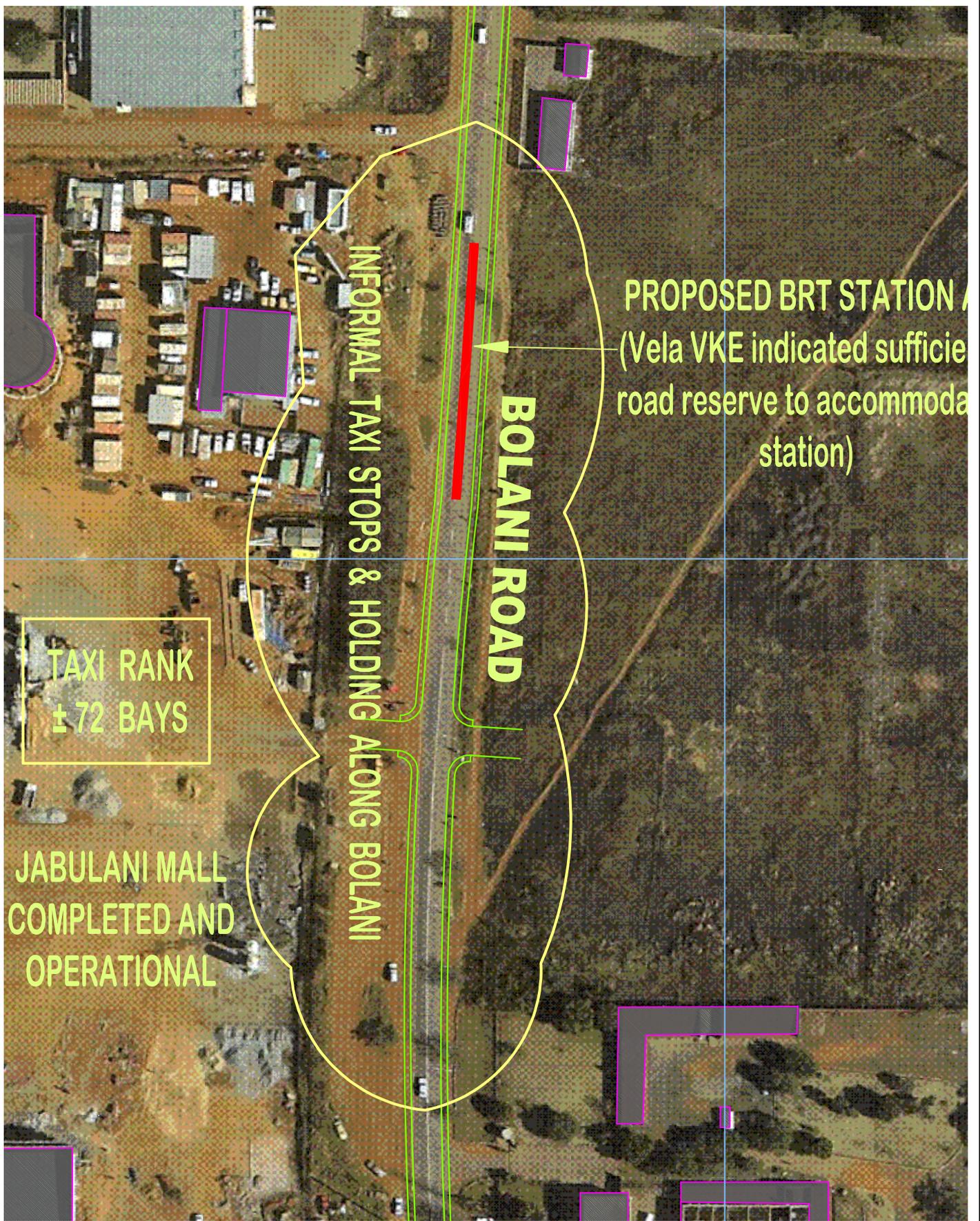
**PWV ROAD NETWORK**

**ANNEXURE**

---

**H**

**ANNEXURE I:**  
**EXISTING PUBLIC TRANSPORT INFRASTRUCTURE**



DESIGNED BY:



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 1453  
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 Fax: 088 011 902 4075  
 Cell: 082 854 7358

PROJEK / PROJECT:

**JABULANI PROJECT**

TITEL / TITLE:

**EXISTING PUBLIC TRANSPORT INFRASTRUCTURE**

ANNEXURE

**I**