

**ANNEXURE K – TRAFFIC IMPACT STUDY**

## **ABLAND (PTY) LTD**

**PROPOSED MIXED-USE DEVELOPMENT ON PORTIONS 68, 69 AND  
112 TO 116, ONDERSTEPSPOORT 266-JR**

### **TRAFFIC IMPACT STUDY**

AUGUST 2012

REPORT NO. C1581/01TIS

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#### **REPORT SHEET**

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PROJECT TITLE: PROPOSED MIXED-USE DEVELOPMENT ON PORTIONS  
68, 69 AND 112 TO 116, ONDERSTEPSPOORT 266-JR

TRAFFIC IMPACT STUDY

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#### DECLARATION

I certify that this study has been prepared under my immediate supervision and that I have experience and training in the field of traffic and transportation engineering.

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## 1 INTRODUCTION

### 1.1 Background

Civil Concepts (Pty) Ltd was appointed by Abland (Pty) Ltd to prepare a Traffic Impact Study (TIS) for a proposed mixed-use development to be located on Portions 68, 69 and 112 to 116, Onderstepoort 266-JR.

The proposed development is divided into 5 different phases which will be constructed over a number of years. The phases are (refer to **Annexure A** for the site development plan (SDP) and implementation plan):

#### Phase 1

- Retail.

#### Phase 2

- Special for public garage and ancillary uses; and
- Special for mixed-uses.

#### Phase 3

- Special for mixed-uses.

#### Phase 4

- Residential 1;
- Residential 3; and
- Special for community uses

#### Phase 5

- Residential 1;
- Residential 3;
- Special for community uses; and
- Educational.

Traffic impact studies will be submitted to the City of Tshwane (CoT) and the Gauteng Department of Roads and Transport (Gautrans) for approval prior to each phase/phases being constructed.

According to the City Council of Pretoria's Guidelines for Traffic Impact Studies, a study is only valid for a period of 5 years from the date of submission. By submitting traffic impact studies for each phase/phases, each study will only cover the development(s) completed within the following 5 years from the date of submission.

The sites of the proposed development are located in the north of Pretoria opposite each other along Mopanie Road and are bordered by Scoutpan Road to the east and the R80 freeway to the west as shown on the locality plan in Figure 1.



**Figure 1: Locality Plan**

At present, access to the proposed development will be gained via one full access off Mopanie Road to the north and south as shown on the locality plan. Additional access points may be required as the sites are developed.

The objective of the TIS is to determine the impact of the additional traffic to be generated by the proposed development on the adjacent street network. The expected trip generation, distribution and assignment, as well as the required road upgrades to accommodate the development trips will be discussed in the remainder of this report.



## 1.2 Definitions

The following definitions from the 2010 Highway Capacity Manual are applicable to this report:

### Capacity

The maximum hourly rate at which vehicles can reasonable be expected to traverse a lane or roadway during a given period under prevailing roadway, traffic and control conditions.

### Volume

The hourly rate (v/h), the actual flow rate for an approach or lane.

### Volume to capacity ratio (V/C)

The ratio of flow to capacity.

### Level of Service (LOS)

Level of Service is defined in terms of delay. Delay is a measure of driver discomfort, frustration, fuel consumption and lost travel time. The Levels of Service for intersections as defined in the 2010 Highway Capacity Manual are shown in Table 1.1.

TABLE 1.1: LEVEL OF SERVICE DEFINITIONS

Level of Service	Control delay per vehicle (s/veh)	
	Signalised intersections	Unsignalised intersections
A	< 10	< 10
B	10 to 20	10 to 15
C	20 to 35	15 to 25
D	35 to 55	25 to 35
E	55 to 80	35 to 50
F	> 80	> 50

## 1.3 Time Horizons

The Pretoria's Guidelines for Traffic Impact Studies stipulates that where a development generates more than 2000 trips in the peak hour, the base year and 10 years after the base year should be analysed.

A ten year horizon (2024) might be inconclusive as new roads and developments might be constructed within the vicinity of the proposed development which might not require the proposed 2024 road upgrades, therefore a five year horizon (2019) analysis has also been done.

The time horizons analysed are 2014 (base year), 2019 (5 year horizon) and 2024 (10 year horizon). The weekday afternoon and Saturday peak hours are analysed.

## 1.4 Determination of Road Upgrading

The City Council of Pretoria's Guidelines for Traffic Impact Studies stipulates:

"The necessary upgrading and improvement of the road infrastructure needs to be determined for both the with development and without development scenarios for the base year (opening year) and the horizon year(s), although the required road improvements are only based on the capacity analysis for the ultimate horizon year. The following procedure should be followed to determine the necessary road upgrading:

- Calculate the LOS, v/c ratios and the site traffic as a percentage of the critical flows at the critical elements for every scenario.
- If the LOS is worse than LOS D and/or a v/c ratio of 0.95 for the **with development** scenario but not for the **without development** scenario and the 2% contribution to critical flow complies, then the developer is responsible for all the required road upgrading.
- If the LOS is worse than LOS D and/or a v/c ratio of 0.95 for the **with and without development** scenarios and the 2% contribution to critical flow complies, then the developer is only responsible for the incremental upgrading to obtain the same LOS and v/c ratio as for the **without development** scenario.

Although in many instances the professional judgement of the traffic engineer is needed to determine the required road upgrading by the developer, the basic principles as laid down above must be adhered to."

## 2 PROPOSED LAND USE RIGHTS AND TRIP GENERATION

### 2.1 Introduction

The proposed land use rights are described first. This is then followed by the trip generation of the proposed rights. Trip distributions and assignments are then provided.

### 2.2 Proposed Land Use Rights

The proposed development sites are 66.33 ha in extent. The proposed land use rights are shown in Table 2.1.

**TABLE 2.1: PROPOSED LAND USE RIGHTS**

Land Use	No. / GLA
<b>Phase 1</b>	
Retail	47 100 m <sup>2</sup>
<b>Phase 2</b>	
Special for Garage and Ancillary Uses	6 900 m <sup>2</sup>
Special for Mixed-Uses	3 850 m <sup>2</sup>
<b>Phase 3</b>	
Special for Mixed-Uses	64 950 m <sup>2</sup>
<b>Phase 4</b>	
Residential 1	276 units
Residential 3	346 units
<b>Phase 5</b>	
Residential 1	209 units
Residential 3	224 units
Educational (Primary School)	1 000 pupils

The land use, "special for mixed-uses" is not yet determined; therefore the proposed land use rights have been taken as value mart. This land use is considered as a conservative approach.

### 2.3 Trip Generation

#### 2.3.1 Introduction

The trip generation rates in the Department of Transport's "South African Trip Generation Rates, 2<sup>nd</sup> Edition, June 1995" and previous traffic impact studies were used to calculate the development trips. Trip reductions were applied where applicable and explained in Section 2.3.2. The trip reduction factors in the COTO's *draft* "South African Trip Data Manual, Version 0.0, April 2011" were used.

The average trip generation rate has been used for the retail component.

The weekday afternoon and Saturday peak hours have been considered as the critical time periods.

#### 2.3.2 Methodology

The proposed development consists of various land-uses, some of which are not covered in the Department of Transport's 1995 South African Trip Generation Rates Manual. The development will be located on a site that can be considered as being in a previously disadvantaged area and will therefore have low vehicle ownership.

Many trips will either be by walking and/or public transport. Public transport facilities such as bus and taxi lay-bys and a taxi rank will be provided within the site. The walking trips can also be attributed to the short distances between the various land-use developments.

For the reasons mentioned above, the following methodology has been used to determine the development trips:

- Retail and Value Mart - 10% reduction in trips have been applied to the PM and Saturday peak hours to account for internal trips between the different land-uses. A further 30% trip reduction has been applied to both PM and Saturday peak hours to account for low vehicle ownership and could be attributed to walking and public transport trips.
- Educational (Primary School) – A 30% reduction in trips has been applied to the AM peak hour to account for internal trips between the different land-uses. A further 50% trip reduction has been applied to the AM peak hour to account for low vehicle ownership and could be attributed to walking and public transport trips.
- Residential 1 - A 10% reduction in trips has been applied to the AM, PM and Saturday peak hours to account for internal trips between the different land-uses. A further 40% trip reduction has been applied to AM, PM and Saturday peak hour periods to account for low vehicle ownership and could be attributed to walking and public transport trips.

- Residential 3 - A 15% reduction in trips has been applied to the AM, PM and Saturday peak hours to account for internal trips between the different land-uses. A further 30% trip reduction has been applied to AM, PM and Saturday peak hour periods to account for low vehicle ownership and could be attributed to walking and public transport trips.

The land use, "special for public garage and ancillary uses" will be a filling station.

The Department of Transport's "South African Trip Generation Rates, 2<sup>nd</sup> Edition, June 1995" stipulates that filling stations do not generate new trips, but only attract existing traffic from the adjacent street(s); therefore the land use was not considered.

The retail trips will comprise of primary and pass-by trips only. It is assumed that there will not be any diverted trips because of the presence of other retail centres in the surrounding vicinity. The diverted trips have been considered as primary trips for this study.

### 2.3.3. Trip Generation

The weekday morning, afternoon and Saturday peak hour development trips with multi-use and low vehicle ownership trip reductions, are shown in Tables 2.2 to 2.13, respectively. A weekday morning peak hour trip generation has not been done for phase 1, since weekday morning peak hour retail trips are negligible.

#### A Phase 1 Peak Hour Trip Generations

**TABLE 2.2: PHASE 1 AFTERNOON PEAK HOUR TRIP GENERATION**

Facility	Area	Rate	Multi-use Development Reduction	Low Vehicle Ownership Reduction	Directional split		Peak Hour Trips		
					Weekday		IN	OUT	TOTAL
					IN	OUT			
Retail	47 100	4.55 \ 100 m <sup>2</sup>	10%	30%	50%	50%	675	675	1351
			65%		PRIMARY+DIVERTED		439	439	878
			35%		PASSBY		236	236	473
					<b>TOTAL</b>		<b>675</b>	<b>675</b>	<b>1351</b>

**TABLE 2.3: PHASE 1 SATURDAY PEAK HOUR TRIP GENERATION**

Facility	Area	Rate	Multi-use Development Reduction	Low Vehicle Ownership Reduction	Directional split		Peak Hour Trips		
					Saturday		IN	OUT	TOTAL
					IN	OUT			
Retail	47 100	8.09 \ 100 m <sup>2</sup>	10%	30%	50%	50%	1200	1200	2400
			65%		PRIMARY+DIVERTED		780	780	1560
			35%		PASSBY		420	420	840
					<b>TOTAL</b>		<b>1200</b>	<b>1200</b>	<b>2400</b>

#### B Phase 2 Peak Hour Trip Generations

**TABLE 2.4: PHASE 2 AFTERNOON PEAK HOUR TRIP GENERATION**

Facility	Area	Rate	Multi-use Development Reduction	Low Vehicle Ownership Reduction	Directional split		Peak Hour Trips		
					Weekday		IN	OUT	TOTAL
					IN	OUT			
Value Mart (assumed)	3 850	4.00 \ 100 m <sup>2</sup>	10%	30%	60%	40%	58	39	97
			65%		PRIMARY+DIVERTED		38	25	63
			35%		PASSBY		20	14	34
					<b>TOTAL</b>		<b>58</b>	<b>39</b>	<b>97</b>

**TABLE 2.5: PHASE 2 SATURDAY PEAK HOUR TRIP GENERATION**

Facility	Area	Rate	Multi-use Development Reduction	Low Vehicle Ownership Reduction	Directional split		Peak Hour Trips		
					Saturday		IN	OUT	TOTAL
					IN	OUT			
Value Mart (assumed)	3 850	6.00 \ 100 m <sup>2</sup>	10%	30%	50%	50%	73	73	146
			65%		PRIMARY+DIVERTED		47	47	95
			35%		PASSBY		25	25	51
					<b>TOTAL</b>		<b>73</b>	<b>73</b>	<b>146</b>

#### C Phase 3 Peak Hour Trip Generations

**TABLE 2.6: PHASE 3 AFTERNOON PEAK HOUR TRIP GENERATION**

Facility	Area	Rate	Multi-use Development Reduction	Low Vehicle Ownership Reduction	Directional split		Peak Hour Trips		
					Weekday		IN	OUT	TOTAL
					IN	OUT			
Value Mart (assumed)	64 950	4.00 \ 100 m <sup>2</sup>	10%	30%	60%	40%	982	655	1637
			65%		PRIMARY+DIVERTED		638	426	1064
			35%		PASSBY		344	229	573
					<b>TOTAL</b>		<b>982</b>	<b>655</b>	<b>1637</b>

**TABLE 2.7: PHASE 3 SATURDAY PEAK HOUR TRIP GENERATION**

Facility	Area	Rate	Multi-use Development Reduction	Low Vehicle Ownership Reduction	Directional split		Peak Hour Trips		
					Saturday		IN	OUT	TOTAL
					IN	OUT			
Value Mart (assumed)	64 950	6.00 \ 100 m <sup>2</sup>	10%	30%	50%	50%	1228	1228	2455
			65%		PRIMARY+DIVERTED		798	798	1596
			35%		PASSBY		430	430	859
					<b>TOTAL</b>		<b>1228</b>	<b>1228</b>	<b>2455</b>

D Phase 4 Peak Hour Trip Generations

TABLE 2.8: PHASE 4 MORNING PEAK HOUR TRIP GENERATION

Facility	No.	Rate	Multi-use Development Reduction	Low Vehicle Ownership Reduction	Directional split		Peak Hour Trips		
					Weekday		IN	OUT	TOTAL
					IN	OUT			
Residential 1	276	0.5\Unit	10%	40%	35%	65%	26	48	75
					Residential 1		26	48	75
Residential 3	346	0.5\Unit	15%	30%	35%	65%	36	67	103
					Residential 3		36	67	103
<b>TOTAL</b>							<b>62</b>	<b>115</b>	<b>177</b>

TABLE 2.9: PHASE 4 AFTERNOON PEAK HOUR TRIP GENERATION

Facility	No.	Rate	Multi-use Development Reduction	Low Vehicle Ownership Reduction	Directional split		Peak Hour Trips		
					Weekday		IN	OUT	TOTAL
					IN	OUT			
Residential 1	276	0.5\Unit	10%	40%	65%	35%	48	26	75
					Residential 1		48	26	75
Residential 3	346	0.5\Unit	15%	30%	65%	35%	67	36	103
					Residential 3		67	36	103
<b>TOTAL</b>							<b>115</b>	<b>62</b>	<b>177</b>

TABLE 2.10: PHASE 4 SATURDAY PEAK HOUR TRIP GENERATION

Facility	No.	Rate	Multi-use Development Reduction	Low Vehicle Ownership Reduction	Directional split		Peak Hour Trips		
					Saturday		IN	OUT	TOTAL
					IN	OUT			
Residential 1	276	0.25\Unit	10%	40%	50%	50%	19	19	38
					Residential 1		19	19	38
Residential 3	346	0.25\Unit	15%	30%	50%	50%	26	26	52
					Residential 3		26	26	52
<b>TOTAL</b>							<b>45</b>	<b>45</b>	<b>90</b>

Note: Saturday Residential Trip Rates are half of the weekday trip rates with 50%-50% directional splits

E Phase 5 Peak Hour Trip Generations

TABLE 2.11: PHASE 5 MORNING PEAK HOUR TRIP GENERATION

Facility	No.	Rate	Multi-use Development Reduction	Low Vehicle Ownership Reduction	Directional split		Peak Hour Trips		
					Weekday		IN	OUT	TOTAL
					IN	OUT			
Residential 1	209	0.5\Unit	10%	40%	35%	65%	20	37	56
					Residential 1		20	37	56
Residential 3	224	0.5\Unit	15%	30%	35%	65%	23	43	67
					Residential 3		23	43	67
Primary School	1000	0.9\Pupil	30%	50%	50%	50%	158	158	315
					Primary School		158	158	315
<b>TOTAL</b>							<b>201</b>	<b>237</b>	<b>438</b>

TABLE 2.12: PHASE 5 AFTERNOON PEAK HOUR TRIP GENERATION

Facility	No.	Rate	Multi-use Development Reduction	Low Vehicle Ownership Reduction	Directional split		Peak Hour Trips		
					Weekday		IN	OUT	TOTAL
					IN	OUT			
Residential 1	209	0.5\Unit	10%	40%	65%	35%	37	20	56
					Residential 1		37	20	56
Residential 3	224	0.5\Unit	15%	30%	65%	35%	43	23	67
					Residential 3		43	23	67
Primary School	1000	0.0\Pupil	0%	0%	0%	0%	0	0	0
					Primary School		0	0	0
<b>TOTAL</b>							<b>80</b>	<b>43</b>	<b>123</b>

TABLE 2.13: PHASE 5 SATURDAY PEAK HOUR TRIP GENERATION

Facility	No.	Rate	Multi-use Development Reduction	Low Vehicle Ownership Reduction	Directional split		Peak Hour Trips		
					Saturday		IN	OUT	TOTAL
					IN	OUT			
Residential 1	209	0.25\Unit	10%	40%	50%	50%	14	14	28
					Residential 1		14	14	28
Residential 3	224	0.25\Unit	15%	30%	50%	50%	17	17	33
					Residential 3		17	17	33
Primary School	1000	0.0\Pupil	0%	0%	0%	0%	0	0	0
					Primary School		0	0	0
<b>TOTAL</b>							<b>31</b>	<b>31</b>	<b>62</b>

F Phases 1 to 5 Total Development Peak Hour Trip Generations

TABLE 2.14: TOTAL MORNING PEAK HOUR TRIP GENERATION

Facility	Peak Hour Trips		
	IN	OUT	TOTAL
All Components	263	353	616
	<b>263</b>	<b>353</b>	<b>616</b>

TABLE 2.15: TOTAL AFTERNOON PEAK HOUR TRIP GENERATION

Facility	Peak Hour Trips		
	IN	OUT	TOTAL
All Components	1911	1474	3385
	<b>1911</b>	<b>1474</b>	<b>3385</b>

TABLE 2.16: TOTAL SATURDAY PEAK HOUR TRIP GENERATION

Facility	Peak Hour Trips		
	IN	OUT	TOTAL
All Components	2575	2575	5150
	<b>2575</b>	<b>2575</b>	<b>5150</b>

## 2.4 Trip Distribution and Assignment

The development trips were distributed and assigned to the adjacent road network based on the expected origins and destinations to and from the development.

The weekday afternoon and Saturday peak hour trip distributions and assignments are shown in:

- Figures 2.1 and 2.2 – PM and Saturday residential trips;
- Figures 2.3 and 2.4 – PM and Saturday Value Mart Primary and Diverted trips;
- Figures 2.5 and 2.6 – PM and Saturday Value Mart Pass-by trips;
- Figures 2.7 and 2.8 – PM and Saturday Total Value Mart trips;
- Figures 2.9 and 2.10 – PM and Saturday Retail Primary and Diverted trips;
- Figures 2.11 and 2.12 – PM and Saturday Retail Pass-by trips;
- Figures 2.13 and 2.14 – PM and Saturday Total Retail trips; and
- Figures 2.15 and 2.16 – PM and Saturday Total development trips.

## 3 TRAFFIC AND THE ROAD NETWORK

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### 3.1 Introduction

Pretoria's Guidelines for Traffic Impact Studies stipulate that where a development generates more than 2000 trips in the peak hour, the base year and 10 years after the base year should be analysed.

A ten year horizon might be inconclusive as new roads and developments might be constructed within the vicinity of the proposed development which might not require the proposed ten year horizon road upgrades, therefore a five year horizon analysis has also been done.

### 3.2 Traffic Counts

The weekday afternoon and Saturday peak hour traffic counts in the vicinity of the proposed development site were done on 15 and 16 June 2012 at the following intersections:

- Buitekant Road/Commissioner Road (M39);
- Commissioner Road (M39)/M43;
- Commissioner Road (M39)/Aubrey Matlala Street;
- Commissioner Road (M39)/Mopanie Road/R80;
- Mopanie Road/Soutpan Road;
- Soutpan Road/Rooiwalpad Road;
- R80/Ruth First Road western ramp terminal; and
- R80/Ruth First Road eastern ramp terminal.

The weekday afternoon and Saturday peak hour traffic counts are shown in Figures 3.1 and 3.2, respectively.

### 3.3 Latent Rights

No latent rights are known of, therefore none have been considered in this traffic study.

### 3.4 Background Traffic

#### 3.4.1 2014 Background Traffic

The 2012 weekday afternoon and Saturday peak hour traffic counts were escalated at a 3% annual growth rate over 2 years to obtain the 2014 peak hour background traffic volumes.

The 2014 weekday afternoon and Saturday peak hour background traffic volumes are shown in Figures 3.3 and 3.4, respectively.

#### 3.4.2 2019 Background Traffic

The 2012 weekday afternoon and Saturday peak hour traffic counts were escalated at a 3% annual growth rate over 7 years to obtain the 2019 peak hour background traffic volumes.

The 2019 weekday afternoon and Saturday peak hour background traffic volumes are shown in Figures 3.5 and 3.6, respectively.

#### 3.4.3 2024 Background Traffic

The 2012 weekday afternoon and Saturday peak hour traffic counts were escalated at a 3% annual growth rate over 12 years to obtain the 2024 peak hour background traffic volumes.

The 2024 weekday afternoon and Saturday peak hour background traffic volumes are shown in Figures 3.7 and 3.8, respectively.

### 3.5 Background and Development Traffic

#### 3.5.1 2014 Background and Development Traffic

The weekday afternoon and Saturday peak hour total development trips were added to the 2014 background traffic volumes to obtain the 2014 background and development trips.

The 2014 weekday afternoon and Saturday peak hour background and development trips are shown in Figures 3.9 and 3.10, respectively.

#### 3.5.2 2019 Background and Development Traffic

The weekday afternoon and Saturday peak hour total development trips were added to the 2019 background traffic volumes to obtain the 2019 background and development trips.

The 2019 weekday afternoon and Saturday peak hour background and development trips are shown in Figures 3.11 and 3.12, respectively.

#### 3.5.3 2024 Background and Development Traffic

The weekday afternoon and Saturday peak hour total development trips were added to the 2024 background traffic volumes to obtain the 2024 background and development trips.

The 2024 weekday afternoon and Saturday peak hour background and development trips are shown in Figures 3.13 and 3.14, respectively.

### 3.6 Road Network

#### 3.6.1 Existing Road Network - According to City of Tshwane's Road Master Plan

- **Commissioner Road (M39)** is a class 2 metropolitan distributor that lies to the west of the proposed development sites and runs in an east-west direction and bends to the south to become the R30 freeway. This road serves an important mobility function within the Soshanguve central area.
- **Butekant Road** is a class 3 district distributor that lies to the west of the proposed development sites and runs in a north-south direction and intersects with Commissioner Road (M39) to the north to form a four-legged multi-lane all-way stop controlled intersection. This road serves an important mobility function within the Soshanguve Township linking the north and south of Soshanguve.
- The **M43** is a class 3 district distributor that lies to the west of the proposed development sites and runs in a north-south direction and intersects with Commissioner Road (M39) to form a multi-lane all-way stop controlled T-intersection. This road serves an important mobility function to the north of the Soshanguve Township.
- **Aubrey Matlala Street** is a class 3 district distributor that lies to the west of the proposed development sites and runs in a north-south direction and intersects with Commissioner Road (M39) to form a four-legged signalised intersection.

- The **R80** freeway is a class 1 metropolitan distributor and borders one of the proposed development sites to the west and runs in a north-south direction. This freeway is a continuation of Commissioner Road (M39) from the north. The freeway plays a major mobility function between the northern townships of Tshwane, linking them to the CBD.
- **Soutpan Road** is a class 2 metropolitan distributor that borders the proposed development sites to the east and runs in a north-south direction. This road plays a major mobility function linking the northern part of Tshwane to the CBD. This road was the main road to the Pretoria CBD before the R80 freeway was constructed.
- **Mopanie Road** is a class 2 metropolitan distributor that runs between the proposed development sites in an east-west direction and is a link road between the R80 freeway and Soutpan Road. It forms multi-lane all-way stop controlled T-intersections with the R80 freeway and Soutpan Road. This road is approximately 1.15 km in length and is a single carriage way which carries a considerable amount of traffic during the weekdays. Access to the proposed development sites will be gained off this road.
- **Rooiwalpad Road** is a class 4a collector road that lies to the south of the proposed development sites and runs in an east-west direction and is linked to the R101 road to the east and intersects with Soutpan Road to form a priority controlled T-intersection.
- **Ruth First Road** is a class 2 metropolitan distributor that lies to the south of the proposed development sites and runs in an east-west direction and is linked to the R80 freeway. This road is a major mobility link road to the R80 freeway for the southern part of Soshanguve Township.

### 3.6.2 Proposed Upgrading of the Road Network (refer to Annexure B for existing and proposed upgraded intersection configurations)

A ten year (2024) and a five year (2019) horizon period after the base year (2014) have been considered in this traffic study, due to the reason that a ten year horizon might be inconclusive as new roads and developments might be constructed within the vicinity of the proposed development which might not require the proposed ten year horizon road upgrades.

The following changes and/or upgrades are required to the road network:

#### A Without Proposed Development (due to 2019 background traffic)

- **Commissioner Road (M39)/Buitekant Road intersection**

The intersection requires traffic signals.

- **Commissioner Road (M39)/M43 intersection**

The intersection requires traffic signals.

- **Commissioner Road (M39)/Aubrey Matlala Street intersection**

The northern approach requires a shared through and left turning slip lane and a right turning lane. The southern approach requires a left turning continuous lane, a through lane and a right turning lane.

The traffic signal timings have to be adjusted.

- **Commissioner Road (M39)/R80/Mopanie Road intersection**

The intersection requires traffic signals.

- **Soutpan Road/Mopanie Road intersection**

The intersection requires traffic signals.

The northern approach requires a dedicated through lane and a right turning lane.

- **Soutpan Road/Rooiwalpad Road intersection**

There is no intersection upgrades required to accommodate the 2019 background traffic volumes.

- **Ruth First Road/R80 Western Ramp Terminal intersection**

There is no intersection upgrades required to accommodate the 2019 background traffic volumes.

- **Ruth First Road/R80 Eastern Ramp Terminal intersection**

There is no intersection upgrades required to accommodate the 2019 background traffic volumes.

#### **8 Without Proposed Development (due to 2024 background traffic)**

- **Commissioner Road (M39)/Buitekant Road intersection**

The intersection requires traffic signals.

- **Commissioner Road (M39)/M43 intersection**

The intersection requires traffic signals.

- **Commissioner Road (M39)/Aubrey Matlala Street intersection**

The northern approach requires a left turning slip lane, a through lane and a right turning lane. The southern approach requires a left turning slip lane, a through lane and a right turning lane. The eastern approach requires a left turning slip lane, 3 through lanes and 2 right turning lanes. Exit lanes have to be provided accordingly.

The traffic signal timings have to be adjusted.

- **Commissioner Road (M39)/R80/Mopanie Road intersection**

The intersection requires traffic signals.

- **Soutpan Road/Mopanie Road intersection**

The intersection requires traffic signals.

The northern approach requires a dedicated through lane and a right turning lane.

The western approach requires a left turning continuous lane.

- **Soutpan Road/Rooiwalpad Road intersection**

It is proposed that the intersection be changed to a butterfly intersection. The shared through and right turning lane on the southern approach be changed to a right turning lane only.

- **Ruth First Road/R80 Western Ramp Terminal intersection**

There is no intersection upgrades required to accommodate the 2024 background traffic volumes.

- **Ruth First Road/R80 Eastern Ramp Terminal intersection**

There is no intersection upgrades required to accommodate the 2024 background traffic volumes.

#### **C With Proposed Development (due to development traffic - 2019)**

From the 2019 background traffic proposed upgrades, the following changes and/or upgrades are required to the road network to accommodate the development trips:

- **Commissioner Road (M39)/Buitekant Road intersection**

The traffic signal timings have to be adjusted.

- **Commissioner Road (M39)/M43 intersection**

The traffic signal timings have to be adjusted.

- **Commissioner Road (M39)/Aubrey Matlala Street intersection**

The northern approach has to be reconfigured to two through lanes, a right turning lane and a left turning continuous lane. The southern approach requires an additional right turning lane. The western approach requires an additional through lane. The eastern approach requires additional through and right turning lanes. The exit lanes have to be provided accordingly.

The traffic signal timings have to be adjusted.



- **Commissioner Road (M39)/R80/Mopanie Road Intersection**

The northern approach requires an additional through lane. The southern approach requires an additional right turning lane. The eastern approach requires three right turning lanes and a left turning continuous lane.

- **Soutpan Road/Mopanie Road Intersection**

The western approach requires a left turning continuous lane.

The traffic signal timings have to be adjusted.

- **Soutpan Road/Rooiwalpad Road Intersection**

It is proposed that the intersection be changed to a butterfly intersection. The shared through and right turning lane on the southern approach be changed to a right turning lane only.

- **Ruth First Road/R80 Western Ramp Terminal Intersection**

There is no intersection upgrades required to accommodate the development traffic.

- **Ruth First Road/R80 Eastern Ramp Terminal Intersection**

There is no intersection upgrades required to accommodate the development traffic.

- **Mopanie Road/Proposed Access to development Intersection**

The proposed access positions opposite each other off Mopanie Road have been analysed for the entire development (Phases 1 to 5), and it was found that it will not be able to accommodate the entire development traffic for the five year horizon (2019) scenario.

Additional accesses will have to be provided in order to accommodate the development traffic for the entire development. The provision of additional accesses for the entire development will be dealt with in future as the development progresses. The number of accesses has to be determined. The developer may have to acquire land for these accesses.

An analysis was also done for phases 1 and 2 only to determine the configuration of the proposed access intersection. Phases 1 and 2 lie to the south of Mopanie Road, therefore the proposed access will be a T-intersection.

The following upgrades are for phases 1 and 2 development traffic only:

The intersection will require traffic signals.

The western approach requires a through lane and two right turning lanes. The eastern approach requires a through lane and a left turning slip lane. The southern approach (access approach) requires a left turning continuous lane and a right turning lane.

The exit lanes have to be provided accordingly.

#### **D With Proposed Development (due to development traffic - 2024)**

From the 2024 background traffic proposed upgrades, the following changes and/or upgrades are required to the road network to accommodate the development trips:

- **Commissioner Road (M39)/Buitekant Road Intersection**

The traffic signal timings have to be adjusted.

- **Commissioner Road (M39)/M43 Intersection**

The eastern approach requires an additional right turning lanes. Exit lanes have to be provided accordingly.

The traffic signal timings have to be adjusted.

- **Commissioner Road (M39)/Aubrey Matlala Street Intersection**

The northern approach requires an additional through lane, and the left turning yield slip lane have to be changed to a continuous slip lane. The southern approach requires an additional right turning lane. The western approach requires an additional through lane. The exit lanes have to be provided accordingly.

The traffic signal timings have to be adjusted.

- **Commissioner Road (M39)/R80/Mopanie Road intersection**

The northern approach requires an additional through lane. The southern approach requires an additional right turning lane. The eastern approach requires three right turning lanes and a left turning continuous lane.

- **Soutpan Road/Mopanie Road intersection**

The traffic signal timings have to be adjusted.

- **Soutpan Road/Rooiwalpad Road intersection**

There are no intersection upgrades required from that of the 2024 background traffic scenario to accommodate the development trips.

- **Ruth First Road/R80 Western Ramp Terminal intersection**

There are no intersection upgrades required from that of the 2024 background traffic scenario to accommodate the development trips.

- **Ruth First Road/R80 Eastern Ramp Terminal intersection**

There are no intersection upgrades required from that of the 2024 background traffic scenario to accommodate the development trips.

- **Mopanie Road/Proposed Access to development intersection**

The proposed access position for phases 1 and 2 was not analysed for the 2024 scenario as it is envisaged that other phases of the entire development would have been developed and that the proposed additional accesses would have been provided.

## 4 TRAFFIC OPERATIONS

### 4.1 Introduction

The SIDRA 5.0 and TRANSYT 14.0 software programs were used for the capacity calculations.

The signalised and priority controlled intersections were analysed using SIDRA while the all-way stop controlled intersections were analysed using TRANSYT.

### 4.2 Background Traffic

#### 4.2.1 2014 Background Traffic

The signal timings are shown in Table 4.1.

The phasings and timings of the traffic signals are included in Annexure C.

**TABLE 4.1: 2014 BACKGROUND TRAFFIC PROPOSED PEAK HOUR SIGNAL TIMINGS**

SIGNALISED INTERSECTION	PEAK HOUR	SIGNAL TIMINGS (SECONDS)									CYCLE LENGTH
		PHASE A			PHASE B			PHASE C			
		G	A	R	G	A	R	G	A	R	
COMMISSIONER/ BUITEKANT	PM	37	4	2	11	4	2	-	-	-	60
	SAT	36	4	2	12	4	2	-	-	-	60
COMMISSIONER/M43	PM	38	4	2	10	4	2	-	-	-	60
	SAT	36	4	2	12	4	2	-	-	-	60
COMMISSIONER/ AUBREY MATLALA	PM	16	4	2	24	4	2	12	4	2	70
	SAT	21	4	2	27	4	2	-	-	-	60
COMMISSIONER/R80/ MOPANIE	PM	37	4	2	11	4	2	-	-	-	60
	SAT	39	4	2	9	4	2	-	-	-	60
SOUTPAN/MOPANIE	PM	30	4	2	18	4	2	-	-	-	60
	SAT	28	4	2	20	4	2	-	-	-	60

Legend: G = Green,  
A = Amber,  
R = Red

The capacity calculation results are shown in Table 4.2. Detailed capacity calculation results are included in Annexure D.

**TABLE 4.2: 2014 BACKGROUND TRAFFIC CAPACITY CALCULATION RESULTS**

INTERSECTION		WEEKDAY PM PEAK HOUR	SATURDAY PEAK HOUR	
SIGNALISED	COMMISSIONER/ BUITEKANT	V/C ratio	0.510	0.360
		LOS	A	A
		Delay (sec/veh)	5.1	4.7
	COMMISSIONER/ M43	V/C ratio	0.650	0.640
		LOS	A	A
		Delay (sec/veh)	3.9	4.2
	COMMISSIONER/ AUBREY MATLALA	V/C ratio	0.898	0.764
		LOS	C	B
		Delay (sec/veh)	23.8	18.6
	COMMISSIONER/ R80/ MOPANIE	V/C ratio	0.720	0.560
		LOS	A	A
		Delay (sec/veh)	5.4	4.2
SOUTPAN/ MOPANIE	V/C ratio	0.860	0.650	
	LOS	B	A	
	Delay (sec/veh)	11.8	7.9	
PRIORITY CONTROLLED	SOUTPAN/ ROOIWALPAD	V/C ratio	0.418	0.160
		LOS	N/A	N/A
		Delay (sec/veh)	6.8	7.0

**TABLE 4.2: CONTINUED**

PRIORITY CONTROLLED	RUTH FIRST/R80 WESTERN RAMP TERMINAL	V/C ratio	0.438	0.263
		LOS	N/A	N/A
		Delay (sec/veh)	5.3	4.4
	RUTH FIRST/R80 EASTERN RAMP TERMINAL	V/C ratio	0.383	0.390
		LOS	N/A	N/A
		Delay (sec/veh)	9.6	9.5

Legend: V/C ratio = Volume to capacity ratio

LOS = Level of Service

N/A = The average intersection delay is not a good LOS measure for a priority control intersection due to zero delays associated with major road movements.

The intersections will operate satisfactorily with the proposed upgrades.

4.2.2 2019 Background Traffic

The signal timings are shown in Table 4.3.

The phasings and timings of the traffic signals are included in Annexure C.

**TABLE 4.3: 2019 BACKGROUND TRAFFIC PROPOSED PEAK HOUR SIGNAL TIMINGS**

SIGNALISED INTERSECTION	PEAK HOUR	SIGNAL TIMINGS (SECONDS)									CYCLE LENGTH
		PHASE A			PHASE B			PHASE C			
		G	A	R	G	A	R	G	A	R	
COMMISSIONER/ BUTEKANT	PM	37	4	2	11	4	2	-	-	-	60
	SAT	35	4	2	13	4	2	-	-	-	60
COMMISSIONER/M43	PM	38	4	2	10	4	2	-	-	-	60
	SAT	35	4	2	13	4	2	-	-	-	60
COMMISSIONER/AUBREY MATLALA	PM	13	4	2	16	4	2	13	4	2	60
	SAT	14	4	2	22	4	2	6	4	2	60
COMMISSIONER/R80/MOPANIE	PM	36	4	2	12	4	2	-	-	-	60
	SAT	39	4	2	9	4	2	-	-	-	60
SOUTPAN/MOPANIE	PM	29	4	2	19	4	2	-	-	-	60
	SAT	24	4	2	24	4	2	-	-	-	60

Legend: G = Green,  
A= Amber,  
R = Red

The capacity calculation results are shown in Table 4.4. Detailed capacity calculation results are included in Annexure B.

**TABLE 4.4: 2019 BACKGROUND TRAFFIC CAPACITY CALCULATION RESULTS**

INTERSECTION			WEEKDAY PM PEAK HOUR	SATURDAY PEAK HOUR	
SIGNALISED	COMMISSIONER/ BUTEKANT	V/C ratio	0.650	0.390	
		LOS	A	A	
		Delay (sec/veh)	5.5	4.8	
	COMMISSIONER/ M43	V/C ratio	0.750	0.690	
		LOS	A	A	
		Delay (sec/veh)	4.5	4.7	
	COMMISSIONER/ AUBREY MATLALA	V/C ratio	0.905	0.822	
		LOS	C	C	
		Delay (sec/veh)	24.8	21.9	
	COMMISSIONER/ R80/ MOPANIE	V/C ratio	0.770	0.650	
		LOS	A	A	
		Delay (sec/veh)	6.2	4.5	
	SOUTPAN/ MOPANIE	V/C ratio	0.920	0.630	
		LOS	B	A	
		Delay (sec/veh)	13.2	7.3	
	PRIORITY CONTROLLED	SOUTPAN/ ROOTWALPAD	V/C ratio	0.609	0.205
			LOS	N/A	N/A
			Delay (sec/veh)	8.2	7.2

**TABLE 4.4: CONTINUED**

PRIORITY CONTROLLED	RUTH FIRST/R80 WESTERN RAMP TERMINAL	V/C ratio	0.507	0.305
		LOS	N/A	N/A
		Delay (sec/veh)	5.4	4.4
	RUTH FIRST/R80 EASTERN RAMP TERMINAL	V/C ratio	0.444	0.451
		LOS	N/A	N/A
		Delay (sec/veh)	9.7	9.6

Legend: V/C ratio = Volume to capacity ratio

LOS = Level of Service

N/A = The average intersection delay is not a good LOS measure for a priority control intersection due to zero delays associated with major road movements.

The intersections will operate satisfactorily with the proposed upgrades.

4.2.3 2024 Background Traffic

The signal timings are shown in Table 4.5.

The phasings and timings of the traffic signals are included in Annexure C.

**TABLE 4.5: 2024 BACKGROUND TRAFFIC PROPOSED PEAK HOUR SIGNAL TIMINGS**

SIGNALISED INTERSECTION	PEAK HOUR	SIGNAL TIMINGS (SECONDS)									CYCLE LENGTH
		PHASE A			PHASE B			PHASE C			
		G	A	R	G	A	R	G	A	R	
COMMISSIONER/ BLITTEKANT	PM	38	4	2	10	4	2	-	-	-	60
	SAT	35	4	2	13	4	2	-	-	-	60
COMMISSIONER/M43	PM	37	4	2	11	4	2	-	-	-	60
	SAT	34	4	2	14	4	2	-	-	-	60
COMMISSIONER/ AUBREY MATLALA	PM	16	4	2	16	4	2	10	4	2	60
	SAT	18	4	2	18	4	2	6	4	2	60
COMMISSIONER/R80/ MOPANIE	PM	36	4	2	12	4	2	-	-	-	60
	SAT	38	4	2	10	4	2	-	-	-	60
SOUTPAN/MOPANIE	PM	41	4	2	7	4	2	-	-	-	60
	SAT	38	4	2	10	4	2	-	-	-	60

Legend: G = Green,

A= Amber,

R = Red

The capacity calculation results are shown in Table 4.6. Detailed capacity calculation results are included in Annexure D.

**TABLE 4.6: 2024 BACKGROUND TRAFFIC CAPACITY CALCULATION RESULTS**

INTERSECTION		WEEKDAY PM PEAK HOUR	SATURDAY PEAK HOUR	
SIGNALISED	COMMISSIONER/ BUTEKANT	V/C ratio	0.810	0.450
		LOS	A	A
		Delay (sec/veh)	6.5	5.0
	COMMISSIONER/ M43	V/C ratio	0.800	0.750
		LOS	A	A
		Delay (sec/veh)	5.6	5.5
	COMMISSIONER/ AUBREY MATLALA	V/C ratio	0.873	0.781
		LOS	C	C
		Delay (sec/veh)	23.0	20.7
	COMMISSIONER/ R80/ MOPANIE	V/C ratio	0.890	0.680
		LOS	A	A
		Delay (sec/veh)	8.4	4.8
SOUTPAN/ MOPANIE	V/C ratio	0.610	0.530	
	LOS	A	A	
	Delay (sec/veh)	3.3	3.7	
PRIORITY CONTROLLED	SOUTPAN/ ROOIWALPAD	V/C ratio	0.565	0.242
		LOS	N/A	N/A
		Delay (sec/veh)	4.6	6.4

**TABLE 4.6: CONTINUED**

PRIORITY CONTROLLED	RUTH FIRST/R80 WESTERN RAMP TERMINAL	V/C ratio	0.588	0.353
		LOS	N/A	N/A
		Delay (sec/veh)	5.4	4.5
	RUTH FIRST/R80 EASTERN RAMP TERMINAL	V/C ratio	0.514	0.521
		LOS	N/A	N/A
		Delay (sec/veh)	10.0	9.9

Legend: V/C ratio = Volume to capacity ratio

LOS = Level of Service

N/A = The average intersection delay is not a good LOS measure for a priority control intersection due to zero delays associated with major road movements.

The intersections will operate satisfactorily with the proposed upgrades.

### 4.3 Background and Development Traffic

#### 4.3.1 Introduction

All the intersections were analysed for the entire development (phases 1 to 5), except for the proposed access, which was analysed for phases 1 and 2 only.

#### 4.3.2 2014 Background and Development Traffic

The signal timings are shown in Table 4.7.

The phasings and timings of the traffic signals are included in Annexure C.

**TABLE 4.7: 2014 BACKGROUND AND DEVELOPMENT TRAFFIC PROPOSED PEAK HOUR SIGNAL TIMINGS**

SIGNALISED INTERSECTION	PEAK HOUR	SIGNAL TIMINGS (SECONDS)												CYCLE LENGTH
		PHASE A			PHASE B			PHASE C			PHASE D			
		G	A	R	G	A	R	G	A	R	G	A	R	
COMMISSIONER/ BUI TEKANT	PM	36	4	2	12	4	2	-	-	-	-	-	-	60
	SAT	35	4	2	13	4	2	-	-	-	-	-	-	60
COMMISSIONER/M43	PM	39	4	2	9	4	2	-	-	-	-	-	-	60
	SAT	40	4	2	8	4	2	-	-	-	-	-	-	60
COMMISSIONER/ AUBREY MATLALA	PM	11	4	2	22	4	2	7	4	2	6	4	2	70
	SAT	12	4	2	33	4	2	14	4	2	7	4	2	90
COMMISSIONER/RBO/ MOPANIE	PM	28	4	2	19	4	2	25	4	2	-	-	-	90
	SAT	22	4	2	16	4	2	34	4	2	-	-	-	90
SOUTPAN/MOPANIE	PM	33	4	2	25	4	2	-	-	-	-	-	-	70
	SAT	22	4	2	26	4	2	-	-	-	-	-	-	60
MOPANIE/PROPOSED DEVELOPMENT ACCESS (Phases 1 & 2 only)	PM	13	4	2	22	4	2	7	4	2	-	-	-	60
	SAT	25	4	2	10	4	2	7	4	2	-	-	-	60

Legend: G = Green,

A = Amber,

R = Red

The capacity calculation results are shown in Table 4.8. Detailed capacity calculation results are included in Annexure D.

**TABLE 4.8: 2014 BACKGROUND AND DEVELOPMENT TRAFFIC CAPACITY CALCULATION RESULTS**

INTERSECTION		WEEKDAY PM PEAK HOUR	SATURDAY PEAK HOUR	
SIGNALISED	COMMISSIONER/ BUI TEKANT	V/C ratio	0.620	0.510
		LOS	A	A
		Delay (sec/veh)	5.5	4.9
	COMMISSIONER/ M43	V/C ratio	0.780	0.930
		LOS	A	A
		Delay (sec/veh)	4.6	7.7
	COMMISSIONER/ AUBREY MATLALA	V/C ratio	0.859	0.886
		LOS	C	C
		Delay (sec/veh)	25.7	30.8
	COMMISSIONER/ RBO/ MOPANIE	V/C ratio	0.780	0.930
		LOS	B	B
		Delay (sec/veh)	12.0	16.0
SOUTPAN/ MOPANIE	V/C ratio	0.930	0.750	
	LOS	B	A	
	Delay (sec/veh)	15.4	8.9	
MOPANIE/ PROPOSED DEVELOPMENT ACCESS (Phases 1 & 2 only)	V/C ratio	0.752	0.667	
	LOS	B	B	
	Delay (sec/veh)	18.0	16.4	

**TABLE 4.8: CONTINUED**

PRIORITY CONTROLLED	SOUTPAN/ ROOIWALPAD	V/C ratio	0.531	0.205
		LOS	N/A	N/A
		Delay (sec/veh)	7.8	7.4
	RUTH FIRST/R80 WESTERN RAMP TERMINAL	V/C ratio	0.438	0.263
		LOS	N/A	N/A
		Delay (sec/veh)	5.3	4.5
	RUTH FIRST/R80 EASTERN RAMP TERMINAL	V/C ratio	0.383	0.390
		LOS	N/A	N/A
		Delay (sec/veh)	10.4	11.1

Legend: V/C ratio = Volume to capacity ratio

LOS = Level of Service

N/A = The average intersection delay is not a good LOS measure for a priority control intersection due to zero delays associated with major road movements.

The intersections will operate satisfactorily with the proposed upgrades.

The proposed access intersection will operate satisfactorily for phases 1 and 2 only.

4.3.3 2019 Background and Development Traffic

The signal timings are shown in Table 4.9.

The phasings and timings of the traffic signals are included in Annexure C.

**TABLE 4.9: 2019 BACKGROUND AND DEVELOPMENT TRAFFIC PROPOSED PEAK HOUR SIGNAL TIMINGS**

SIGNALISED INTERSECTION	PEAK HOUR	SIGNAL TIMINGS (SECONDS)												CYCLE LENGTH
		PHASE A			PHASE B			PHASE C			PHASE D			
		G	A	R	G	A	R	G	A	R	G	A	R	
COMMISSIONER/ BUTTEKANT	PM	37	4	2	11	4	2	-	-	-	-	-	-	60
	SAT	34	4	2	14	4	2	-	-	-	-	-	-	60
COMMISSIONER/M43	PM	40	4	2	8	4	2	-	-	-	-	-	-	60
	SAT	27	4	2	22	4	2	13	4	2	-	-	-	80
COMMISSIONER/ AUBREY MATLALA	PM	14	4	2	17	4	2	8	4	2	7	4	2	70
	SAT	9	4	2	19	4	2	11	4	2	7	4	2	70
COMMISSIONER/R80/ MOPANIE	PM	31	4	2	15	4	2	26	4	2	-	-	-	90
	SAT	24	4	2	13	4	2	35	4	2	-	-	-	90
SOUTPAN/MOPANIE	PM	41	4	2	7	4	2	-	-	-	-	-	-	60
	SAT	37	4	2	11	4	2	-	-	-	-	-	-	60
MOPANIE/PROPOSED DEVELOPMENT ACCESS (Phases 1 & 2 only)	PM	12	4	2	23	4	2	7	4	2	-	-	-	60
	SAT	24	4	2	11	4	2	7	4	2	-	-	-	60

Legend: G = Green,

A = Amber,

R = Red



The capacity calculation results are shown in Table 4.10. Detailed capacity calculation results are included in Annexure D.

**TABLE 4.10: 2019 BACKGROUND AND DEVELOPMENT TRAFFIC CAPACITY CALCULATION RESULTS**

INTERSECTION		WEEKDAY PM PEAK HOUR	SATURDAY PEAK HOUR	
SIGNALISED	COMMISSIONER/ BUTTEKANT	V/C ratio	0.740	0.520
		LOS	A	A
		Delay (sec/veh)	6.2	5.10
	COMMISSIONER/ M43	V/C ratio	0.930	0.940
		LOS	A	B
		Delay (sec/veh)	8.1	16.3
	COMMISSIONER/ AUBREY MATLALA	V/C ratio	0.804	0.887
		LOS	C	C
		Delay (sec/veh)	24.4	25.6
	COMMISSIONER/ R80/ MOPANIE	V/C ratio	0.780	0.890
		LOS	B	B
		Delay (sec/veh)	11.7	14.2
	SOUTPAN/ MOPANIE	V/C ratio	0.630	0.580
		LOS	A	A
		Delay (sec/veh)	3.7	4.0
	MOPANIE/ PROPOSED DEVELOPMENT ACCESS (Phases 1 & 2 only)	V/C ratio	0.860	0.697
		LOS	B	B
		Delay (sec/veh)	19.5	16.8

**TABLE 4.10: CONTINUED**

PRIORITY CONTROLLED	SOUTPAN/ ROOIWALPAD	V/C ratio	0.529	0.235
		LOS	N/A	N/A
		Delay (sec/veh)	4.6	6.5
	RUTH FIRST/R80 WESTERN RAMP TERMINAL	V/C ratio	0.507	0.305
		LOS	N/A	N/A
		Delay (sec/veh)	5.4	4.6
	RUTH FIRST/R80 EASTERN RAMP TERMINAL	V/C ratio	0.444	0.451
		LOS	N/A	N/A
		Delay (sec/veh)	10.7	11.4

Legend: V/C ratio = Volume to capacity ratio

LOS = Level of Service

N/A = The average intersection delay is not a good LOS measure for a priority control intersection due to zero delays associated with major road movements.

The intersections will operate satisfactorily with the proposed upgrades.

The proposed access intersection will operate satisfactorily for phases 1 and 2 only.

4.3.4 2024 Background and Development Traffic

The proposed access position for phases 1 and 2 was not analysed for the 2024 scenario as it is envisaged that other phases of the entire development would have been developed and that the proposed additional accesses would have been provided.

The signal timings are shown in Table 4.11.

The phasings and timings of the traffic signals are included in Annexure C.

**TABLE 4.11: 2024 BACKGROUND AND DEVELOPMENT TRAFFIC PROPOSED PEAK HOUR SIGNAL TIMINGS**

SIGNALISED INTERSECTION	PEAK HOUR	SIGNAL TIMINGS (SECONDS)												CYCLE LENGTH
		PHASE A			PHASE B			PHASE C			PHASE D			
		G	A	R	G	A	R	G	A	R	G	A	R	
COMMISSIONER/ BUTEKANT	PM	38	4	2	10	4	2	-	-	-	-	-	-	60
	SAT	34	4	2	14	4	2	-	-	-	-	-	-	60
COMMISSIONER/M43	PM	14	4	2	17	4	2	11	4	2	-	-	-	60
	SAT	11	4	2	19	4	2	12	4	2	-	-	-	60
COMMISSIONER/AUBREY MATLALA	PM	13	4	2	25	4	2	7	4	2	6	4	2	75
	SAT	11	4	2	24	4	2	13	4	2	8	4	2	80
COMMISSIONER/R80/MOPANIE	PM	30	4	2	17	4	2	25	4	2	-	-	-	90
	SAT	24	4	2	14	4	2	34	4	2	-	-	-	90
SOUTPAN/MOPANIE	PM	41	4	2	7	4	2	-	-	-	-	-	-	60
	SAT	36	4	2	12	4	2	-	-	-	-	-	-	60

Legend: G = Green,  
A = Amber,  
R = Red

The capacity calculation results are shown in Table 4.12. Detailed capacity calculation results are included in Annexure D.

**TABLE 4.12: 2024 BACKGROUND AND DEVELOPMENT TRAFFIC CAPACITY CALCULATION RESULTS**

INTERSECTION		WEEKDAY PM PEAK HOUR	SATURDAY PEAK HOUR	
SIGNALISED	COMMISSIONER/ BUTEKANT	V/C ratio	0.910	0.580
		LOS	A	A
		Delay (sec/veh)	8.7	5.4
	COMMISSIONER/ M43	V/C ratio	0.840	0.890
		LOS	A	B
		Delay (sec/veh)	9.2	11.2
	COMMISSIONER/ AUBREY MATLALA	V/C ratio	0.930	0.909
		LOS	C	C
		Delay (sec/veh)	32.9	34.7
	COMMISSIONER/ R80/ MOPANIE	V/C ratio	0.850	0.930
		LOS	B	B
		Delay (sec/veh)	12.5	15.9
SOUTPAN/ MOPANIE	V/C ratio	0.880	0.600	
	LOS	A	A	
	Delay (sec/veh)	6.0	4.3	
PRIORITY CONTROLLED	SOUTPAN/ ROOTWALPAD	V/C ratio	0.507	0.269
		LOS	N/A	N/A
		Delay (sec/veh)	4.7	6.6

**TABLE 4.12: CONTINUED**

PRIORITY CONTROLLED	RUTH FIRST/R80 WESTERN RAMP TERMINAL	V/C ratio	0.588	0.353
		LOS	N/A	N/A
		Delay (sec/veh)	5.4	4.6
	RUTH FIRST/R80 EASTERN RAMP TERMINAL	V/C ratio	0.514	0.521
		LOS	N/A	N/A
		Delay (sec/veh)	11.1	12.0

Legend: V/C ratio = Volume to capacity ratio

LOS = Level of Service

N/A = The average intersection delay is not a good LOS measure for a priority control intersection due to zero delays associated with major road movements.

The intersections will operate satisfactorily with the proposed upgrades.

## 5 ACCESS

Phases 1 and 2 of the proposed development lie to the south of Mopanie Road, therefore the proposed access intersection for these phases will be a full T-intersection.

The proposed T-intersection will operate satisfactorily for the 2019 background and development traffic scenario.

An additional leg to the north of Mopanie Road will be provided to the intersection as the development progresses, and will provide access to the phases of the proposed development lying to the north of Mopanie Road.

The proposed access will form a four-legged intersection with Mopanie Road for the entire development (phases 1 to 5).

It was found that the proposed access will not be able to accommodate the entire development traffic for the five year horizon (2019) scenario.

Additional accesses will have to be provided in order to accommodate the development traffic for the entire development. Land for the other accesses has to be acquired now.

The proposed access position was evaluated using the National Guidelines for Road Access Management in South Africa.

The Gauteng Department of Roads and Transport requires that an access be located 100m away from a provincial road reserve boundary. The proposed access position lies more than 100m away to the east of the R80 freeway road reserve boundary, and therefore the access position is adequate.

## 6 PEDESTRIAN AND PUBLIC TRANSPORT ASSESSMENT

### 6.1 Pedestrians

It is recommended that pedestrian walkways be provided along the northern and southern sides of Mopanie Road and anywhere else required in consultation with the City of Tshwane.

Pedestrian facilities will be provided at all signalised intersections (i.e. pedestrian crossings, pedestrian signals, etc.).

The widths of the pedestrian walkways will be dealt with during the site development stage but will not be less than 1.5m wide.

### 6.2 Public Transport

The proposed development sites are bordered by bus and taxi routes (Mopanie Road and Soutpan Road), but there are no public transport facilities provided within the vicinity of the proposed development sites.

It is proposed that taxi and bus bays be provided along Mopanie Road and Soutpan Road on both sides of the roads.

The developer will provide a taxi rank adjacent to the retail centre, together with drop-off/pick-up points.

The developer is also willing to construct a BRT station along Mopanie Road provided that the BRT route could be extended to the site.

## 7 SUMMARY OF ROAD UPGRADES

### 7.1 Introduction

It is required that the cost of upgrades to the road network as a result of background traffic volumes be paid by the local authority.

It is required that the cost of upgrades to the road network to mitigate the effects of the development traffic volumes be paid by the developer.

### 7.2 Road upgrades to accommodate the background traffic

#### 7.2.1 Road upgrades to accommodate the 2019 background traffic

- **Commissioner Road (M39)/Buitekant Road intersection**

The intersection requires traffic signals.

- **Commissioner Road (M39)/M43 intersection**

The intersection requires traffic signals.

- **Commissioner Road (M39)/Aubrey Matlala Street intersection**

The northern approach requires a shared through and left turning slip lane and a right turning lane. The southern approach requires a left turning continuous lane, a through lane and a right turning lane.

The traffic signal timings have to be adjusted.

- **Commissioner Road (M39)/R80/Mopanie Road intersection**

The intersection requires traffic signals.

- **Soutpan Road/Mopanie Road intersection**

The intersection requires traffic signals.

The northern approach requires a dedicated through lane and a right turning lane.

- **Soutpan Road/Rooiwalpad Road intersection**

There is no intersection upgrades required to accommodate the 2019 background traffic volumes.

- **Ruth First Road/R80 Western Ramp Terminal Intersection**

There is no intersection upgrades required to accommodate the 2019 background traffic volumes.

- **Ruth First Road/R80 Eastern Ramp Terminal Intersection**

There is no intersection upgrades required to accommodate the 2019 background traffic volumes.

#### 7.2.2 Road upgrades to accommodate the 2024 background traffic

- **Commissioner Road (M39)/Buitekant Road intersection**

The intersection requires traffic signals.

- **Commissioner Road (M39)/M43 intersection**

The intersection requires traffic signals.

- **Commissioner Road (M39)/Aubrey Mattala Street intersection**

The northern approach requires a left turning slip lane, a through lane and a right turning lane. The southern approach requires a left turning slip lane, a through lane and a right turning lane. The eastern approach requires a left turning slip lane, 3 through lanes and 2 right turning lanes. Exit lanes have to be provided accordingly.

The traffic signal timings have to be adjusted.

- **Commissioner Road (M39)/R80/Mopanie Road Intersection**

The intersection requires traffic signals.

- **Soutpan Road/Mopanie Road Intersection**

The intersection requires traffic signals.

The northern approach requires a dedicated through lane and a right turning lane.

The western approach requires a left turning continuous lane.

- **Soutpan Road/Rooiwalpad Road Intersection**

It is proposed that the intersection be changed to a butterfly intersection. The shared through and right turning lane on the southern approach be changed to a right turning lane only.

- **Ruth First Road/R80 Western Ramp Terminal intersection**

There is no intersection upgrades required to accommodate the 2024 background traffic volumes.

- **Ruth First Road/R80 Eastern Ramp Terminal Intersection**

There is no intersection upgrades required to accommodate the 2024 background traffic volumes.

### 7.3 Road upgrades to accommodate the development traffic

#### 7.3.1 Road upgrades to accommodate the development traffic in 2019

- **Commissioner Road (M39)/Buitekant Road intersection**

The traffic signal timings have to be adjusted.

- **Commissioner Road (M39)/M43 intersection**

The traffic signal timings have to be adjusted.

- **Commissioner Road (M39)/Aubrey Mattala Street Intersection**

The northern approach has to be reconfigured to two through lanes, a right turning lane and a left turning continuous lane. The southern approach requires an additional right turning lane. The western approach requires an additional through lane. The eastern approach requires additional through and right turning lanes. The exit lanes have to be provided accordingly.

The traffic signal timings have to be adjusted.

- **Commissioner Road (M39)/R80/Mopanie Road Intersection**

The northern approach requires an additional through lane. The southern approach requires an additional right turning lane. The eastern approach requires three right turning lanes and a left turning continuous lane.

- **Soutpan Road/Mopanie Road intersection**

The western approach requires a left turning continuous lane.

The traffic signal timings have to be adjusted.

- **Soutpan Road/Rooiwalpad Road intersection**

It is proposed that the intersection be changed to a butterfly intersection. The shared through and right turning lane on the southern approach be changed to a right turning lane only.

- **Ruth First Road/R80 Western Ramp Terminal Intersection**

There is no intersection upgrades required to accommodate the development traffic.

- **Ruth First Road/R80 Eastern Ramp Terminal Intersection**

There is no intersection upgrades required to accommodate the development traffic.

- **Mopanie Road/Proposed Access to development intersection**

The proposed access positions opposite each other off Mopanie Road have been analysed for the entire development (Phases 1 to 5), and it was found that it will not be able to accommodate the entire development traffic for the five year horizon (2019) scenario.

Additional accesses will have to be provided in order to accommodate the development traffic for the entire development. The provision of additional accesses for the entire development will be dealt with in future as the development progresses. The number of accesses has to be determined. The developer may have to acquire land for these accesses.

An analysis was also done for phases 1 and 2 only to determine the configuration of the proposed access intersection. Phases 1 and 2 lie to the south of Mopanie Road, therefore the proposed access will be a T-intersection.

The following upgrades are for phases 1 and 2 development traffic only:

The intersection will require traffic signals.

The western approach requires a through lane and two right turning lanes. The eastern approach requires a through lane and a left turning slip lane. The southern approach (access approach) requires a left turning continuous lane and a right turning lane.

The exit lanes have to be provided accordingly.

### 7.3.2 Road upgrades to accommodate the development traffic in 2024

- **Commissioner Road (M39)/Bultekant Road intersection**

The traffic signal timings have to be adjusted.

- **Commissioner Road (M39)/M43 intersection**

The eastern approach requires an additional right turning lanes. Exit lanes have to be provided accordingly.

The traffic signal timings have to be adjusted.

- **Commissioner Road (M39)/Aubrey Matlala Street intersection**

The northern approach requires an additional through lane, and the left turning yield slip lane have to be changed to a continuous slip lane. The southern approach requires an additional right turning lane. The western approach requires an additional through lane. The exit lanes have to be provided accordingly.

The traffic signal timings have to be adjusted.

- **Commissioner Road (M39)/R80/Mopanie Road intersection**

The northern approach requires an additional through lane. The southern approach requires an additional right turning lane. The eastern approach requires three right turning lanes and a left turning continuous lane.

- **Soutpan Road/Mopanie Road intersection**

The traffic signal timings have to be adjusted.

- **Soutpan Road/Rooiwalpad Road intersection**

There are no intersection upgrades required from that of the 2024 background traffic scenario to accommodate the development trips.

- **Ruth First Road/R80 Western Ramp Terminal intersection**

There are no intersection upgrades required from that of the 2024 background traffic scenario to accommodate the development trips.

- **Ruth First Road/R80 Eastern Ramp Terminal intersection**

There are no intersection upgrades required from that of the 2024 background traffic scenario to accommodate the development trips.

- **Mopanie Road/Proposed Access to development intersection**

The proposed access position for phases 1 and 2 was not analysed for the 2024 scenario as it is envisaged that other phases or the entire development would have been developed and that the proposed additional access would have been provided.

## **8 CONCLUSION**

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The sites of the proposed development are situated on Portions 68, 69 and 112 to 116, Onderstepoort 266-JR.

The proposed sites will be developed over 5 phases over a number of years and will consist of the following components:

**Phase 1**

- Retail.

**Phase 2**

- Special for public garage and ancillary uses; and
- Special for mixed-uses.

**Phase 3**

- Special for mixed-uses.

**Phase 4**

- Residential 1;
- Residential 3; and
- Special for community uses

**Phase 5**

- Residential 1;
- Residential 3;
- Special for community uses; and
- Educational.

Due to the extent of the proposed development, traffic impact studies will be submitted to CoT and Gautrans for approval prior to each phase/phases being constructed.

Trip reductions were applied to the total development trips to account for walking, public transport and internal vehicle trips between the various components of the proposed development. A vast majority of trips will be walking and public transport trips. The proposed development trips were also reduced to account for low car ownership in the area.

The proposed development will generate more than 2000 trips during the weekday afternoon and Saturday peak hours, therefore a ten year horizon after the base year

should to be analysed in accordance with the City Council of Pretoria's Guidelines for Traffic Impact Studies.

A 5 year and a 10 year horizon period after the base year have been considered in this traffic study, but due to the fact that a ten year horizon might be inconclusive as new roads and developments might be constructed within the vicinity of the proposed development which might not require the proposed ten year horizon road upgrades.

The proposed development with trip reductions will generate a total of **3 385** and **5 150** development trips during the weekday afternoon and Saturday peak hours, respectively.

The development traffic can be accommodated on the proposed upgraded road network except for the proposed access intersection with Mopanie Road for the 2019 background and development traffic scenario.

The proposed accesses off Mopanie Road will not be able to accommodate the entire development traffic for the five year horizon period scenario.

Additional accesses will have to be provided in order to accommodate the development traffic for the entire development. The land requirements for the provision of additional accesses have to be acquired now.

An analysis was done for phases 1 and 2 only to determine the configuration of the proposed access intersection.

The proposed access intersection will be able to accommodate the development traffic for phases 1 and 2.

## 9 RECOMMENDATIONS

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It is recommended that:

- the proposed mixed-use development on Portions 68, 69 and 112 to 116, Onderstepoort 266-JR be approved subject to the proposed road upgrades being implemented.
- the developer constructs accesses to the proposed development sites.
- the developer constructs pedestrian and public transport facilities where required in consultation with the City of Tshwane.
- the geometric layouts of the upgrades on roads be submitted to CoT and Gautrans for approval.



## REFERENCES

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2. BKS Incorporated, (June 1995) **South African Trip Generation Rates**, 2<sup>nd</sup> Edition, Report No. RR 92/228, Department of Transport, Pretoria, South Africa.
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## FIGURES

**ANNEXURE A**  
**SITE DEVELOPMENT PLAN**

**ANNEXURE B**  
**EXISTING AND PROPOSED**  
**UPGRADED INTERSECTION**  
**CONFIGURATIONS**

**ANNEXURE C**

**TRAFFIC SIGNAL PHASINGS AND  
TIMINGS**

**ANNEXURE D**

**CAPACITY CALCULATION RESULTS**

PROPOSED MIXED-USE DEVELOPMENT - EXISTING AND PROPOSED CONFIGURATIONS

1. Buitekant Road / Bushveld Road



2. Aubrey Matlakala Street / Bushveld Road



3. Bushveld Road / R80 / Mopanie Road		
EXISTING	BACKGROUND	BACKGROUND + DEVELOPMENT
	<p>No upgrades proposed</p>	
4. Mopanie Road / Proposed Access 1 and 2		
EXISTING	BACKGROUND	BACKGROUND + DEVELOPMENT
<p>N/A</p>	<p>N/A</p>	

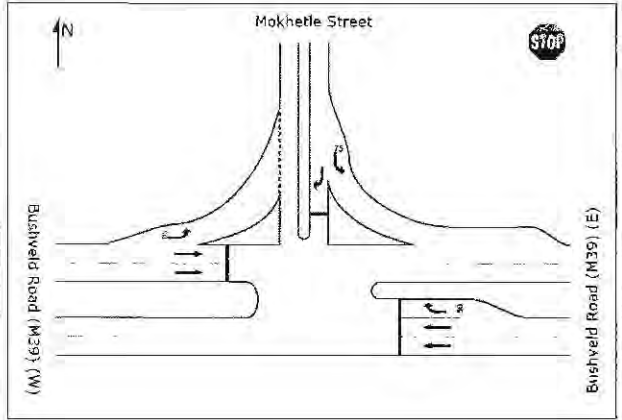
**5. Soutpan Road / Rooiwalpad**



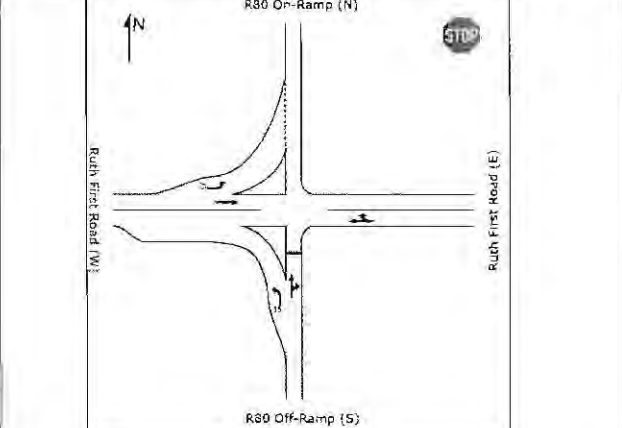
**6. Mopanie Road / Soutpan Road**



**7. Bushveld Road / Mokhetle Road**

EXISTING	BACKGROUND	BACKGROUND + DEVELOPMENT
 <p>The diagram shows an intersection of Mokhetle Street (vertical) and Bushveld Road (M39) (horizontal). Bushveld Road has two lanes in each direction. Mokhetle Street crosses over Bushveld Road. A stop sign is located at the intersection. Arrows indicate traffic flow. A north arrow is in the top left corner.</p>	<p>No Upgrades Required</p>	<p>No Upgrades Required</p>

**8. R80 / Ruth First Road Western Terminal ramp**

EXISTING	BACKGROUND	BACKGROUND + DEVELOPMENT
 <p>The diagram shows an intersection of Ruth First Road (vertical) and R80 (horizontal). Ruth First Road has two lanes in each direction. R80 has an on-ramp (N) and an off-ramp (S). A stop sign is located at the intersection. Arrows indicate traffic flow. A north arrow is in the top left corner.</p>	<p>No Upgrades Required</p>	<p>No Upgrades Required</p>

EXISTING	9, R80 / Ruth First Eastern Terminal Ramp BACKGROUND		BACKGROUND + DEVELOPMENT
	<p>No Upgrades Required</p>	<p>No Upgrades Required</p>	

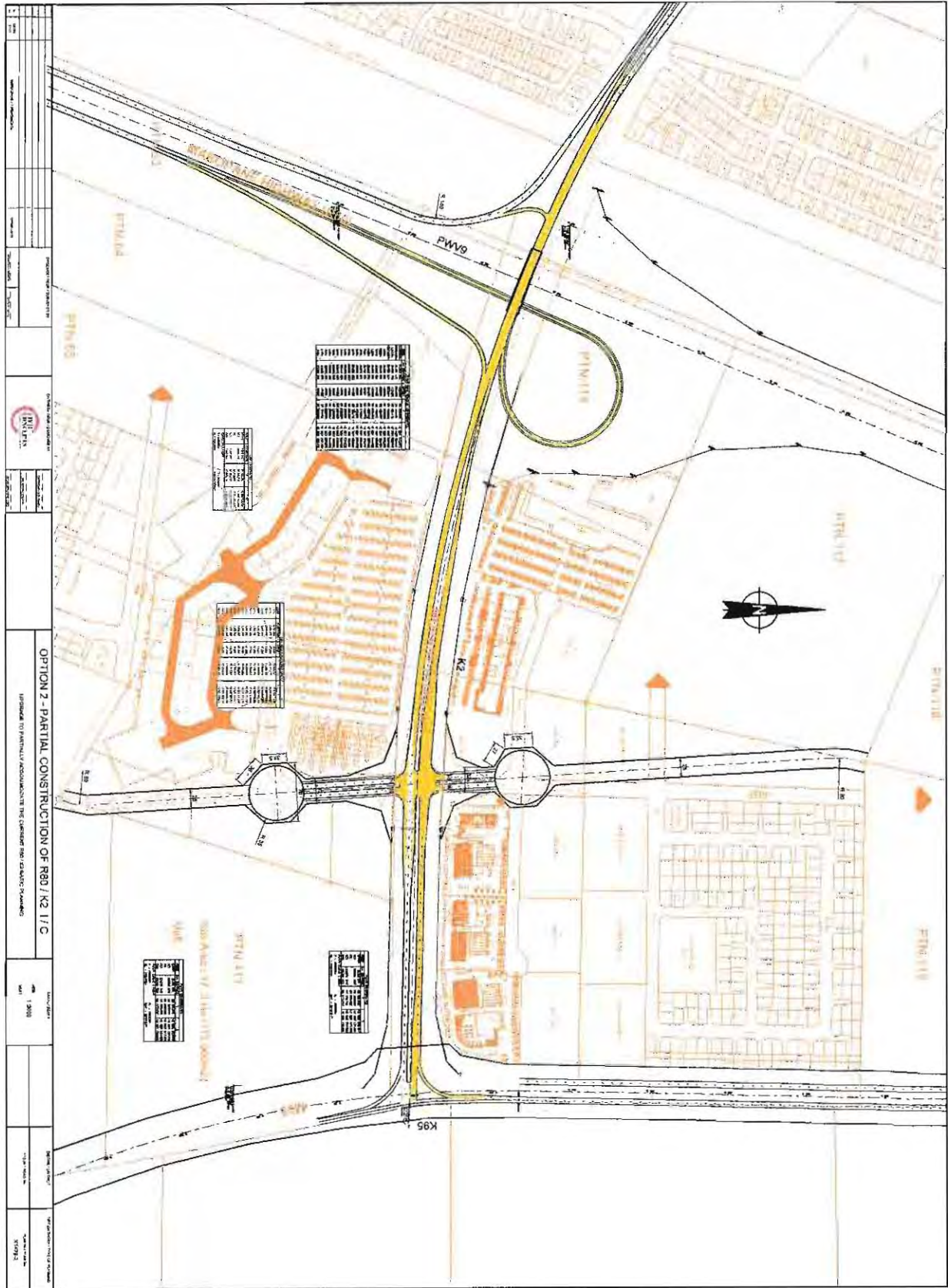


Three proposed alternatives for the upgrading of the intersection of the  
Mabopane freeway (road R80) with Mopanie Road

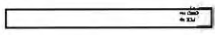
Alternative 3 is preferred







<p>OPTION 2 - PARTIAL CONSTRUCTION OF R80 / K2 I/C          UPGRADING TO PARTIALLY ACCOMMODATE THE CURRENT ROAD DESIGN STANDARDS</p>	
<p>DATE: 1/2003</p>	<p>SCALE: 1:500</p>
<p>PROJECT NO: 1000000000</p>	<p>DATE: 1/2003</p>
<p>PROJECT NO: 1000000000</p>	<p>DATE: 1/2003</p>







**ANNEXURE L – CIVIL ENGINEERING SERVICES REPORT**



Civil Concepts (Pty) Ltd, Reg Number: 95/12428/07  
50, 15<sup>th</sup> Street, Menlo Park  
(Cnr 17<sup>th</sup> & Justice Mahomed (Charles) Streets)  
PO Box 36148, Menlo Park, 0102  
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Email: mail@civilconcepts.co.za



C1581/2.9  
8 August 2014

**ONDERSTEPSPOORT EXTS 33, 34, 38 AND 39**  
**BULK WATER AND SEWERAGE**  
**COMMENTS ON GLS CONSULTING'S REPORT**

**1. Bulk Water**

- 1.1 The total costs required to provide bulk water to this development and surrounding areas is R28 720 160.00.
- 1.2 To provide water to this development, we propose that a temporary connection be made to the existing water network in Soshanguve and that the following pipes be installed at the following costs:
- |                    |                    |
|--------------------|--------------------|
| - SLR.31           | R 4 121 600        |
| - SLR.32           | R 6 897 800        |
| <b>Total Costs</b> | <b>R11 019 400</b> |

- 1.3 We further propose that we negotiate with Council regarding offsetting the bulk service contributions for water against the above costs.

- 1.4 The balance of the work (R17 700 760) should be done by other developers in the surrounding areas.

**2. Bulk Sewers**

- 2.1 The proposed development falls into two drainage areas. The proposed development North of Mopane Road drains towards the Rietgat sewage treatment works to the North. The proposed development South of Mopane Road drains towards the Rooiwal sewage treatment works to the South.
- 2.2 The estimated costs to install the bulk outfall sewers from the proposed development to the above sewage treatment works are:
- |                                    |             |
|------------------------------------|-------------|
| - Outfall sewer to Rietgat (North) | R 3 347 900 |
| - Outfall sewer to Rooiwal (South) | R17 300 100 |
- 2.3 On the Northern section of the development, we have not included the cost of sewer RG F052.01 (R1 559 500) as it may be possible to internally drain this area.
- 2.4 To drain the section of the development North of Mopane Road, we propose that the Northern outfall sewer (R3 347 900) be installed.

DIRECTORS:

**TS Kruger** PrEng MEng MSAICE AIAStructE CEng    **HJ van den Berg** PrEng B Eng (Civ)  
**JC Paola** PrEng BSc(Eng) MSAICE AIAStructE CEng    **W Stander** Pr Eng BSc(Eng) MSAICE    **MM Gounden** PrEng BSc(Eng)MSAICE MIHT

- 2.5 To drain the section of the development South of Mopane Road, we propose that a temporary sewage pump station be installed at the low point of this section, which pumps sewage to the Northern section.
- 2.6 We further propose that we negotiate with Council regarding offsetting the bulk service contributions for sewage against the above costs.

**3. Summary**

If the above proposals are acceptable, we propose that we be appointed to discuss these proposals and the way forward with Council.

Civil Concepts (Pty) Ltd  
August 2014

27 July 2014

General Manager: Water and Sanitation  
City of Tshwane Metropolitan Municipality  
PO Box 6338  
PRETORIA  
0001

**ATTENTION: Ms Andronica Mathibela**

Dear Ma'am,

**WATER AND SEWER MASTER PLANS: DEVELOPMENT OF PROPOSED TOWNSHIP/REZONING –  
ONDERSTEPSPOORT 226JR PTNS 68, 69 AND 112 TO 116**

The attached request from Civil Concepts (Jamie Paola) dated 04 April 2014 with regards to accommodating the proposed development in the Tshwane water and sewer systems refers.

Although the City of Tshwane has water and sewer master plans, you requested this further analysis and report because :

- The development is considered to be a large development (i.e. > than 250 housing units).
- The development has large fire flow requirements (e.g. 20l/s, 25l/s or 50l/s which is usually the case for higher density cluster developments, industry, general business, shopping centres or high-rise flats >= 4 storeys).

This report is a technical report stating upgrades required in the distribution networks in the vicinity of the proposed development. The City of Tshwane engineer (yourself) will accept the report or suggest changes and will make a final decision on works to be implemented by the proposed development.

This analysis and report is based on the 2010 water and sewer master plans which are updated every quarter. The latest master plans which were used in this analysis were the October 2013 master plans.

All costs shown in this report are estimates only and **include** 40% surcharge for P&Gs, contingencies and fees but **exclude** VAT.



# 1 WATER DISTRIBUTION NETWORK

## 1.1 Distribution Zone

The proposed development was taken into consideration in the above mentioned water master plan as part of Onderstepoort 266JR 1A and Onderstepoort 266JR 1B future development areas. The master plan indicates that the proposed development falls in the Soshanguve L reservoir zone.

## 1.2 Revised Water Demand

The combined AADD for the proposed development as originally calculated and used in the analysis of the water distribution network in the master plan was 863kℓ/d.

The revised AADD, peak flow and fire flow calculated for the proposed development and used in the re-analysis of the water distribution network was:

Development name	Anticipated Location	New Develop. Area (ha)	Density (Units/ha)	FFH	Fire flow (ℓ/s)	No. of Units	FSR Units	Unit Type	UWCD (ℓ/c Unit/d)	AADD (No. Units) (kℓ/d)	PEEPH (No. Units) (kℓ/d)	Water Demand Ratio	Peak Flow (ℓ/s)	Fire Flow (ℓ/s)	
X3	General business with an FSR	15.709		0.30	4.710		471	floor	0.80	471000m <sup>3</sup> /d	371	784	75%	5.3	3.0
	Roads	1.600						none	0.00	0m <sup>3</sup> /d	0	0	0%	0.0	0.0
X4	Garage or filling station	1.380		0.60	0.890		69	floor	1.20	82800m <sup>3</sup> /d	83	53	84%	1.0	1.4
	Mixed	0.770		0.50	0.355		39	floor	0.80	31200m <sup>3</sup> /d	31	20	88%	0.4	0.6
XA	Mixed	12.990		0.50	6.495		650	seor	0.80	520000m <sup>3</sup> /d	520	340	65%	6.5	9.5
	Roads	1.510						none	0.00	0m <sup>3</sup> /d	0	0	0%	0.0	0.0
XB	Low cost housing - erf up to 500m <sup>2</sup>	5.110	54			276		unit	0.75	207000m <sup>3</sup> /d	207	168	82%	2.5	3.9
	High rise flats ( ± 50m <sup>2</sup> per unit ) + FSR residential	4.270	81			346		unit	0.80	280800m <sup>3</sup> /d	208	202	97%	3.0	4.3
	Club buildings	0.170		0.25	0.043		4	floor	0.30	10200m <sup>3</sup> /d	1	1	74%	0.0	0.0
	Municipal/ governmental developments	0.060		0.25	0.015		2	floor	0.60	12000m <sup>3</sup> /d	1	1	70%	0.0	0.0
	Public open space	1.230						area	15.00	18360m <sup>3</sup> /d	18	0	0%	0.0	0.0
	Roads	4.630						none	0.00	0m <sup>3</sup> /d	0	0	0%	0.0	0.0
XC	Low cost housing - erf up to 500m <sup>2</sup>	4.890	43			209		unit	0.75	157000m <sup>3</sup> /d	157	128	82%	1.9	2.7
	High rise flats ( ± 50m <sup>2</sup> per unit ) + FSR residential	2.800	80			224		unit	0.80	180800m <sup>3</sup> /d	134	131	97%	2.0	2.8
	Club buildings	0.210		0.25	0.053		5	floor	0.30	10200m <sup>3</sup> /d	2	1	74%	0.0	0.0
	School, creche, educational buildings	2.800		0.25	0.700		70	floor	0.60	168000m <sup>3</sup> /d	42	28	67%	0.5	0.7
	Public open space	2.370						area	15.00	35550m <sup>3</sup> /d	36	0	0%	0.0	0.0
	Roads	3.840						none	0.00	0m <sup>3</sup> /d	0	0	0%	0.0	0.0
<b>New Master Plan To New Master Plan Total</b>		<b>66.330</b>				<b>1655</b>	<b>1340</b>			<b>1616</b>	<b>1367</b>	<b>78%</b>	<b>23.3</b>	<b>33.4</b>	

- Peak flow using zone peak hour factor of:  $3.0^{\ddagger}$  = 63 ℓ/s
- Fire flow for type: Industrial/Business – moderate risk = 50 ℓ/s @ 15 m

## 1.3 Accommodation of Proposed Development in the Existing Water Distribution Network

Accommodation of the proposed development, with its revised AADD, requires implementation of the following additions and adjustments to the existing water distribution network as indicated in **Figure 1 (Water)** attached:

### 1.3.1 Bulk Items

Items required to alleviate existing problems in the bulk water system:

- SB.8 390 m x 900 mm Ø main pipe R 4 098 920 \*

### 1.3.2 Reticulation Items

Items required to alleviate existing problems in the water distribution network:

- SLR.19 35 m x 110 mm Ø link pipe R 40 040 \*

<sup>‡</sup> Higher peak flow factors might be applicable for internal networks.

\* Year 2013/14 Rand value which includes 40% surcharge for P&Gs, contingencies and fees but excludes VAT.

Items required to accommodate the proposed development (excluding fire flow requirements):

• As above, and:							
• SLR.21a	405	m	x	900	mm Ø main pipe	R	4 098 920 *
• SLR.20	1 470	m	x	700	mm Ø parallel reinforcement pipe (to existing 250 mm Ø pipe) <i>QR equivalent replacement pipe</i>	R	9 462 880 *
					750mm Ø	R	11 309 000
• SLR.31	585	m	x	700	mm Ø main pipe	R	4 121 600 *
• SLR.32	1 085	m	x	700	mm Ø main pipe	R	6 897 800 *

Items required to accommodate the proposed development (including fire flow requirements):

- As above.

The proposed connection point to the existing water distribution system is shown in **Figure 1 (Water)** attached.

#### 1.4 Internal Reticulation

The internal network design on the property of the proposed development is beyond the scope of this report. However, the consulting engineer for the development is required to allow for the fire flow demand as listed in 1.2 above on the internal networks.

For internal network design purposes the water distribution network provides the following energy gradelines (EGLs) at the proposed connection point (see **Figure 1 (Water)**):

				<u>POINT A</u>
• Static EGL	=	1 355	m a.s.l. (44 m)	
• Residual EGL	=	1 351	m a.s.l. (40 m)	
• Fire Flow EGL	=	1 349	m a.s.l. (38 m)	
• Ground Level	=	1 311	m a.s.l.	

#### 1.5 Adjustments to the Master Plan

No adjustments to the water master plan are required due to the revised AADD of the proposed development.

## 2 SEWER NETWORK

### 2.1 Drainage Area

The proposed development was taken into consideration in the above mentioned water master plan as part of Onderstepoort 266JR 1A and Onderstepoort 266JR 1B future development areas.

The master plan indicates that the proposed development falls in the Rietgat and Rooiwal 1 drainage areas.

\* Year 2013/14 Rand value which includes 40% surcharge for P&Gs, contingencies and fees but excludes VAT.

## RIETGAT DRAINAGE AREA

### 2.2 Revised Sewer Flow

The combined peak day dry weather flow (PDDWF) for the proposed development as originally calculated and used in the analysis of the sewer system in the master plan was 325 kℓ/d.

The revised PDDWF calculated for the proposed development and used in the re-analysis of the sewer system was 955 kℓ/d with an instantaneous peak dry weather flow (IPDWF) of 12.2 ℓ/s. The design flow, or instantaneous peak wet weather flow (IPWWF), is 17.4 ℓ/s.

### 2.3 Accommodation of the Proposed Development in the Existing Sewer System

Accommodation of the proposed development, with its revised PDDWF, requires implementation of the following additions and adjustments to the *existing* sewer reticulation network as indicated in **Figure 2 (Sewer)** attached:

#### 2.3.1 Sewer Bulk Items

Items required to alleviate existing problems in the bulk sewer system i.e. WWTWs:

- RG\_019.00a 30 Mℓ/d Upgrade existing Riegat WWTP R 222 336 000 \*

Items required to accommodate the proposed development in the bulk sewer system i.e.

WWTWs:

- As above

#### 2.3.2 Sewer Reticulation Items

Items required to alleviate existing problems in the existing sewer system:

- None

Items required to accommodate the proposed development in the existing sewer system:

- RG\_F053.00 1 305 m x 160 mm Ø new pipe Design Flow = 11.4 ℓ/s R 1 228 800 \*
- RG\_F052.01 1 704 m x 160 mm Ø new pipe Design Flow = 8.8 ℓ/s R 1 559 500 \*
- RG\_F052.02 400 m x 200 mm Ø new pipe Design Flow = 22.3 ℓ/s R 510 500 \*
- RG\_F052.04 658 m x 250 mm Ø new pipe Design Flow = 28.1 ℓ/s R 836 900 \*
- RG\_F052.05 508 m x 315 mm Ø new pipe Design Flow = 72.8 ℓ/s R 773 700 \*

The proposed connection points to the existing sewer system are shown in **Figure 2 (Sewer)** attached.

In **Figure 2 (Sewer)** attached pipes in future development areas are indicated schematically.

### 2.4 Adjustments to the Master Plan

No adjustments to the sewer master plan are required due to the revised PDDWF of the proposed development.

---

\* Year 2013/14 Rand value which includes 40% surcharge for P&Gs, contingencies and fees but excludes VAT.

## ROOIWAL 1 DRAINAGE AREA

### 2.5 Revised Sewer Flow

The combined peak day dry weather flow (PDDWF) for the proposed development as originally calculated and used in the analysis of the sewer system in the master plan was 395 kℓ/d.

The revised PDDWF calculated for the proposed development and used in the re-analysis of the sewer system was 861 kℓ/d with an instantaneous peak dry weather flow (IPDWF) of 11.1 ℓ/s. The design flow, or instantaneous peak wet weather flow (IPWWF), is 15.9 ℓ/s.

### 2.6 Accommodation of the Proposed Development in the Existing Sewer System

Accommodation of the proposed development, with its revised PDDWF, requires implementation of the following additions and adjustments to the *existing* sewer reticulation network as indicated in **Figure 2 (Sewer)** attached.

#### 2.6.1 Sewer Bulk Items

Items required to alleviate existing problems in the bulk sewer system i.e. WWTWs:

- OS\_019.00a 65 Mℓ/d Upgrade existing Rooiwal (North) WWTP (Phase 1) R 399 221 000 \*

Items required to accommodate the proposed development in the bulk sewer system i.e. WWTWs:

- As above

#### 2.6.2 Sewer Reticulation Items

Items required to alleviate existing problems in the existing sewer system:

- None

Items required to accommodate the proposed development in the existing sewer system:

- As above, and:

• R1_F106.00	133	m x	250	mm Ø new pipe	Design Flow =	29.7	ℓ/s	R	198 300	*
• R1_F105.02	650	m x	250	mm Ø new pipe	Design Flow =	58.9	ℓ/s	R	828 200	*
• R1_F105.03	313	m x	315	mm Ø new pipe	Design Flow =	68.5	ℓ/s	R	491 300	*
• R1_F105.04	401	m x	315	mm Ø new pipe	Design Flow =	72.0	ℓ/s	R	619 800	*
• R1_F105.05	300	m x	355	mm Ø new pipe	Design Flow =	78.7	ℓ/s	R	527 700	*
• R1_F105.06	301	m x	355	mm Ø new pipe	Design Flow =	79.8	ℓ/s	R	675 000	*
• R1_F105.07	368	m x	355	mm Ø new pipe	Design Flow =	82.4	ℓ/s	R	636 900	*
• R1_F105.08	535	m x	355	mm Ø new pipe	Design Flow =	85.5	ℓ/s	R	1 135 000	*
• R1_F095.13	547	m x	525	mm Ø new pipe	Design Flow =	264.5	ℓ/s	R	1 719 700	*
• R1_F095.14	110	m x	525	mm Ø new pipe	Design Flow =	301.5	ℓ/s	R	392 200	*
• R1_F095.15	377	m x	600	mm Ø new pipe	Design Flow =	420.8	ℓ/s	R	1 405 400	*
• R1_F095.16	604	m x	600	mm Ø new pipe	Design Flow =	426.0	ℓ/s	R	2 211 500	*
• R1_F095.17	1 464	m x	675	mm Ø new pipe	Design Flow =	436.5	ℓ/s	R	6 459 100	*

The proposed connection point to the existing sewer system is shown in **Figure 2 (Sewer)** attached.

\* Year 2013/14 Rand value which includes 40% surcharge for P&Gs, contingencies and fees but excludes VAT.

In **Figure 2 (Sewer)** attached pipes in future development areas are indicated schematically.

The above Design Flows (or IPWWF) and thus pipe sizes were calculated taking cognizance of future developments upstream of the proposed development. In this regard, sewer pipes within the proposed development must be designed (layout and sizing) to receive a Design Flow of 1 l/s from "Point A" and Design Flow of 2 l/s from "Point B" (see Figure 2 (Sewer)). As the Design Flow already accommodates stormwater ingress, the pipe can be designed to flow 100% full with the Design Flows provided above.

## 2.7 Adjustments to the Master Plan

No adjustments to the sewer master plan are required due to the revised PDDWF of the proposed development.

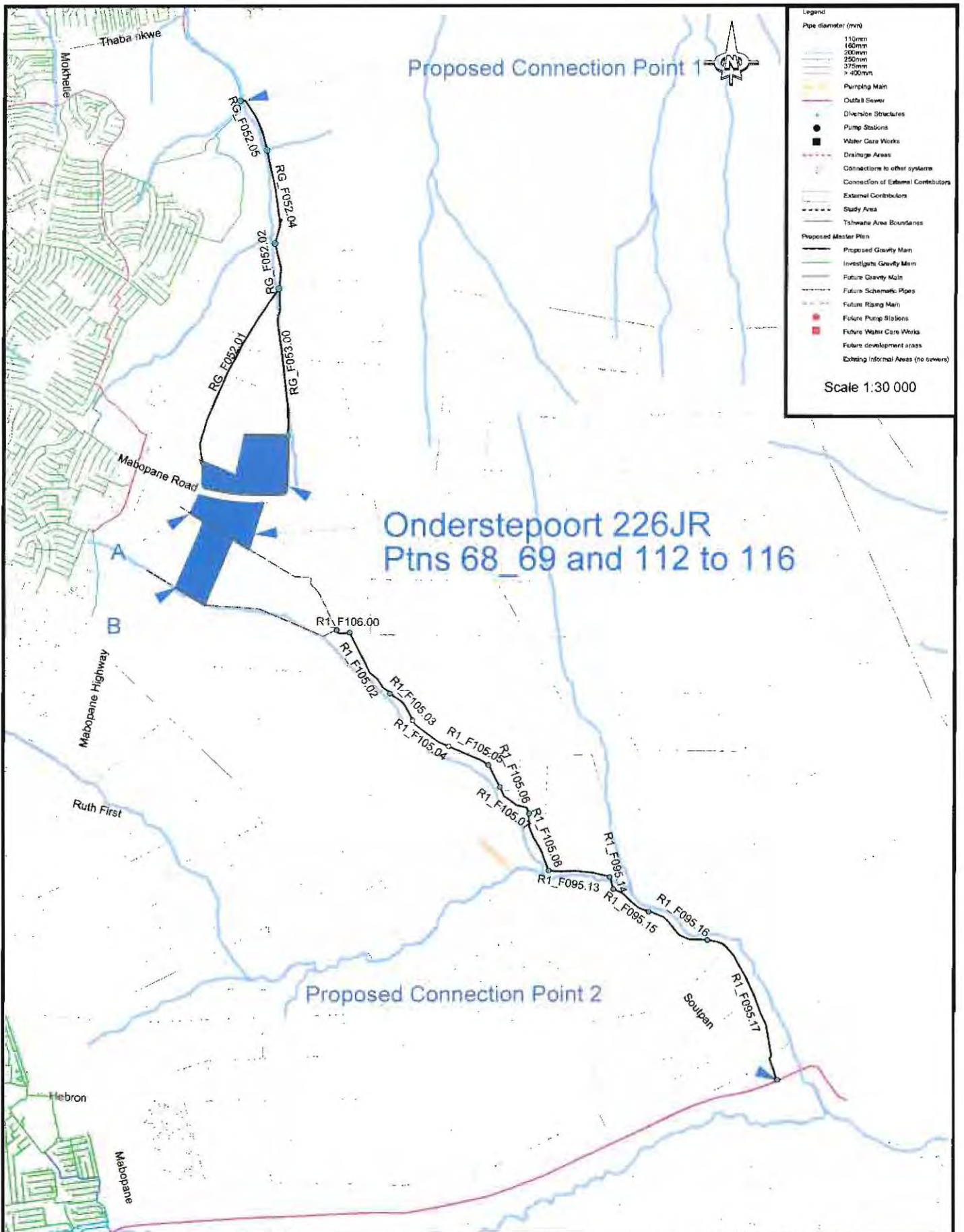
Yours sincerely,



---

Per: Dr BF Loubser  
GLS Consulting

Checked by:  Adie Vienings adie@glc.co.za 071 897 8633
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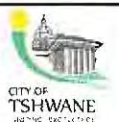


**FIGURE 2 (SEWER)**

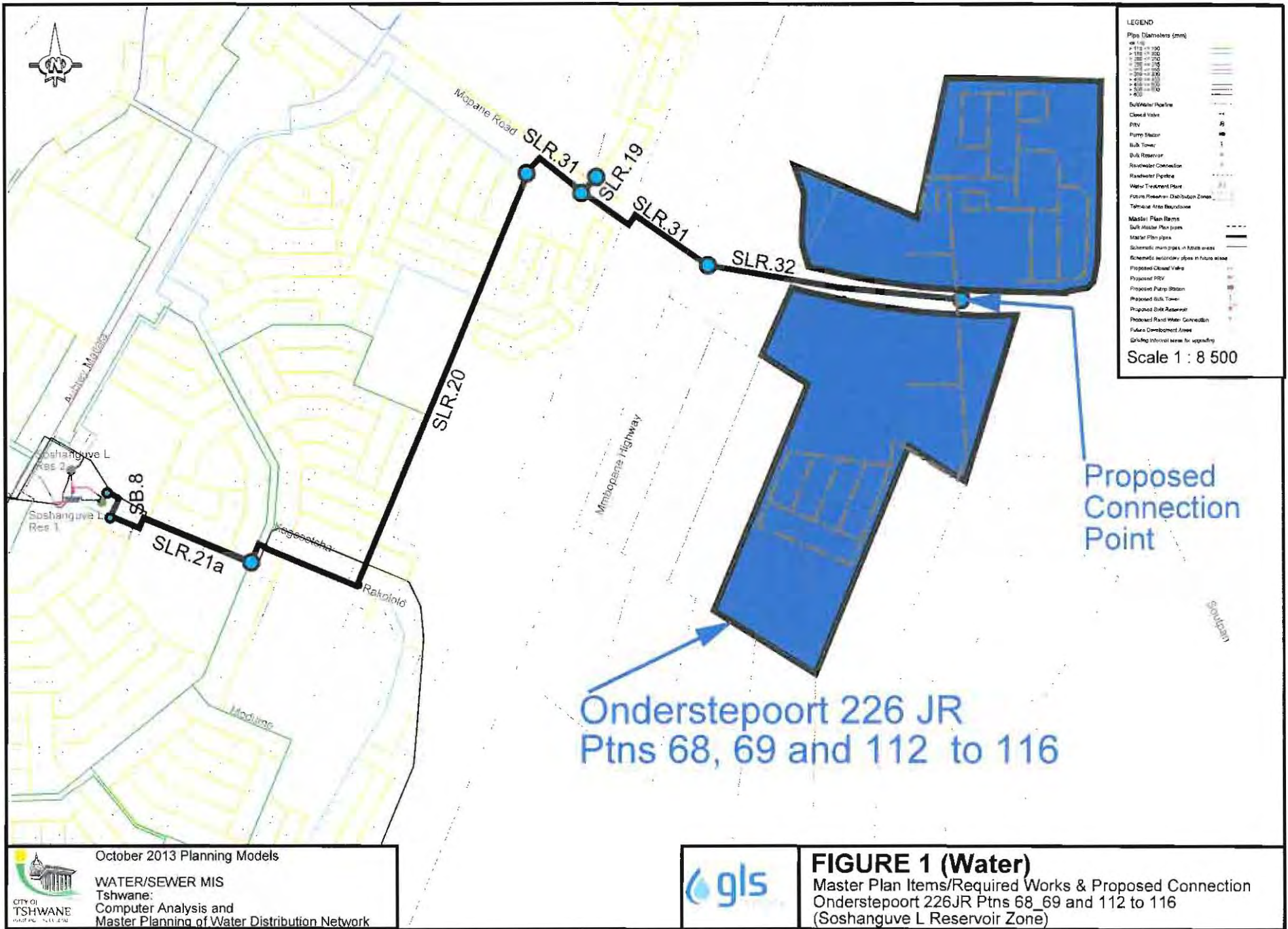
Master Plan Items / Required Works and Proposed Connections  
 Onderstepoort 226JR Ptns 68\_69 and 112 to 116  
 (Rietgat and Rooival 1 Drainage Area)

October 2013 Master Plan Models

WATER/SEWER MIS  
 Tshwane:  
 Computer Analysis and  
 Master Planning of Sewerage System







**ANNEXURE M – ELECTRICAL ENGINEERING SERVICES REPORT**





GREYCON PROJECTS CC  
 In association with Voltano Pty (Ltd) Energy Solutions  
 PO Box 303, Cornwall Hill, 0178  
 Cellular: 082 575 4708  
 Fax: 086 674 3424

 GREEN BUILDING COUNCIL  
 MEMBER ORGANISATION - 2012  
 CK88/13805/23  
 VAT Number: 489 016 2995  
 E-mail: [martin@voltano.com](mailto:martin@voltano.com)

Ecologic Africa

08 August 2014

Attention: Mr Ian Roos

**ONDERSTEPSPOORT EXTENSIONS 33, 34, 38 & 39**

**ENVIRONMENTAL REPORT**

**LOCALITY**

The proposed township developments are situated on Portions 68, 69 and 112 to 116 of the Farm Onderstepoort 266-JR. These farm portions are located along the R80 Mabopane Highway, East of Soshanguve Block-L in the Northern district of the Metropolitan Municipality of Tshwane.

**TOWNSHIP ZONING TABLE**

The proposed township developments are zoned:

Onderstepoort Extension 33	Zoning	Erf Size (ha)	Erf Size (m)	FAR	Density (Units / ha)	Total Units
1	Business 2	8,63	86300	0,3		
2	Business 2	7,03	70300	0,3		
	Public Street	1,64	16400			
Credit		0				
Total		17,3	173000			
Onderstepoort Extension 34	Zoning	Erf Size (ha)	Erf Size (m)	FAR	Density (Units / ha)	Total Units
1	Special (Garage)	1,39	13900	0,5		
2	Special (Mixed Uses)	0,83	8300	0,5		
Credit		0				
Total		2,22	22200			

Onderstepoort Extension 38	Zoning	Erf Size (ha)	Erf Size (m)	FAR	Density (Units / ha)	Total Units
1-463	Residential 1	14,37	143700		32	463
464	Special (Communal)	0,14	1400			
465	Municipal	0,06	600			
466	Special (Mixed Uses)	0,51	5100	0,5		
467	Special (Mixed Uses)	1,14	11400	0,5		
468	Special (Mixed Uses)	1,79	17900	0,5		
469	Special (Mixed Uses)	1,73	17300	0,5		
470	Special (Mixed Uses)	1,14	11400	0,5		
471	Special (Mixed Uses)	0,77	7700	0,5		
472	Special (Mixed Uses)	1,36	13600	0,5		
473	Special (Mixed Uses)	0,85	8500	0,5		
474, 476, 477	POS	3,65	36500			4
	Public Street	4,77	47700			
Credit		0				
Total		32,28	322800			
Onderstepoort Extension 39	Zoning	Erf Size (ha)	Erf Size (m)	FAR	Density (Units / ha)	Total Units
1-314	Residential 1	6,977	69770		45	314
315	Special (Communal)	0,089	890	0,5		
316, 317	POS	6,99	69900			
	Public Street	2,85	28500			
Credit						
Total		16,906	169060			
<b>Grand total</b>		<b>68,706</b>	<b>687060</b>			

#### TOWNSHIP ELECTRICAL LOAD CALCULATION

The estimated load for the proposed township developments were calculated according to the zoning above and are calculated as follow:

Onderstepoort Extension 33	Zoning	Total load (kVA)
1	Business 2	2071,20
2	Business 2	1687,20
	Public Street	13,80
Total		3772,20
Onderstepoort Extension 34	Zoning	Total load (kVA)
1	Special (Garage)	556,00
2	Special (Mixed Uses)	346,00
Total		902,00



Onderstepoort Extension 38	Zoning	Total load (kVA)
1-463	Residential 1	1852,0
464	Special (Communal)	55,36
465	Municipal	41,52
466	Special (Mixed Uses)	207,6
467	Special (Mixed Uses)	484,4
468	Special (Mixed Uses)	716,0
469	Special (Mixed Uses)	692,0
470	Special (Mixed Uses)	484,4
471	Special (Mixed Uses)	311,4
472	Special (Mixed Uses)	544,0
473	Special (Mixed Uses)	346
474, 476, 477	PO5 Public Open Space	55,2
	Public Street	13,8
Total		5803,68
Onderstepoort Extension 39	Zoning	Total load (kVA)
1-314	Residential 1	1256,0
315	Special (Communal)	41,52
316, 317	POS Public Open Space	27,6
	Public Street	13,8
Total		1338,92
Grand total		11803

### EXTERNAL TOWNSHIP SUPPLY PROPOSAL

The proposed townships falls within the jurisdiction of the City of Tshwane Metropolitan Municipality. The total load for all the extensions are estimated at 11.76MVA. This supply can be made available at the Soshanguve 132/11kV substation, located approximately 1,5km from the proposed development.

Based on the verbal agreement with the Tshwane Municipality Electrical Department, a new Satellite substation is to be built within the vicinity of the proposed development Onderstepoort Extension 38 Erf 465. The City of Tshwane Metropolitan Municipality is responsible for the erection of the proposed satellite substation; however the developer will provide the stand of minimum 20m x 40m to be zoned for municipal use. The City of Tshwane Metropolitan Municipality is willing to supply the developer with three T4 Ring Main Units to be utilized as the internal township service connection point, until the construction of the satellite substation has been completed.

The three T4 Ring Main Units will be supplied with four 185mm<sup>2</sup> x3 core 11kV Cu cables and are to be installed from the Soshanguve 132/11kV Substation along the existing 132kV power

line servitude.

As an initial phase only two 185mm<sup>2</sup> x3 core 11kV Cu cables needs to be installed from the Soshanguve 132/11kV substation that will supply two T4 Ring Main Units to be provided by the City of Tshwane Metropolitan Municipality and installed on the municipal erf. This will be adequate capacity to supply Onderstepoort Extensions 33 and 34.

In order to supply Onderstepoort Extensions 38 and 39 the remainder of the 11kV main feeders is to be installed. The two 185mm<sup>2</sup> x3 core 11kV Cu cables will then be added to the existing 11kV main feeder cables fed from Soshanguve 132/11kV substation. The City of Tshwane Metropolitan Municipality will provide an additional T4 Ring Main Unit to be installed next to the existing two T4 Ring Main Units.

#### **INTERNAL TOWNSHIP SERVICE PROPOSAL**

The estimated internal electrical reticulation cost is attached as the bill of quantities in Annexure G and is as follow:

#### **ONDERSTEPOORT EXTENSION 33**

Install 2x 4MVA, 200A, 11kV metering RM6 units. A new 185mm<sup>2</sup> x 3 core 11kV Cu cable is to be installed from the Sun Village Satellite Substation across Mopane Road (K2).

#### **ONDERSTEPOORT EXTENSION 34**

Install 1x 4MVA, 200A, 11kV metering RM6 units on the boundary of Erf 1 and a 315kVA miniature substation with the required low voltage cables for Erf 2. A new 185mm<sup>2</sup> x3 core 11kV Cu cable is to be jointed to the existing 11kV cable installed as part of Onderstepoort Extension 33.

#### **ONDERSTEPOORT EXTENSION 38**

Install 3x 4MVA, 200A, 11kV Metering RM6 units, 3x 500kVA miniature substations and 10x 315kVA miniature substations and the required low voltage cables for the remainder of the erven. A new 185mm<sup>2</sup> x3 core 11kV Cu cable is to be installed from the Sun Village Satellite Substation in order to establish a separate 11kV network.

#### **ONDERSTEPOORT EXTENSION 39**

Install 5x 315kVA miniature substations and the required low voltage cables to service all the stands according to the specified zoning. A new 185mm<sup>2</sup> x3 core 11kV Cu cable is to be installed from the Sun Village Satellite Substation in order to establish a separate 11kV network.

#### **COSTING**

Due to a portion of the external services deductible from the bulk contribution fees, the estimated costs are as follow, excluding VAT:



<b>ONDERSTEPSPOORT EXTENSION 33</b>	<b>Estimate</b>
External Link Estimate	R 10 661 025
Estimated Bulk Contribution Fee	R 7 800 909
Payable Bulk Contribution Fee	-
Internal Reticulation Cost Estimate	R 2 350 000

<b>ONDERSTEPSPOORT EXTENSION 34</b>	<b>Estimate</b>
External Link Estimate	-
Estimated Bulk Contribution Fee	R 1 865 336
Payable Bulk Contribution Fee	-
Internal Reticulation Cost Estimate	R 1 550 000


<b>ONDERSTEPSPOORT EXTENSION 38</b>	<b>Estimate</b>
External Link Estimate	R 10 335 985
Estimated Bulk Contribution Fee	R 11 916 395
Payable Bulk Contribution Fee	-
Internal Reticulation Cost Estimate	R 16 180 000

<b>ONDERSTEPSPOORT EXTENSION 39</b>	<b>Estimate</b>
External Link Estimate	-
Estimated Bulk Contribution Fee	R 2 740 348
Payable Bulk Contribution Fee	-
Internal Reticulation Cost Estimate	R 12 850 000

#### **TELKOM**

The project have been discussed with Telkom and is registered as PDC0015228.

For any further information please contact the writer.

On behalf of Greycon Projects CC  
 Per :  Martin Greyling Pr. Eng (Electrical) ECSA 880448

Attached: Drawings









**DEVELOPMENT PLAN OF  
PROPOSED DEVELOPMENT  
ONDERSTEEPOORT EXTENSIONS  
33, 34, 38 AND 39**  
SITUATED ON PORTIONS 58, 69 AND 112-116  
ONDERSTEEPOORT NO. 266-J.R.

REFERENCE

**ONDERSTEEPOORT EXT. 33**

USE	EXT. NO.	AMOUNT	AREA	PERCENTAGE	%
RESIDENTIAL	1	1000	1000	100	100
PUBLIC SPACE	1	1000	1000	100	100
TOTAL	2	2000	2000	100	100

**ONDERSTEEPOORT EXT. 34**

USE	EXT. NO.	AMOUNT	AREA	PERCENTAGE	%
RESIDENTIAL	1	1000	1000	100	100
PUBLIC SPACE	1	1000	1000	100	100
TOTAL	2	2000	2000	100	100

**ONDERSTEEPOORT EXT. 38**

USE	EXT. NO.	AMOUNT	AREA	PERCENTAGE	%
RESIDENTIAL	1	1000	1000	100	100
PUBLIC SPACE	1	1000	1000	100	100
TOTAL	2	2000	2000	100	100

**ONDERSTEEPOORT EXT. 39**

USE	EXT. NO.	AMOUNT	AREA	PERCENTAGE	%
RESIDENTIAL	1	1000	1000	100	100
PUBLIC SPACE	1	1000	1000	100	100
TOTAL	2	2000	2000	100	100

**NOTES**

PORTION OF SITE AREA	MEASURE	AREA
PTN 58	1.8.274 J.L.	11,458m <sup>2</sup>
PTN 69	4.7.0.0.0	10,411m <sup>2</sup>
PTN 112	0.1.0.0.0	10,278m <sup>2</sup>
PTN 113	0.2.0.0.0	11,570m <sup>2</sup>
PTN 114	3.0.0.0.0	12,540m <sup>2</sup>
PTN 115	0.1.0.0.0	12,930m <sup>2</sup>
PTN 116	0.4.7.0.0	17,340m <sup>2</sup>
TOTAL	0.4.7.0.0	72,533m <sup>2</sup>

**LEGEND**

SYSTEM	PROPOSED	SHORT DESCRIPTION
□	□	110V Area Assembly Unit
○	○	110V Circuit Breaker
△	△	Medium Substation (MVA) - Transformer Capacity 2 - 3000KVA, 11kV/33kVA, 11/0.4kV
⊙	⊙	Established Low Voltage Distribution and Meter Point (Maximum 3 meters)
⊕	⊕	Standard High Voltage Metering Point with Pole Top, Support and Cable Tray
⊖	⊖	Street Light Pole (as Meeting Height with Pole Top, Support) (2" x 4" Pole)
⊙	⊙	95mm <sup>2</sup> 3 core Copper 110V Cable (Table 18)
---	---	120mm <sup>2</sup> 4 core Aluminium Low Voltage Cable
---	---	180mm <sup>2</sup> 4 core Copper Low Voltage Cable
---	---	180mm <sup>2</sup> 3 core Copper Low Voltage Stand-Off Connection Cable
---	---	160mm <sup>2</sup> 4 core Copper Low Voltage Cable for Street Lighting
---	---	160mm <sup>2</sup> 3 core Copper Low Voltage Cable (Protective Cable for Stand-Off Connection Cable)
---	---	110mm <sup>2</sup> 3 core Aluminium Low Voltage Cable
---	---	110mm <sup>2</sup> 3 core Aluminium Low Voltage Cable (Protective Cable for Stand-Off Connection Cable)
---	---	110mm <sup>2</sup> 3 core Aluminium Low Voltage Cable (Protective Cable for Stand-Off Connection Cable)
---	---	Supply Boundary
---	---	Township Boundary

**CLIENT**

Abland

**PROJECT**  
Soshanguve Sun Village - Onderstepoort Extension 33 SC,  
x34 Filling Station, X38, x39

**DESCRIPTION**  
Proposed Electrical Layout

**DRAWN BY**  
JA Van Der Berg

**APPROVED BY**  
MPJ Greyling

**DISCIPLINE**  
ELECTRICAL

**SCALE**  
NTS

**PROJECTS REFERRED**  
August 2014

**DRAWING NO**  
ONP33, 34, 38, 39-EL-02

**NO**  
0

**GREYCON**  
Electrical Engineering  
Project and Construction Management

110 Blue Hill, 11000 Hill Drive  
Lafayette, Louisiana 70503  
Tel: (504) 281-1100  
Fax: (504) 281-1101  
www.greycon.com

Validation of Layout by Senior Engineering #18918747		Validation of Electrical design by Senior Engineering #18918747		Approved By	
Date	Signature	Date	Signature	Approved By	Signature
Validation of Construction plan by Senior Engineering #18918747		Electrical Development		Approved By	
Date	Signature	Date	Signature	Approved By	Signature

**CITY OF TSHWANE**  
ENERGY & ELECTRICITY  
DEVELOPMENT  
CENTRAL REGION  
BLISS FRICT  
PO BOX 423  
1016, GERM  
1001

**CITY OF TSHWANE**  
1016/1017 EXTENSION

**ANNEXURE N – HERITAGE IMPACT ASSESSMENT**





## **ONDERSTEPOORT EXT. 33, 34, A, B and C**

**Proposed Development of Portions 68, 69, 112, 113, 114, 115 and 116 of  
the farm Onderstepoort 266-JR, Tshwane Metropolitan Municipality,  
Gauteng Province**

### **Heritage Impact Assessment**

**Issue Date:** 25 July 2012  
**Revision No.:** 1  
**Client:** Abland (Pty) Ltd

## Declaration of Independence

*The report has been compiled by PGS Heritage & Grave Relocation Consultants, an appointed Heritage Specialist for Abland (Pty) Ltd. The views stipulated in this report are purely objective and no other interests are displayed during the decision making processes discussed in the Heritage Impact Assessment.*

**HERITAGE CONSULTANT:** PGS Heritage & Grave Relocation Consultants

**CONTACT PERSON:** Polke Birkholtz  
Tel: +27 (0) 12 332 5305  
Email: polke@gravesolutions.co.za

**SIGNATURE:** \_\_\_\_\_

## ACKNOWLEDGEMENT OF RECEIPT

**CLIENT:** Abland (Pty) Ltd

**CONTACT PERSON:** Andrew Honeyborne  
Email: andrew.honeyborne@abland.co.za

**SIGNATURE:**

\_\_\_\_\_

3

## EXECUTIVE SUMMARY

PGS Heritage & Grave Relocation Consultants (PGS) was appointed by Abland to undertake a Heritage Impact Assessment (HIA), which forms part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the establishment of Onderstepoort Ext. 33, 34, A, B & C and which are located on Portions 68, 69, 112, 113, 114, 115 and 116 of the farm Onderstepoort 266-JR, located in the Tshwane Metropolitan Municipality of Gauteng Province. The proposed activity comprises the development of a mixed development comprising amongst others residential, commercial, infrastructural and municipal components.

A desktop study was undertaken, which focussed on cartographic material with which historically significant structures and features can be highlighted. This was followed by fieldwork, which resulted in the identification of 14 sites (12 structures and two cemeteries).

*Table 1: Summarised List of Heritage Sites Identified during the Fieldwork*

Site	Description	Heritage Significance	S	E	Mitigation
1	Structure	Low Local (GP. C)	25° 31' 45.1"	28° 07' 32.6"	No mitigation required
2	Structure	Medium Local (GP. B)	25° 31' 48.7"	28° 07' 31.6"	Photographs and measured drawings, permit application, archaeological monitoring at the time of destruction
3	Structure	Medium Local (GP. B)	25° 31' 49.6"	28° 07' 31.1"	Photographs and measured drawings, permit application, archaeological monitoring at the time of destruction
4	Structure	Medium Local (GP. B)	25° 31' 53.2"	28° 07' 32.7"	Photographs and measured drawings, permit application, archaeological monitoring at the time of destruction
5	Structure	Low Local (GP. C)	25° 31' 44.2"	28° 07' 25.1"	No mitigation required
6	Structure	Medium Local (GP. B)	25° 31' 49.4"	28° 07' 23.9"	Photographs and measured drawings, permit application, archaeological monitoring at the time of destruction
7	Structure	Medium Local (GP. B)	25° 31' 57.1"	28° 07' 22.5"	Photographs and measured drawings, permit application, archaeological monitoring at

					the time of destruction
8	Structure	Low Local (GP. C)	25° 32' 01.5"	28° 07' 22.2"	No mitigation required
9	Cemetery	High/Medium Local (GP. A)	25° 32' 03.8"	28° 07' 23.4"	In situ preservation, if not possible full grave relocation
10	Structure	Low Local (GP. C)	25° 31' 59.9"	28° 07' 13.6"	No mitigation required
11	Structure	High/Medium Local (GP. A)	25° 32' 10.4"	28° 07' 21.3"	(1) Photographs and measured drawings, permit application, archaeological monitoring at the time of destruction (2) Confirm no graves during social consultation and reconnaissance excavations
12	Structure	Medium Local (GP. B)	25° 32' 11.9"	28° 07' 21.7"	Photographs and measured drawings, permit application, archaeological monitoring at the time of destruction
13	Cemetery	High/Medium Local (GP. A)	25° 32' 18.5"	28° 07' 16.3"	In situ preservation
14	Structure	Medium Local (GP. B)	25° 32' 10.5"	28° 07' 13.9"	Photographs and measured drawings, permit application, archaeological monitoring at the time of destruction

The impact of the proposed development on the located heritage sites was assessed, and it was established that the proposed development will have an impact risk of 2.13 on the located structures, which represents a moderate impact. The impact risk of the development on the two cemeteries was calculated to be 2.93, which represents a moderate impact. The impact risk on the possible presence of infant graves associated with one structure was calculated to be 2.2, which also represent a moderate impact. As a result of the moderate calculated impact risk, mitigation measures for some of the structures (Site 2, Site 3, Site 4, Site 6, Site 7, Site 11, Site 12 and Site 14), cemeteries (Site 9 and Site 13) and possible presence of infant burials (Site 12) need to be undertaken. Refer Section 6 for an outline of the mitigation measures required.

Furthermore, a palaeontological desktop study was also undertaken for this study by Professor Bruce Rubidge of the Bernard Price Institute for Palaeontological Research at the University of the Witwatersrand. His report found that the proposed development offers "...no threat to palaeontological heritage" (Rubidge, 2012:1) (refer **Appendix D**).

The overall impact of the development on heritage resources is seen as acceptably low and impacts can be mitigated to acceptable levels. On the condition that the recommendations made in this report are adhered to, no heritage reasons can be given for the development to be halted.

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## **1 INTRODUCTION**

PGS Heritage & Grave Relocation Consultants (PGS) was appointed by Abland to undertake a Heritage Impact Assessment (HIA), which forms part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the establishment of Onderstepoort Ext. 33, 34, A, B & C and which are located on Portions 68, 69, 112, 113, 114, 115 and 116 of the farm Onderstepoort 266-JR, located in the Tshwane Metropolitan Municipality of Gauteng Province. The proposed activity comprises the development of a mixed development comprising amongst others residential, commercial, infrastructural and municipal components.

### **1.1 Scope of the Study**

The aim of the study is to identify heritage sites that may occur in the proposed development area. The Heritage Impact Assessment aims to inform the EIA in the development of a comprehensive EMP to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999).

### **1.2 Specialist Qualifications**

This Heritage Impact Assessment was compiled by PGS Heritage & Grave Relocation Consultants (PGS). The staff at PGS has a combined experience of nearly 40 years in the heritage consulting industry and have extensive experience in managing HIA processes.

Polke Birkholtz, project manager and archaeologist, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a professional archaeologist. He is furthermore also a registered member of the CRM Section of ASAPA. Professor Bruce Rubidge of the Bernard Price Institute for Palaeontological Research at the University of the Witwatersrand conducted the palaeontological desktop study.

### **1.3 Assumptions and Limitations**

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily

represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and vegetation cover. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.

Such observed or located heritage features and/or objects may not be disturbed or removed in any way, until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out below.

#### **1.4 Legislative Context**

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by the following legislation:

- i. National Environmental Management Act (NEMA) Act 107 of 1998
- ii. National Heritage Resources Act (NHRA) Act 25 of 1999
- iii. Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
- iv. Development Facilitation Act (DFA) Act 67 of 1995

The following sections in each Act refer directly to the identification, evaluation and assessment of cultural heritage resources.

- i. National Environmental Management Act (NEMA) Act 107 of 1998
  - a. Basic Environmental Assessment (BEA) – Section (23)(2)(d)
  - b. Environmental Scoping Report (ESR) – Section (29)(1)(d)
  - c. Environmental Impacts Assessment (EIA) – Section (32)(2)(d)
  - d. EMP (EMP) – Section (34)(b)
- ii. National Heritage Resources Act (NHRA) Act 25 of 1999
  - a. Protection of Heritage Resources – Sections 34 to 36; and
  - b. Heritage Resources Management – Section 38
- iii. Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
  - a. Section 39(3)
- iv. Development Facilitation Act (DFA) Act 67 of 1995

- a. The GNR.1 of 7 January 2000: Regulations and rules in terms of the Development Facilitation Act, 1995. Section 31.

The NHRA stipulates that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority. Section 34(1) of the NHRA states that “no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority...”. The NEMA (No 107 of 1998) states that an integrated EMP should (23:2 (b)) “...identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage”. In accordance with legislative requirements and EIA rating criteria, the regulations of SAHRA and ASAPA have also been incorporated to ensure that a comprehensive and legally compatible HIA report is compiled.

## 1.5 Terminology and Abbreviations

### *Archaeological resources*

This includes:

- i. material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- ii. rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- iii. wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- iv. features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

### *Cultural significance*

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

### *Development*

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- i. construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- ii. carrying out any works on or over or under a place;
- iii. subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- iv. constructing or putting up for display signs or boards;
- v. any change to the natural or existing condition or topography of land; and
- vi. any removal or destruction of trees, or removal of vegetation or topsoil

### *Early Stone Age*

The archaeology of the Stone Age, dating to between roughly 700 000 and 2500 000 years ago.

### *Fossil*

Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

### *Heritage*

That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

### *Heritage resources*

This means any place or object of cultural significance

### *Holocene*

The most recent geological time period, which commenced 10 000 years ago.

### *Later Stone Age*

The archaeology of the last 20 000 years, associated with fully modern people.

### *Late Iron Age (Early Farming Communities)*

The archaeology of the last 1000 years up to the 1800's associated with ironworking and farming activities such as herding and agriculture.

### *Middle Stone Age*

The archaeology of the Stone Age, dating to between 20 000-300 000 years ago, associated with early modern humans.

### *Palaeontology*

Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

<i>Abbreviations</i>	<i>Description</i>
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
LSA	Later Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
MIA	Middle Iron Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Authority
PSSA	Palaeontological Society of South Africa
ROD	Record of Decision
SAHRA	South African Heritage Resources Agency

Refer to **Appendix B** for further discussion on heritage management and legislative matters.

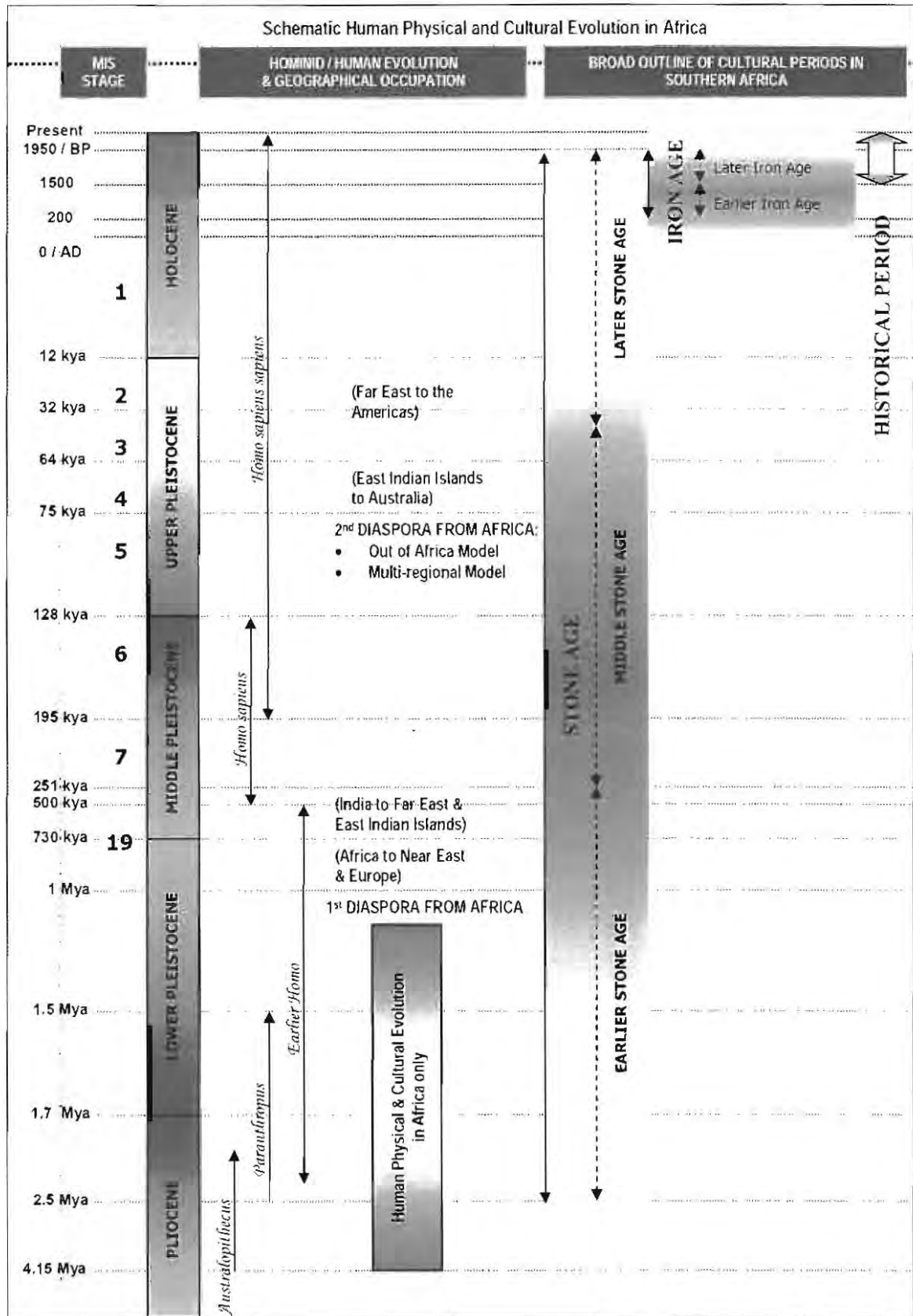


Figure 1—Human and Cultural Time line in Africa (Marris, 2008)



## 2 TECHNICAL DETAILS OF THE PROJECT

### 2.1 Site Location and Description

Location	S25° 31' 59.5" E28° 07' 23.3" The study area is situated roughly 250 m east of Soshanguve, and is positioned north and south of the M35.
Extent of Study Area	Approximately 86 hectares of land.
Land Description	Sections of level ground interposed by rocky hills. The highest point is to the north-west at a hill known as Enkeldebosch, from where the study area slopes down to the stream on its southern end.



Figure 2–The study area within its regional context.

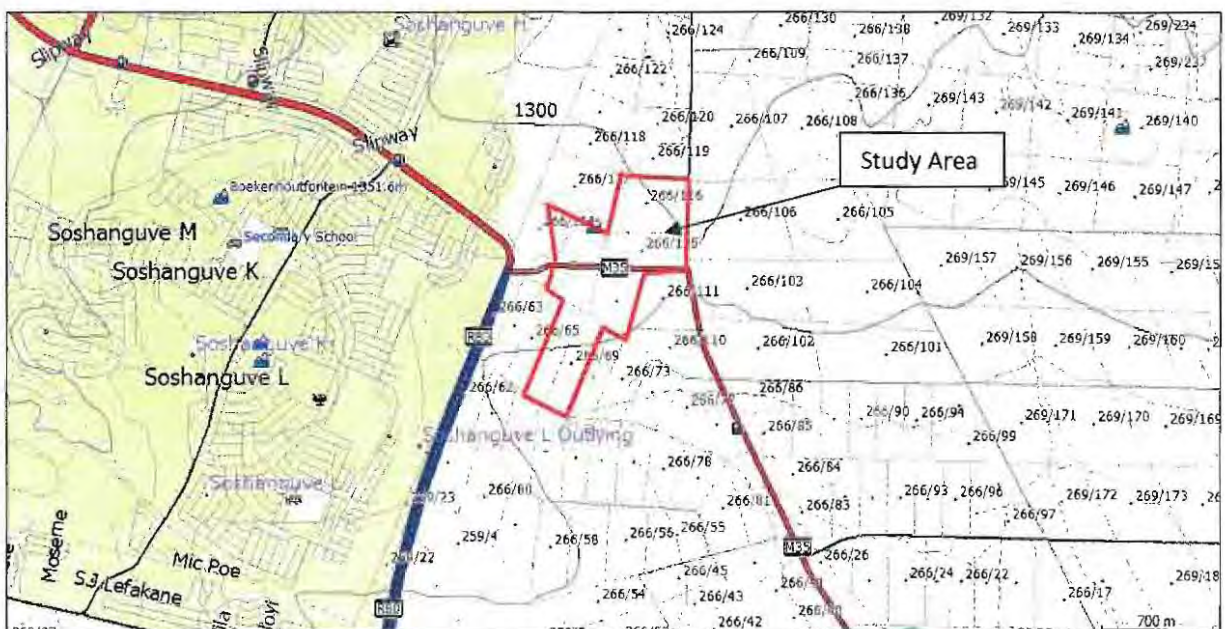


Figure 3–The study area within its local context.

## 2.2 Technical Project Description

Abland (Pty) Ltd is planning the development of Onderstepoort Extensions 33, 34, A, B and C. Refer Annexure C for the Development Layout Plan. The details of the proposed development are as follows:

- Onderstepoort Ext. 33

This proposed extension comprises an area of 17.30 hectares and is earmarked for two Business 2 erven and one Public Street. This will be the first phase of the development.

- Onderstepoort Ext. 34

This proposed extension comprises an area of 2.15 hectares and will be zoned into two erven. The zoned uses of these erven will be one for special use comprising a public garage and ancillary uses as well as a second erf to be zoned as special for mixed uses.

- Onderstepoort Ext. A

This extension comprises an area 14.5 hectares in extent. It will be zoned into 12 erven to be used for special for mixed uses as well as a public street.

- Onderstepoort Ext. B

Onderstepoort Ext. B comprises an area 15.47 hectares in extent. This area will be zoned into 287 erven of which 276 will be zoned as Residential 1, five erven as Residential 3, one erf for community services, one erf for municipal uses and four erven for public open space. The zoning of this extension includes a public street.

- Onderstepoort Ext. C

Onderstepoort Ext. C comprises an area 16.91 hectares in extent. This area will be zoned into 227 erven of which 209 will be zoned as Residential 1, six erven as Residential 3, two erven for community services, one erf for educational purposes and nine erven for public open space. The zoning of this extension includes a public street.

### 3 ASSESSMENT METHODOLOGY

#### 3.1 Methodology for Assessing Heritage Site Significance

This report was compiled by PGS Heritage and Grave Relocation Consultants for a proposed mixed development adjacent to Soshanguve. The applicable maps, tables and figures are included as stipulated in the NHRA (no 25 of 1999) and the National Environmental Management Act (NEMA) (no 107 of 1998). The HIA process consisted of three steps:

Step I – Literature Review: The background information to the field survey leans greatly on the archival and historical cartographic material assessed as part of the study.

Step II – Physical Survey: A physical survey was conducted on Monday, 16 July 2012. The survey was undertaken by a professional archaeologist and field assistant on foot through the proposed project area and was aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

Step III – The final step involved the recording and documentation of relevant heritage resources, as well as the assessment of resources in terms of the heritage impact assessment criteria and report writing, as well as mapping and recommendations.

The significance of heritage sites was based on five main criteria:

- site integrity (i.e. primary vs. secondary context),
- amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter)
  - Low - <10/50m<sup>2</sup>
  - Medium - 10-50/50m<sup>2</sup>
  - High - >50/50m<sup>2</sup>
- uniqueness and
- potential to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:

- A - No further action necessary;
- B - Mapping of the site and controlled sampling required;
- C - No-go or relocate development position
- D - Preserve site, or extensive data collection and mapping of the site; and
- E - Preserve site

### *Site Significance*

Site significance classification standards prescribed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used for the purpose of this report (see **Table 2**).

*Table 2: Site significance classification standards as prescribed by SAHRA*

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	-	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	-	High/Medium	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium	Recording before destruction
Generally Protected C (GP.C)	-	Low	Destruction

### **3.2 Methodology for Impact Assessment**

In order to ensure uniformity, a standard impact assessment methodology has been utilised so that a wide range of impacts can be compared. The impact assessment methodology makes provision for the assessment of impacts against the following criteria:



- Significance;
- Spatial scale;
- Temporal scale;
- Probability; and
- Degree of certainty.

A combined quantitative and qualitative methodology was used to describe impacts for each of the aforementioned assessment criteria. A summary of each of the qualitative descriptors, along with the equivalent quantitative rating scale for each of the aforementioned criteria, is given in **Table 3**.

*Table 3: Quantitative rating and equivalent descriptors for the impact assessment criteria*

RATING	SIGNIFICANCE	EXTENT SCALE	TEMPORAL SCALE
1	VERY LOW	<i>Isolated corridor / proposed corridor</i>	<u>Incidental</u>
2	LOW	<i>Study area</i>	<u>Short-term</u>
3	MODERATE	<i>Local</i>	<u>Medium-term</u>
4	HIGH	<i>Regional / Provincial</i>	<u>Long-term</u>
5	VERY HIGH	<i>Global / National</i>	<u>Permanent</u>

A more detailed description of each of the assessment criteria is given in the following sections.

#### *Significance Assessment*

The significance rating (importance) of the associated impacts embraces the notion of extent and magnitude, but does not always clearly define these, since their importance in the rating scale is very relative. For example, 10 structures younger than 60 years might be affected by a proposed development, and if destroyed the impact can be considered as VERY LOW in that the structures are all of Low Heritage Significance. If two of the structures are older than 60 years and of historic significance, and as a result of High Heritage Significance, the impact will be considered to be HIGH to VERY HIGH.

A more detailed description of the impact significance rating scale is given in **Table 4** below.

Table 4: Description of the significance rating scale

RATING		DESCRIPTION
5	VERY HIGH	Of the highest order possible within the bounds of impacts which could occur. In the case of adverse impacts: there is no possible mitigation and/or remedial activity which could offset the impact. In the case of beneficial impacts, there is no real alternative to achieving this benefit.
4	HIGH	Impact is of substantial order within the bounds of impacts which could occur. In the case of adverse impacts: mitigation and/or remedial activity is feasible but difficult, expensive, time-consuming or some combination of these. In the case of beneficial impacts, other means of achieving this benefit are feasible but they are more difficult, expensive, time-consuming or some combination of these.
3	MODERATE	Impact is real but not substantial in relation to other impacts, which might take effect within the bounds of those which could occur. In the case of adverse impacts: mitigation and/or remedial activity are both feasible and fairly easily possible. In the case of beneficial impacts: other means of achieving this benefit are about equal in time, cost, effort, etc.
2	LOW	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts: mitigation and/or remedial activity is either easily achieved or little will be required, or both. In the case of beneficial impacts, alternative means for achieving this benefit are likely to be easier, cheaper, more effective, less time consuming, or some combination of these.
1	VERY LOW	Impact is negligible within the bounds of impacts which could occur. In the case of adverse impacts, almost no mitigation and/or remedial activity is needed, and any minor steps which might be needed are easy, cheap, and simple. In the case of beneficial impacts, alternative means are almost all likely to be better, in one or a number of ways, than this means of achieving the benefit. Three additional categories must also be used where relevant. They are in addition to the category represented on the scale, and if used, will replace the scale.
0	NO IMPACT	There is no impact at all - not even a very low impact on a party or system.

### *Spatial Scale*

The spatial scale refers to the extent of the impact i.e. will the impact be felt at the local, regional, or global scale. The spatial assessment scale is described in more detail in **Table 5**.



Table 5: Description of the spatial significance rating scale

RATING	DESCRIPTION
5 Global/National	The maximum extent of any impact.
4 Regional/Provincial	The spatial scale is moderate within the bounds of possible impacts, and will be felt at a regional scale (District Municipality to Provincial Level). The impact will affect an area up to 50 km from the proposed site / corridor.
3 Local	The impact will affect an area up to 5 km from the proposed site.
2 Study Area	The impact will affect an area not exceeding the boundary of the study area.
1 Isolated Sites / proposed site	The impact will affect an area no bigger than the site.

*Temporal/Duration Scale*

In order to accurately describe the impact, it is necessary to understand the duration and persistence of an impact in the environment.

The temporal or duration scale is rated according to criteria set out in **Table 6**.

Table 6: Description of the temporal rating scale

RATING	DESCRIPTION
1 Incidental	The impact will be limited to isolated incidences that are expected to occur very sporadically.
2 Short-term	The environmental impact identified will operate for the duration of the construction phase or a period of less than 5 years, whichever is the greater.
3 Medium-term	The environmental impact identified will operate for the duration of life of the project.
4 Long-term	The environmental impact identified will operate beyond the life of operation of the project.
5 Permanent	The environmental impact will be permanent.

*Degree of Probability*

The probability or likelihood of an impact occurring will be outlined in **Table 7** below.

Table 7: Description of the degree of probability of an impact occurring

RATING	DESCRIPTION
1	Practically impossible
2	Unlikely
3	Could happen
4	Very likely
5	It's going to happen / has occurred

#### Degree of Certainty

As with all studies, it is not possible to be 100% certain of all facts, and for this reason a standard "degree of certainty" scale is used, as discussed in **Table 8**. The level of detail for specialist studies is determined according to the degree of certainty required for decision-making. The impacts are discussed in terms of affected parties or environmental components.

Table 8: Description of the degree of certainty rating scale

RATING	DESCRIPTION
Definite	More than 90% sure of a particular fact.
Probable	Between 70 and 90% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Between 40 and 70% sure of a particular fact, or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact or the likelihood of an impact occurring.
Can't know	The consultant believes an assessment is not possible even with additional research.

#### Quantitative Description of Impacts

To allow for impacts to be described in a quantitative manner, in addition to the qualitative description given above, a rating scale of between 1 and 5 was used for each of the assessment criteria. Thus the total value of the impact is described as the function of significance, spatial and temporal scale, as described below:

$$\text{Impact Risk} = (\text{SIGNIFICANCE} + \text{Spatial} + \text{Temporal}) \times \text{Probability}$$

3

5

An example of how this rating scale is applied is shown below:

Table 9: Example of Rating Scale

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	LOW	Local	Medium Term	Could Happen	
Impact on heritage structures	2	3	3	3	1.6

**Note:** The significance, spatial and temporal scales are added to give a total of 8, which is divided by 3 to give a criterion rating of 2.67. The probability (3) is divided by 5 to give a probability rating of 0.6. The criteria rating of 2.67 is then multiplied by the probability rating (0,6) to give the final rating of 1,6.

The impact risk is classified according to 5 classes as described in the table below.

Table 10: Impact Risk Classes

RATING	IMPACT CLASS	DESCRIPTION
0.1 – 1.0	1	Very Low
1.1 – 2.0	2	Low
2.1 – 3.0	3	Moderate
3.1 – 4.0	4	High
4.1 – 5.0	5	Very High

Therefore, with reference to the example used for heritage structures above, an impact rating of 1.6 will fall in the Impact Class 2, which will be considered to be a low impact.

## 4 CURRENT STATUS QUO

### 4.1 Site Description

The property is situated roughly 250 m east of Soshanguve and is located north and south of the M35 which provides access into Soshanguve from Onderstepoort Road. In general terms the study area can be described as comprising sections of level ground interposed by rocky hills. The highest point from within the study area is on its north-western end where a hill known as Enkeldebosch is located. From here the land slopes down toward the river located on the southern boundary of the study area. Sections of the southern end of the study were used as agricultural fields.





*Figure 4 –Section of the study area north of the M35. The hill known as Enkeldebosch can be seen in the back. This hill is the highest point within the study area.*



*Figure 5 – General view of a section of the study area south of the M35.*

## 4.2 Archival Findings

### 4.2.1 Archival and Historic Maps of the Study Area and Surrounding Landscape

#### 4.2.1.1 Pretoria Sheet of the Major Jackson Map

Figure 5 depicts an enlarged section of the Pretoria sheet of the Major Jackson Series (National Archives, Maps, 3/551). This series was produced during the South African War (1899-1902), by the Mapping Section of the Field Intelligence Department under the supervision of Major R.M. Jackson. This sheet is the Revised Edition dated to June 1902.

While no heritage features are depicted within the study area, two secondary roads cross each other at a point located south-east of the present study area. At the time, one of these roads appears to have been used as an access road between Pretoria and the historically significant Salt Pan (presently known as the Tswaing Crater). Furthermore, the farm on which the study area is located was known at the time as Enkeldebosch, not Onderstepoort.

#### 4.2.1.2 2528CA Topographical Sheet

Figure 6 below depicts an enlarged section of the First Edition of the 2528CA Topographical Sheet. The map was surveyed in 1939 and 1940 and drawn by the Trigonometrical Survey Office in 1943. Field revision was undertaken by the 45 Survey Company of the South African Engineering Corps during June 1943.

Four features are depicted within the study area and its direct surroundings, namely:

- Feature 1: A single hut is depicted here. This feature was not identified in the field.
- Feature 2: A single hut is depicted here. This feature was not identified in the field.
- Feature 3: A cattle kraal is depicted here. The remains of a kraal was identified during the fieldwork in close proximity to the location as depicted on this map (see Site 12 below).
- Feature 4: A farmstead is depicted here. It seems very likely that this farmstead was located outside of the study area.

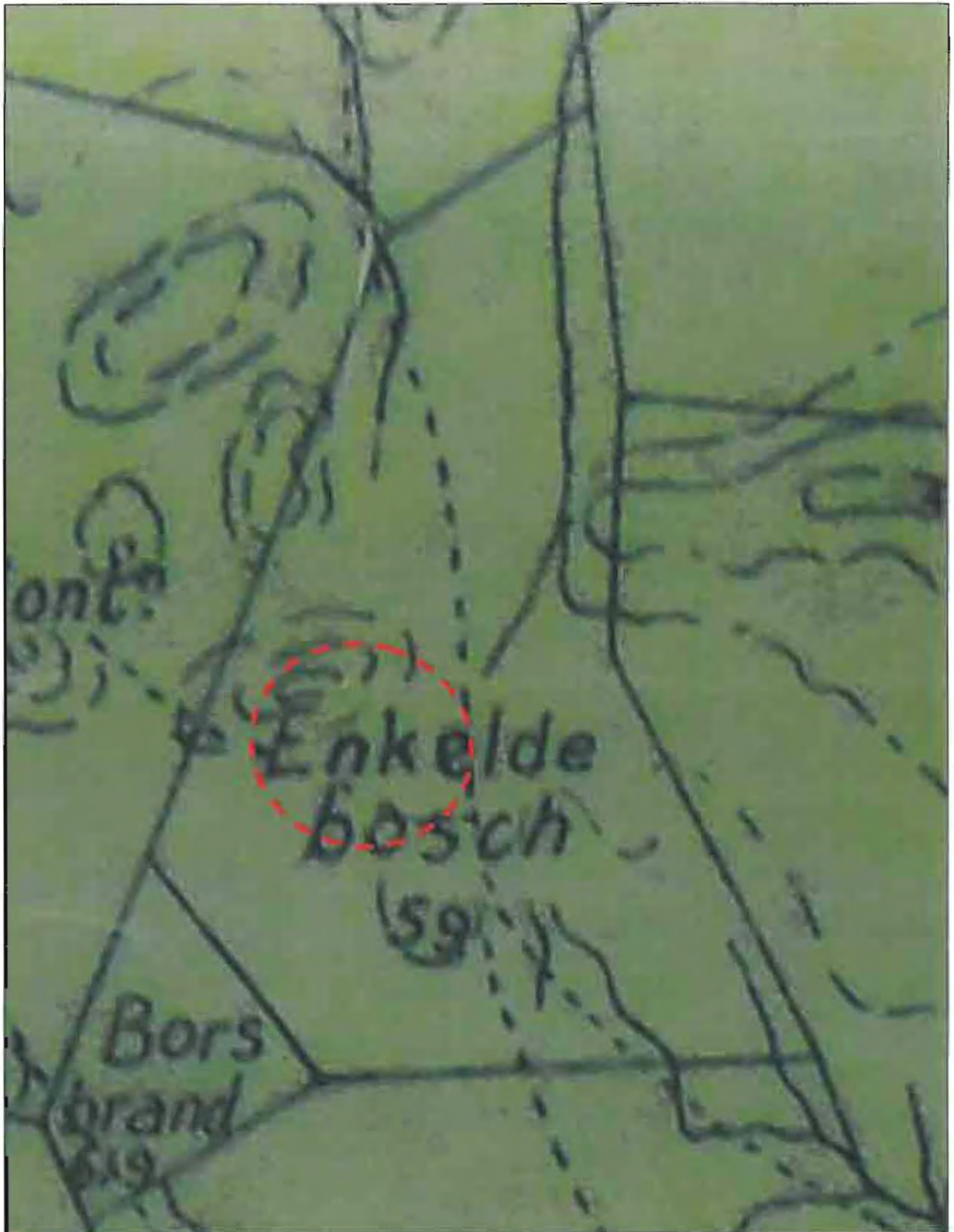


Figure 6 – Pretoria Sheet of the Major Jackson Series which is dated to June 1902. The approximate position of the study area is indicated by the red dotted line.



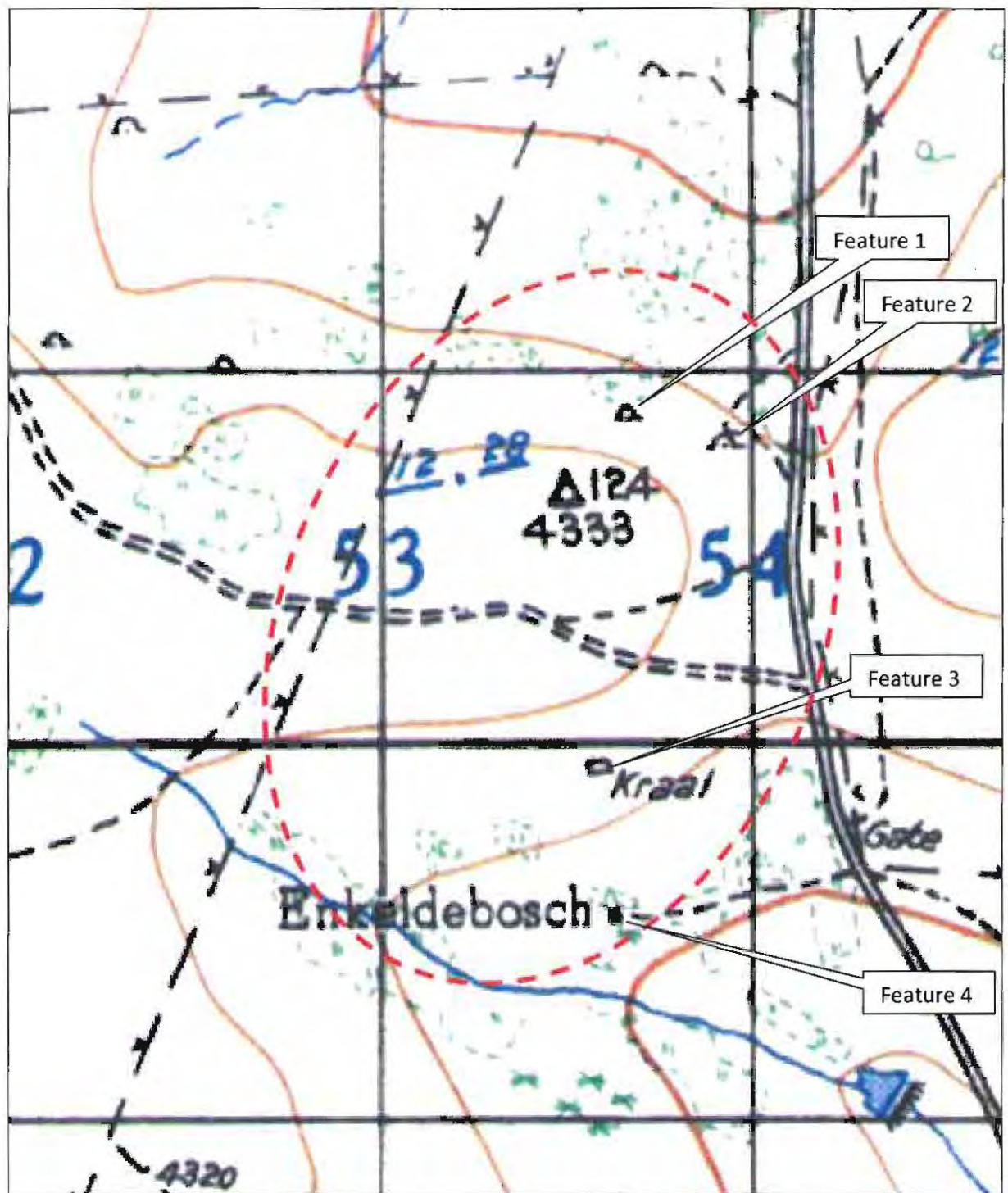


Figure 7 – First Edition of the 2528CA Topographical Sheet that was surveyed in 1939 and 1940. The approximate position of the study area is depicted in red dotted line.

#### 4.2.2 Historic Overview of Study Area and Surrounding Landscape

DATE	DESCRIPTION
2.5 million to 250 000 years ago	The Earlier Stone Age is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian and comprises more refined and better made stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates back to approximately 1.5 million years ago.
250 000 to 40 000 years ago	The Middle Stone Age is the second oldest phase identified in South Africa's archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique.
40 000 years ago to the historic past	The Later Stone Age is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths.
AD 450 – Ad 750	The Mzonjani facies of the Kwale Branch of the Urewe Ceramic Tradition is the earliest Iron Age presence for which archaeological evidence had been found in the surroundings of the study area. The key features on the decoration of the ceramics from this facies comprise punctuates on the rim and spaced motifs on the shoulder of the vessel (Huffman, 2007).
AD 1500 - AD 1700	The Olifantspoort facies of the Moloko Branch of the Urewe Ceramic Tradition is the next Iron Age facies to be identified within the surroundings of the study area. The key features of the decoration used on the ceramics from this facies include multiple bands of fine stamping or narrow incision separated by colour (Huffman, 2007).
AD 1610 – AD 1636	The arrival of the Southern Ndebele under their ruler Mhlanga in the general vicinity of the study area, and the establishment of their settlement known as Kwa-Manyamana (the place of black hills). This settlement stretched over a large area, and had at its core the area known today as Bon Accord Dam (Van Vuuren, 1991). Bon Accord Dam is located roughly 11.2km south-east of the study area.
AD 1700 – AD 1840	The Buispoort facies of the Moloko branch of the Urewe Ceramic Tradition is the next phase to be identified within the study area's surroundings. The key features on the decorated ceramics include rim notching, broadly incised chevrons and white bands, all with red ochre (Huffman, 2007).
1827	During the so-called Difaqane, the Khumalo Ndebele (more commonly known as the Matabele) of Mzilikazi established themselves in the general vicinity of the study area (Bergh, 1999).
1830s to 1840s	These years saw the arrival of the first Voortrekker families in the general vicinity of the study area as well as their settlement in these parts. One of the earliest farms to be inspected and proclaimed in the general vicinity of the study area was the farm De Onderstepoort (roughly 8.5km south-east of the study area), and the date on which it was proclaimed is 10 August 1841

	(The City Council of Pretoria, 1955). It is worth noting that it was quite common during the 19 <sup>th</sup> and early 20 <sup>th</sup> centuries for the warmer bushveld farms north of Pretoria to be used as winter grazing by the Highveld farmers from Pretoria and further afield. This historic activity can still be found in place names from this area, such as Winterveld and Rust de Winter. Mr. Harry Struben, who was later to be associated with the early gold discoveries in the vicinity of Krugersdorp, owned such a winter grazing farm known as Klipgat during the 19 <sup>th</sup> century (Struben & Struben, 1920).
November 1850	Conflict between the Mmakau-Kgatla of Kgosi Seamego Mamonwana (who was commonly known by his nickname Sjambok) and the Boer authorities broke out after a dispute and skirmish took place between Boer farmers and the Kgosi over the provision of labour by the Mmakau-Kgatla. A deputation was sent to Commandant-General Andries Pretorius who decided to attack the Mmakau-Kgatla. Due to the rising threat of conflict the white families living on the neighbouring farms ensconced themselves in laagers (wagon forts) on their farms. In the ensuing battle the Mmakau-Kgatla were driven out and fled to the Kekana of Mugombhane further to the north (Bergh, 1999). The core of this conflict would have been the capital settlement of the Mmakau-Kgatla, estimated to be roughly 15km south-west of the study area.
1855	The town of Pretoria was established in 1855, and two years later, in 1857 the District of Pretoria was proclaimed (Bergh, 1999).
1865	The Hebron Mission Station was established by the Hermannsburg Mission Society. The station was also known as Matlhare (Breutz, 1989). This mission station is located roughly 8.7km south-west of the study area.
March 1885 – March 1886	At the hearings of the Location Commission the Mmakau-Kgatla of Kgosi Moemise Motsipe received the farm Hoekfontein and a portion of the farm Krelingspost as their reservation land. At the time, the Mmakau-Kgatla had been living on the farm Hoekfontein since long before the arrival of the Khumalo-Ndebele of Mzilikazi some sixty years before (Bergh, 1999).
1896	The Mmakau-Kgatla bought Kafferskraal and Wildebeesthoek (Bergh, 1999).
1899-1902	<p>The South African War took place during this time. No evidence for battles from within the study area or its direct surroundings was found during the desktop study. However, evidence was found for the presence of both British troops and Boer commandoes very close to the study area during this time. The British forces appear to have been especially active in the surroundings of the study area in the months following on the British occupation of Pretoria on 5 June 1900 and then to a lesser extent during the remainder of the guerrilla phase of the war. Examples are provided below.</p> <ul style="list-style-type: none"> <li>• During August 1900 the Elswick Battery moved past Hebron to Zoutpan, and from there to Warmbaths (Briggs, 1901).</li> <li>• On the afternoon of Friday, 7 September 1900 Major Lewis and his men of the 1<sup>st</sup> Tasmanian Bushmen departed from the Pienaars River on a night march in the general direction of the Salt Pan. They marched until 1am on the morning of Saturday, 8 September 1900 where they rested for three hours before patrolling in search of Boers who were believed to be in the vicinity. Two Boers were</li> </ul>

	<p>encountered but managed to escape capture. That afternoon the Tasmanians reached the Salt Pan where they rested till late that afternoon from where they left on another night march back to Waterval. A few days later (likely on Thursday, 13 September 1900) Lewis and his men left Waterval and went on a patrol toward the Crocodile River, which they reached three days later. On their way to this destination they passed through the Hebron Mission.</p> <ul style="list-style-type: none"> <li>• On 12 September 1900 Plumer's Column (including C Battery) met Paget's supply column at Zoutpan from where they moved to Hebron (Miller, 1993).</li> <li>• On an unknown date the mission station at Hebron was burnt down by British forces as it was believed that the missionary at Hebron had given shelter to a Boer Commando (Spies, 1977).</li> </ul>
1904	The Mogopa Kwena of Jacobus More Mmamogale owned various farms in the general vicinity of the study area (in some cases with the Hermansburg Mission Society) including Kaalzandbult, Syferfontein, Kameelfontein (where the Hebron Mission Station was located), Sjambokzijkraal, Palmietfontein (where the Jericho Mission Station was located), Uitvalgrond and Oskraal (Bergh, 1999). It can be assumed that some of these farms would have been owned by the Mogopa Kwena before this date as well. Of these farms, Kameelfontein is the closest to the study area at a distance of 6.5km.
1925	Bon Accord Dam was completed in this year ( <a href="http://www.wikipedia.org">www.wikipedia.org</a> ).
1936 - 1960	After the promulgation of the Native Trust and Land Act of 1913, the Union of South Africa government under General Jan Smuts acquired a farm by the name of Jacksons Farm. They subsequently subdivided the property into plots that were sold to Black farmers who wished to farm ( <a href="http://www.kopitori.co.za">www.kopitori.co.za</a> ). The property became known as Winterveldt and is located roughly 7km north-west of the study area.
1963	Mabopane was established as a black township by the then Apartheid government. The area fell under the control of Bophuthatswana in 1976 and presently forms part of the City of Tshwane Metropolitan Municipality. During the Apartheid years a number of political rallies, protests and meetings took place at Mabopane ( <a href="http://www.wikipedia.org">www.wikipedia.org</a> ). Mabopane is situated roughly 3.8km north-west of the study area.
1974	Soshanguve was established as a black township on land earmarked for inclusion in Bophuthatswana. Initially it was known as Mabopane East, but after Mabopane West (Mabopane) was included in Bophuthatswana the name Soshanguve was accepted. It is derived from the first two letters of the words Sotho, Shangaan, Nguni and Venda ( <a href="http://www.wikipedia.org">www.wikipedia.org</a> ).
26 March 1986	More than a thousand residents of Winterveldt were gathered on a sport stadium to get feedback in terms of the detention of school children. The stadium was surrounded by members of Bophuthatswana police and army. Teargas was thrown into the crowd and members of the police and army started shooting randomly, killing 11 and injuring 200. This day is known as the Winterveldt Massacre ( <a href="http://www.nwhist.co.za">www.nwhist.co.za</a> ).



### 4.3 Fieldwork Findings

Although most of the study area was covered by the field archaeologist from PGS, the focus in the fieldwork was placed on those areas not located within the marshy sections of the site.

The track logs of the archaeologist during the fieldwork are depicted in **Figure 8** below. It must be noted that only the route of the archaeologist, and not his field assistant, was recorded.

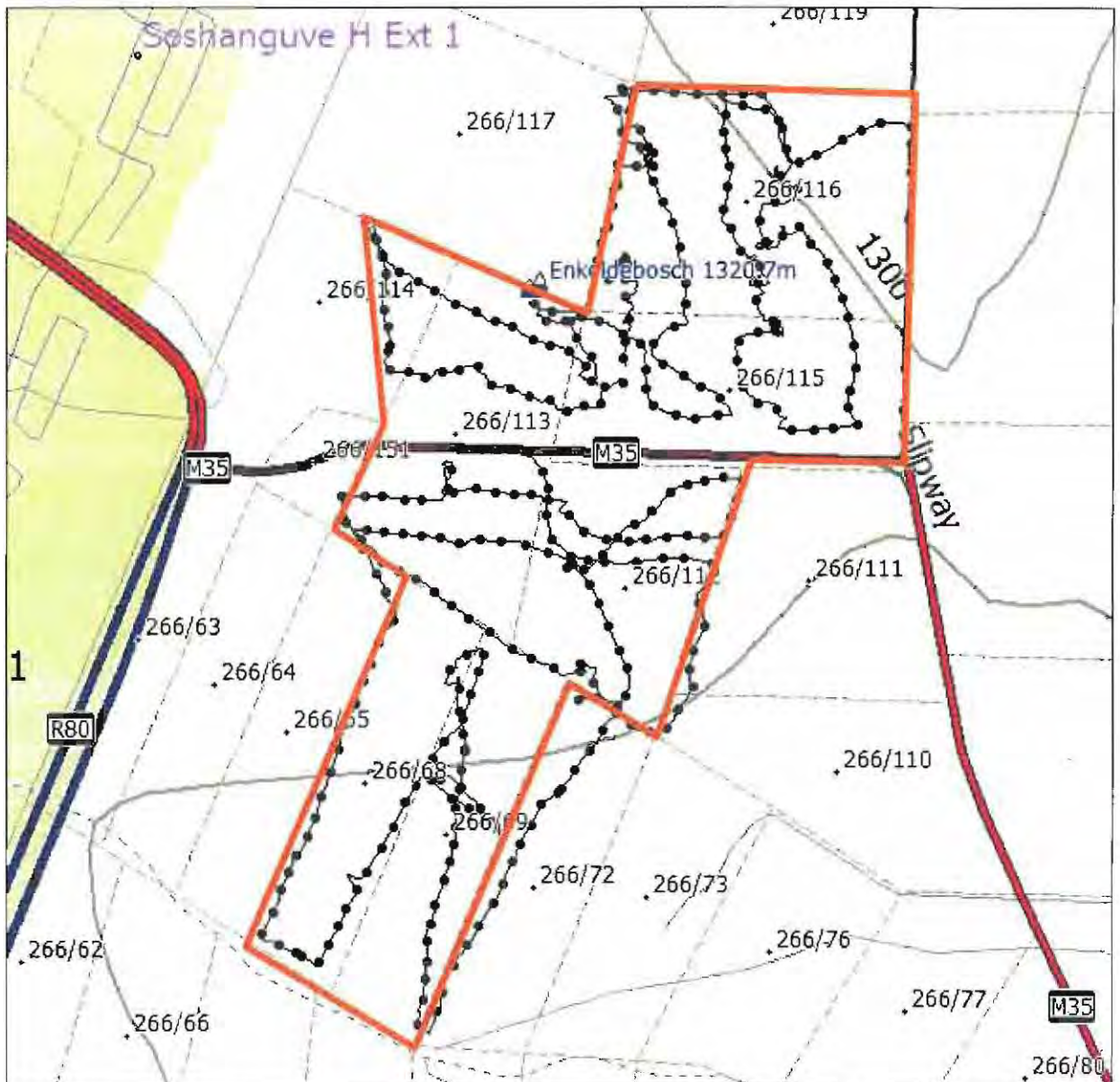


Figure 8 – The track logs recorded by the PGS archaeologist, using a handheld GPS, during the field survey is depicted by the black lines. The study area boundaries are depicted in orange.

A total of fourteen sites were identified within the study area. These sites will be individually discussed below.

#### **4.3.1 Site 1**

*Site Coordinates:*

25° 31' 45.1" S

28° 07' 32.6" E

*Site Description:*

The dilapidated remains of a farmstead were identified at this location. The farmstead comprises the poorly preserved remains of a brick structure as well as structures built from stone and cement. The site is located north of a low hill and stretches over an area roughly 100m by 100m in extent.

According to local resident Ms. Jane Mokopa a white family resided at the farmstead when she first arrived in the area in 1990. This indicates that the site is at least 22 years old. The farmstead is not depicted on the first edition of the 2528CA Topographical Sheet that was surveyed in 1939 and 1940. This indicates that it is between 22 and 72 years old. However, the tangible remains of the farmstead, comprising cement bricks, indicate that the site is not older than 60 years.

*Site Significance:*

The site is not older than 60 years and as a result not protected by the National Heritage Resources Act (25 of 1999). It is furthermore in a very poor condition, with only the dilapidated remains left. The site can also not be considered unique or of any special architectural or scientific significance.

The significance of the site can be classified as Generally Protected C (GP.C), which represents a Low Significance. As a result no further mitigation measures are required for the site.





Figure 9—General view of some of the buildings from Site 1.



Figure 10—One of the poorly preserved stone and cement structures from Site 1.



#### 4.3.2 Site 2

*Site Coordinates:*

25° 31' 48.7" S

28° 07' 31.6" E

*Site Description:*

A circular stonewalled enclosure with an opening on its south-eastern end is located on a neck between two low hills. It is roughly 10m across and its construction method is typical of the Late Iron Age with a double row of larger stones built a small distance apart and the central cavity filled with smaller stones. While both the site's position and building method suggest an association with the Late Iron Age, no such artefacts (i.e. potsherds) were observed and only historic artefacts such as metal and glass pieces were found.

*Site Significance:*

If the site can indeed be associated with the Late Iron Age, it would have comprised a small insignificant cattle post where few if any people would have stayed. The lack of any visible Late Iron Age material such as clay potsherds supports this interpretation. The site is of Generally Protected B (GP. B) or Medium Significance, which indicates that it must be recorded before it is destroyed. The mitigation measures to follow can be found in Section 6 below.



Figure 11 – General view of HM2.

### 4.3.3 Site 3

#### *Site Coordinates:*

25° 31' 49.6" S

28° 07' 31.1" E

#### *Site Description:*

A rectangular stone structure is located at the western foot of the low hill on which Site 2 is located. The two sites are situated roughly 30m apart. The structure is roughly 7m by 4m in extent, and appears to have been used as an enclosure to keep domesticated animals. No associated artefacts were observed. While it is impossible to accurately date a stone structure such as this one without any supportive documentary or oral sources, the structure is certainly at least 60 years old and may even be older than that.

#### *Site Significance:*

The site is of Generally Protected B (GP. B) or Medium Significance, which indicates that it must be recorded before it is destroyed. The mitigation measures can be found in Section 6.



Figure 12– General view of the rectangular stone structure at Site 3.

#### 4.3.4 Site 4

*Site Coordinates:*

25° 31' 53.2" S

28° 07' 32.7" E

*Site Description:*

The site comprises two small circular stone structures, one small and low stone wall and two longer sections of stone walling further away. The entire site stretches over an area of roughly 100m from the coordinates indicated above to the low hill on which Sites 2 and 3 are located. All the structures were constructed of dry stone walling, in other words no mortar was used. Some historical artefacts from the more recent past were identified in close proximity to the site. These artefacts were likely deposited long after the structures were built and used.

While no documentary evidence for a large scale battle during the South African War (1899-1902) could be found in close proximity to the study area nor were any military artefacts (i.e. casings) observed on site, an interpretation of the site in terms of military activities during the South African War would appear to be the most logical way of explaining these structures. It must be stressed here that this interpretation is based on what was seen at the site as well as past experience and may not necessarily represent the correct interpretation. The two small circular stone structures are only 1m to 1.5m wide, and as a result could not have been used to enclose farm animals such as goats, sheep or pigs. The third structure has the appearance of a low piquet (schantz) position whereas the longer walling toward the hill may also be interpreted as a form of defensive stone work. It must be said however, that these longer stone walls are very low and would not have offered much protection. All these structures are located in such a manner that they have good views toward the east and south-east. Rather than a battle, it is possible that during the South African War a Boer or British encampment was located in the general vicinity, and that these structures may have formed part of the peripheral defensive line to protect a centrally located encampment. As no tangible evidence for such an encampment were found within the study area, it is possible that it is located outside of the study area. Alternatively, the site (with possibly the structures from Site 2, Site 3, Site 5, Site 6, Site 7 and Site 13) would have represented an encampment for either a small group of men or alternatively for a larger group of men but used over a shorter period of time.



A number of references were found to military activities in the general vicinity of the study area during the South African War. These include the following:

- During August 1900 the Elswick Battery moved past Hebron to Zoutpan, and from there to Warmbaths (Briggs, 1901).
- On the afternoon of Friday, 7 September 1900 Major Lewis and his men of the 1<sup>st</sup> Tasmanian Bushmen departed from the Pienaars River on a night march in the general direction of the Salt Pan. They marched until 1am on the morning of Saturday, 8 September 1900 where they rested for three hours before patrolling in search of Boers who were believed to be in the vicinity. Two Boers were encountered but managed to escape capture. That afternoon the Tasmanians reached the Salt Pan where they rested till late that afternoon from where they left on another night march back to Waterval. A few days later (likely on Thursday, 13 September 1900) Lewis and his men left Waterval and went on a patrol toward the Crocodile River, which they reached three days later. On their way to this destination they passed through the Hebron Mission ([alh-research.tripod.com](http://alh-research.tripod.com)).
- On 12 September 1900 Plumer's Column (including C Battery) met Paget's supply column at Zoutpan from where they moved to Hebron (Miller, 1993).
- On an unknown date the mission station at Hebron was burnt down by British forces as it was believed that the missionary at Hebron had given shelter to a Boer Commando (Spies, 1977).

*Site Significance:*

If the interpretation of the site outlined above is correct, it is likely older than 100 years and would have some historical and emotional significance. However, the complete lack of associated historical material and artefacts reduces the scientific significance of the site. It is classified as Generally Protected B (GP. B) or Medium Significance. The mitigation measures can be found in Section 6.



Figure 13– *General view of one of the circular structures at the site.*



Figure 14– *The two longer sections of stonewalling located near the hill.*

#### 4.3.5 Site 5

HIA – SOSHANGUVE DEVELOPMENT

20 August 2012



*Site Coordinates:*

25° 31' 44.2" S

28° 07' 25.1" E

*Site Description:*

Three poorly preserved sections of stone walling were identified on the summit of a low hill. These sections of stone walling comprise two crescents (each roughly 4m in length) and one section of straight walling (roughly 3m in length). No associated artefacts were identified. It is possible that the site may have been associated with the structures at Site 4 as part of a bigger military site, but this cannot be stated as fact.

*Site Significance:*

Although the original walling of the site may be quite old, it is in a very poor condition. Furthermore, no associated archaeological material was identified. The significance of the site can be classified as Generally Protected C (GP.C) which represents a Low Significance. No further mitigation measures are required.



Figure 15– *General view of Site 5.*

**4.3.6 Site 6**

*Site Coordinates:*

25° 31' 49.4" S

28° 07' 23.9" E

*Site Description:*

A rectangular stone structure is located here. It is located halfway up the northern slope of hill known as Enkeldebosch which is the highest hill from within the study area. The structure may have been a livestock enclosure. The position of the site so high up the slope suggests that the site was built at a time of conflict, war or social upheaval. As such the site may be associated with other sites from within the study area which may have formed part of a military encampment during the South African War. These sites include Site 2, Site 3, Site 4 and Site 5. No associated artefacts were identified.

*Site Significance:*

The site is of Generally Protected B (GP. B) or Medium Significance, which indicates that it must be recorded before it is destroyed. The mitigation measures can be found in Section 6.



Figure 16 – General view of Site 6

**4.3.7 Site 7**



*Site Coordinates:*

25° 31' 57.1" S

28° 07' 22.5" E

*Site Description:*

A small rectangular structure is located here. The structure is roughly 1.5m by 1m in extent and was built of dry stone walling. The small size of the structure makes it highly unlikely that it was built for farming purposes. The only other apparent interpretation is that the site was associated with the other sites which may have had a military function or origin. No associated archaeological material could be found.

*Site Significance:*

The site is of Generally Protected B (GP. B) or Medium Significance, which indicates that it must be recorded before it is destroyed. The mitigation measures can be found in Section 6.



Figure 17– One of the graves from the cemetery at HM7.

**4.3.8 Site 8**

*Site Coordinates:*

25° 32' 01.5" S

28° 07' 22.2" E

*Site Description:*

A small rectangular cement brick dwelling is located here. It is situated a short distance south of the M35 road, and has its own access road leading from the M35 to this dwelling. The building is not indicated on the 1939 (1940) topographical sheet, and as a result is younger than 72 years. Furthermore, the characteristics of the building indicate that it was built more recent than that, and is certainly not older than 60 years.

*Site Significance:*

The dwelling is certainly not older than 60 years, nor does it have any architectural, historical or scientific significance. The site is of Generally Protected C (GP. C) or Low Significance, which indicates that it can be destroyed without any prior mitigation taking place.



**Figure 18**–Google Earth image depicting the dwelling from Site 8 in relation to the M35.

**4.3.9 Site 9**



*Site Coordinates:*

25° 32' 03.8" S

28° 07' 23.4" E

*Site Description:*

A single grave was identified at this location. It is located roughly 80m south-east of the dwelling at Site 8 and may be associated with it. The grave has a small rectangular cement and stone dressing without any formal headstone and is orientated along the east-west axis. No grave goods were observed on or near the grave.

*Site Significance:*

All graves possess high levels of religious, cultural, emotional and legislative significance. As such, the site is of Generally Protected A (GP. A) or High/Medium Significance. This indicates that the site may not be impacted upon without prior mitigation. The mitigation measures to follow for the site can be found in Section 6 below.



*Figure 19—General view of the grave at Site 9.*

**4.3.10 Site 10**

*Site Coordinates:*

25° 31' 59.9" S

28° 07' 13.6" E

*Site Description:*

The foundation remains of a yellow face brick building are located here. The site is not depicted on the 1939 (1940) topographical sheet, and as a result is younger than 72 years. In fact, the characteristics of the structure indicate that it was built even more recent than that, and is likely younger than 60 years old.

*Site Significance:*

The site is likely younger than 60 years and due to its poor preservation does not have any architectural or scientific significance. The site is of Generally Protected C (GP. C) or Low Significance, which indicates that it can be destroyed without any prior mitigation taking place.



**Figure 20**—General view of the remains of one of the two structures from Site 10.

**4.3.11 Site 11**



*Site Coordinates:*

25° 32' 10.4" S

28° 07' 21.3" E

*Site Description:*

The foundation remains of a rectangular two roomed structure are located here. It is evident that the structure was used as a dwelling, and had a door leading to each of the two rooms. It is possible that the walls would have been made of mud bricks which have since been washed away. Although some artefacts were observed in the surrounding area, no concentrations of archaeological material could be found.

A short distance south-east of the dwelling a low stone wall was identified which may have been used as part of an enclosure to keep animals.

Based on the information that is presently available, it would appear that the dwelling was built and used by black people, possibly black farm workers. Past experience has shown that in some cases stillborn babies were buried in close proximity to the homes of their parents and especially along the sides of the parents' dwelling. This seems to be especially true for older sites. As this site was abandoned some time ago, no direct information with regards to the presence (or not) of stillborn graves are presently available.

*Site Significance:*

Until such time that the presence of graves here has been confirmed or disproved, the site must be viewed as containing graves.

All graves have high levels of emotional, religious and in some cases historical significance. As such the site is of Generally Protected A (GP. A) or High/Medium Significance. This indicates that the site may not be impacted upon without prior mitigation. The mitigation measures to follow for the site can be found in Section 6 below.



**Figure 21**—General view of the dwelling remains at Site 11.

#### 4.3.12 Site 12

*Site Coordinates:*

25° 32' 11.9" S

28° 07' 21.7" E

*Site Description:*

The remains of a large rectangular stone cattle kraal are located here. It is located at the southern foot of a low ridge, and is situated 50m south-east of Site 11 and may be associated with it. The structure is roughly 12m long and 5m wide, has an opening on its eastern end and a smaller subdivided section on its western end which may have been used to keep calves. The site is depicted on the 1939 (1940) topographical sheet and as a result is older than 72 years.

*Site Significance:*

While the site is older than 72 years it is not unique and does not have any architectural or scientific significance. It is of Generally Protected B (GP. B) or Medium Significance, and must be recorded before it is destroyed. The mitigation measures can be found in Section 6.



**Figure 22**—General view of stone structure at Site 12.

#### 4.3.13 Site 13

##### *Site Coordinates:*

25° 32' 18.5" S

28° 07' 16.3" E

##### *Site Description:*

An informal cemetery comprising 20 graves is located here. With the exception of three graves, all the graves from the cemetery have stone-lined or stone-packed dressings with no formal headstones.

The exception to this is three graves, namely a double grave outlined by a single line of bricks and a stone-lined dressing with an inscribed slate headstone. Although the slate headstone has a large piece missing from its centre, the following inscription could be read:

*"HIER RUS ??? GELIEFDE ZOON  
CHRISTIAN ??? GEB. 1884 DEN 13  
MAART OVL. ??? JANUARI 1913"*

The graves are all orientated along the east-west axis. Grave goods in the form of one enamel mug were observed on one of the graves.

The cemetery is located within the study area, five meters from the eastern boundary of Portion 69.

##### *Site Significance:*

All graves possess high levels of religious, cultural, emotional and legislative significance. As such, the site is of Generally Protected A (GP. A) or High/Medium Significance. This indicates that the site may not be impacted upon without prior mitigation.

The mitigation measures to follow for the site can be found in Section 6 below.





**Figure 23**—General view of the cemetery at Site 13.



**Figure 24**—General view of the only inscribed headstone from the cemetery at Site 13.



#### 4.3.14 Site 14

*Site Coordinates:*

25° 32' 10.5" S

28° 07' 13.9" E

*Site Description:*

A small circular structure is located here. The structure is roughly 1m wide and was built of dry stone walling.

The small size of the structure makes it highly unlikely that it was used for agricultural purposes. Furthermore, its position just below the summit of the highest hill on this side of the study area with good views of the valley toward the south below, suggest that it may have had a military function and as such was likely associated with the other sites which may have had a military function or origin from the study area. No associated archaeological material could be found.

Clothing typically associated with the dress of a traditional healer or sangoma was observed inside the structure. A cross made of reeds was also observed in close proximity to the structure. This cross was found placed on top of an ant heap with an empty snuff container and glass bottle associated with it.

It would appear that the structure and surrounding area is used by traditional healers and/or sangomas for religious or medicinal practices.

*Site Significance:*

The site is of Generally Protected B (GP. B) or Medium Significance, which indicates that it must be recorded before it is destroyed. The mitigation measures can be found in Section 6.



*Figure 25– The structure from Site 14 can be seen.*



*Figure 26– This reed cross with associated snuff container and glass bottle was observed a few meters south-east of the circular structure from Site 14.*



## 5 IMPACT OF PROPOSED DEVELOPMENT ON HERITAGE RESOURCES

The impact of the proposed development on the 12 structures will be established first, after which the impact on the two grave and cemetery sites will be calculated.

$$\text{Impact Risk} = \frac{(\text{Significance} + \text{Spatial} + \text{Temporal})}{3} \times \frac{\text{Probability}}{5}$$

$$\text{Impact Risk} = \frac{(3 + 1 + 5)}{3} \times \frac{4}{5}$$

**IMPACT RISK = 2.13**

*Table 11: Risk Calculation for Development Impact on the Identified Structures*

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Low	Isolated	Permanent	Very likely	Moderate
Impact on heritage structures	2	1	5	4	2.13

The following calculation deals with the impact of the proposed development on the two cemeteries that were identified within the study area. These are Site 9 and Site 13.

$$\text{Impact Risk} = \frac{(\text{Significance} + \text{Spatial} + \text{Temporal})}{3} \times \frac{\text{Probability}}{5}$$

$$\text{Impact Risk} = \frac{(4 + 2 + 5)}{3} \times \frac{4}{5}$$

**IMPACT RISK = 2.93**

*Table 12: Risk Calculation for Development Impact on the Identified Grave*

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	High	Study area	Permanent	Very likely	Moderate
Impact on grave	4	2	5	4	2.93

Apart from the two impacts highlighted above, it is also necessary to discuss the possible presence of unmarked graves of stillborn infants in the homesteads of African tenant farmers. Through experience of similar sites and knowledge of cultural customs and traditions, it is known that stillborn babies and deceased infants occasionally were buried near or under the dwellings of African rural communities. These children were sometimes buried near the bedroom or kitchen of the dwelling, and were often buried directly outside of the structure against the wall. These burials were not marked, but were known to the immediate family.

Customs and traditions like these were common in the rural African communities during the early and later 20th century. It is therefore not only possible, but likely, that some of these structures may be associated with such infant remains. The dwelling at Site 11 is of relevance here.

In the calculation below, the impact of the proposed development on the possible infant graves associated with the abovementioned structure will be considered.

$$\text{Impact Risk} = \frac{(\text{Significance} + \text{Spatial} + \text{Temporal})}{3} \times \frac{\text{Probability}}{5}$$

$$\text{Impact Risk} = \frac{(4 + 2 + 5)}{3} \times \frac{3}{5}$$

**IMPACT RISK = 2.2**

*Table 13: Risk Calculation for Development Impact on the Possible Presence of Infant Burials*

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	High	Study area	Permanent	Could happen	Moderate
Impact on graves associated with homesteads	4	2	5	3	2.2

From the above three calculations, it is therefore evident that if the development is allowed to continue unmitigated, it would have a moderate impact on the structures identified there, a moderate impact on the two cemeteries located there and a moderate impact on the possible infant graves associated with one structure.

## 6 MITIGATION MEASURES

No mitigation measures are required for Site 1, Site 5, Site 8 and Site 10. This means that on approval of this report by the relevant heritage authorities, these sites may be destroyed.

The following mitigation measures are required for Site 2, Site 3, Site 4, Site 6, Site 7, Site 11, Site 12 and Site 14:

- The first step would be for these structures to be cleaned and cleared of vegetation
- Photographic documentation in both digital and black and white formats must be undertaken of these structures.
- The structures must be recorded by way of measured drawings.
- The photographs and measured drawings must be compiled in report format.
- A destruction permit application (to which the documentation report is attached) must be lodged with the heritage authorities in order to obtain permission for these structures to be destroyed.
- After receipt of a destruction permit, and at the time that these sites are destroyed, an archaeologist must be present to ensure that no hidden archaeological material is exposed or lost.

The mitigation measures for the two sites (Site 9 and Site 13) containing graves are as follows:

- Adjust the development layout to allow for the in situ preservation of the graves
- Demarcate a 5m buffer around each of the two sites
- Erect a fence (preferably a palisade one) with lockable gate around each of the two sites, on the respective demarcation boundaries
- In the event that a cemetery cannot be excluded from the development footprint, a grave relocation process, as outlined below, needs to be implemented.

Whenever a grave relocation process is required, it must include the following:

- A detailed social consultation process, at least 60 days in length, comprising the attempted identification of the next-of-kin so as to obtain their consent for the relocation of the graves
- Bilingual site notices indicating the intent of the relocation



- Bilingual newspaper notices indicating the intent of the relocation
- A permit from the local authority;
- A permit from the Provincial Department of Health;
- A permit from the South African Heritage Resources Agency, if the graves are older than 60 years or unidentified and thus presumed older than 60 years;
- An exhumation process that keeps the dignity of the remains and family intact;
- An exhumation process that will safeguard the legal rights of the families as well as that of the development company.
- The process must be done by a reputable company well versed in relocations;

As outlined in the previous section, mitigation measures would be required for the impact of the proposed development on the possible presence of infant graves at Site 11. The following mitigation measures are required:

- This issue can either be addressed by way of a social consultation process, or alternatively, with reconnaissance excavations in the areas on and surrounding the structures in question. However, the best option would be to have a combination of both processes.

## **7 SOCIO-ECONOMIC BENEFITS OF THE DEVELOPMENT VERSUS HERITAGE IMPACT**

The expected socio-economic benefits to be derived from the proposed development include:

- Creation of employment opportunities during the project development phase
- Creation of employment opportunities during the project operational phase
- Investment in the local economy

As stated in Section 5, a moderate impact is expected on the identified structures, whereas the unmitigated impact of the proposed development will represent a moderate impact on the two sites containing graves as the possible presence of infant burials associated with one of the structures. However, these moderate impacts can be suitably mitigated by following the recommendations outlined in this report. As such, it is evident that the envisaged socio-economic benefits of the proposed development outweigh the impact of the proposed development on the heritage fabric of the study area.

## 8 CONCLUSIONS AND GENERAL RECOMMENDATIONS

PGS Heritage & Grave Relocation Consultants (PGS) was appointed by Abland to undertake a Heritage Impact Assessment (HIA), which forms part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the establishment of Onderstepoort Ext. 33, 34, A, B & C and which are located on Portions 68, 69, 112, 113, 114, 115 and 116 of the farm Onderstepoort 266-JR, located in the Tshwane Metropolitan Municipality of Gauteng Province. The proposed activity comprises the development of a mixed development comprising amongst others residential, commercial, infrastructural and municipal components.

A desktop study was undertaken, which focussed especially on old cartographic material with which historically significant structures and features can be highlighted. This was followed by fieldwork, which resulted in the identification of fourteen sites (twelve structures and two cemeteries) within the study area.

*Table 14: Summarised List of Heritage Sites Identified during the Fieldwork*

Site	Description	Heritage Significance	S	E	Mitigation
1	Structure	Low Local (GP. C)	25° 31' 45.1"	28° 07' 32.6"	No mitigation required
2	Structure	Medium Local (GP. B)	25° 31' 48.7"	28° 07' 31.6"	Photographs and measured drawings, permit application, archaeological monitoring at the time of destruction
3	Structure	Medium Local (GP. B)	25° 31' 49.6"	28° 07' 31.1"	Photographs and measured drawings, permit application, archaeological monitoring at the time of destruction
4	Structure	Medium Local (GP. B)	25° 31' 53.2"	28° 07' 32.7"	Photographs and measured drawings, permit application, archaeological monitoring at the time of destruction
5	Structure	Low Local (GP. C)	25° 31' 44.2"	28° 07' 25.1"	No mitigation required
6	Structure	Medium Local (GP. B)	25° 31' 49.4"	28° 07' 23.9"	Photographs and measured drawings, permit application, archaeological monitoring at the time of destruction
7	Structure	Medium Local (GP. B)	25° 31' 57.1"	28° 07' 22.5"	Photographs and measured drawings, permit application, archaeological monitoring at the time of destruction

8	Structure	Low Local (GP. C)	25° 32' 01.5"	28° 07' 22.2"	No mitigation required
9	Cemetery	High/Medium Local (GP. A)	25° 32' 03.8"	28° 07' 23.4"	In situ preservation, if not possible full grave relocation
10	Structure	Low Local (GP. C)	25° 31' 59.9"	28° 07' 13.6"	No mitigation required
11	Structure	High/Medium Local (GP. A)	25° 32' 10.4"	28° 07' 21.3"	(1) Photographs and measured drawings, permit application, archaeological monitoring at the time of destruction (2) Confirm no graves during social consultation and reconnaissance excavations
12	Structure	Medium Local (GP. B)	25° 32' 11.9"	28° 07' 21.7"	Photographs and measured drawings, permit application, archaeological monitoring at the time of destruction
13	Cemetery	High/Medium Local (GP. A)	25° 32' 18.5"	28° 07' 16.3"	In situ preservation
14	Structure	Medium Local (GP. B)	25° 32' 10.5"	28° 07' 13.9"	Photographs and measured drawings, permit application, archaeological monitoring at the time of destruction

The impact of the proposed development on the located heritage sites was assessed, and it was established that the proposed development will have an impact risk of 2.13 on the located structures, which represents a moderate impact. The impact risk of the development on the two cemeteries was calculated to be 2.93, which represents a moderate impact. The impact risk on the possible presence of infant graves associated with one structure was calculated to be 2.2, which also represent a moderate impact. As a result of the moderate calculated impact risk, mitigation measures for some of the structures (Site 2, Site 3, Site 4, Site 6, Site 7, Site 11, Site 12 and Site 14), cemeteries (Site 9 and Site 13) and possible presence of infant burials (Site 12) need to be undertaken. Refer Section 6 for an outline of the mitigation measures required.

The overall impact of the development on heritage resources is seen as acceptably low and impacts can be mitigated to acceptable levels. On the condition that the recommendations made in this report are adhered to, no heritage reasons can be given for the development to be halted.

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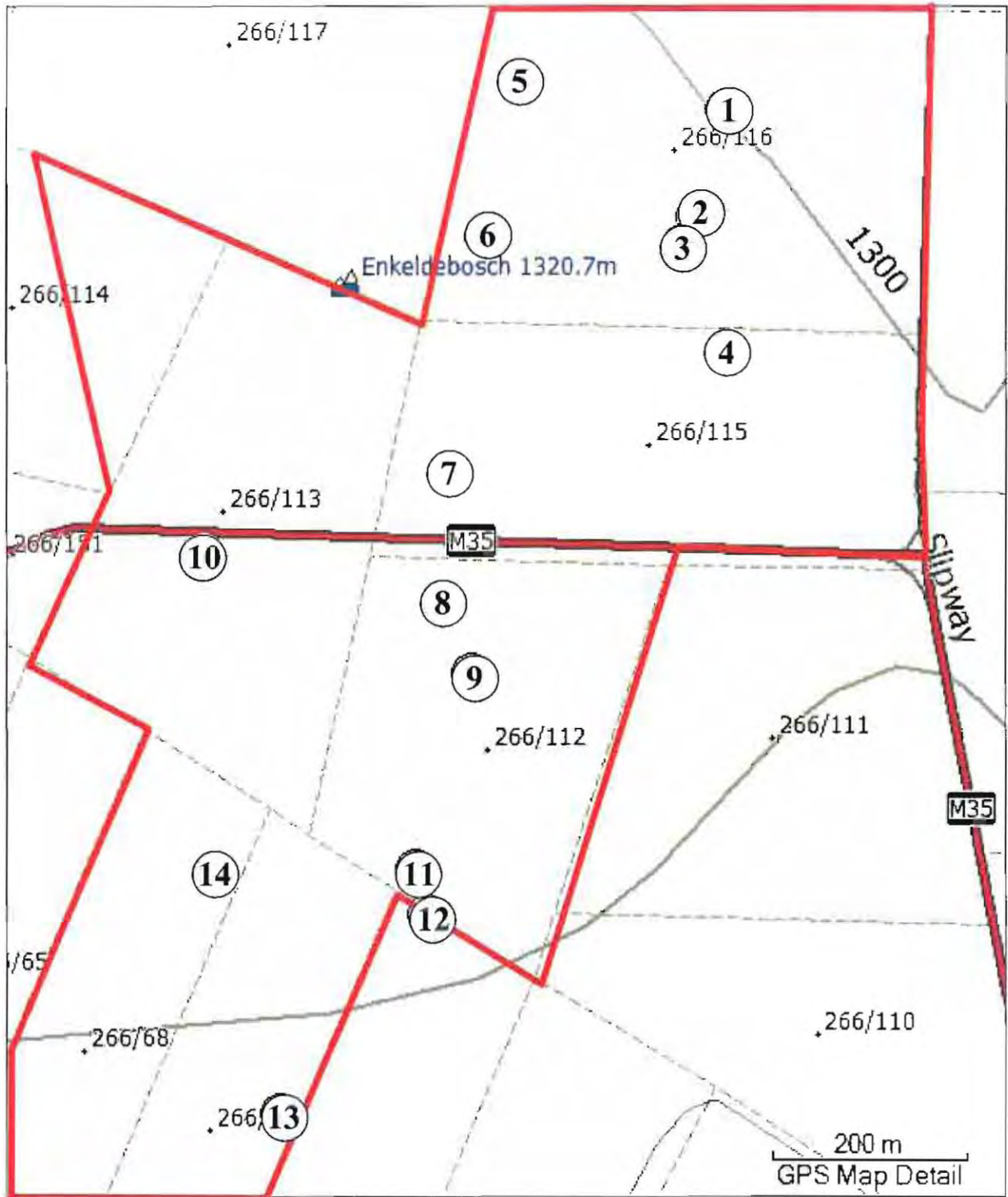
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[www.wikipedia.org](http://www.wikipedia.org)



Appendix A  
**SITE DISTRIBUTION MAP**



**LEGISLATIVE REQUIREMENTS – TERMINOLOGY AND ASSESSMENT CRITERIA**

**General principles**

In areas where there has not yet been a systematic survey to identify conservation worthy places, a permit is required to alter or demolish any structure older than 60 years. This will apply until a survey has been done and identified heritage resources are formally protected.

Archaeological and palaeontological sites, materials, and meteorites are the source of our understanding of the evolution of the earth, life on earth and the history of people. In terms of the heritage legislation, permits are required to damage, destroy, alter, or disturb them. Furthermore, individuals who already possess heritage material are required to register it. The management of heritage resources is integrated with environmental resources and this means that, before development takes place, heritage resources are assessed and, if necessary, rescued.

In addition to the formal protection of culturally significant graves, all graves which are older than 60 years and are not located in a cemetery (such as ancestral graves in rural areas), are protected. The legislation also protects the interests of communities that have an interest in the graves: they should be consulted before any disturbance takes place. The graves of victims of conflict and those associated with the liberation struggle are to be identified, cared for, protected and memorials erected in their honour.

Anyone who intends to undertake a development must notify the heritage resources authority and, if there is reason to believe that heritage resources will be affected, an impact assessment report must be compiled at the construction company's cost. Thus, the construction company will be able to proceed without uncertainty about whether work will have to be stopped if an archaeological or heritage resource is discovered.

According to the National Heritage Act (Act 25 of 1999 section 32) it is stated that:

An object or collection of objects, or a type of object or a list of objects, whether specific or generic, that is part of the national estate and the export of which SAHRA deems it necessary to control, may be declared a heritage object, including –

- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, meteorites and rare geological specimens;
- visual art objects;
- military objects;
- numismatic objects;



- objects of cultural and historical significance;
- objects to which oral traditions are attached and which are associated with living heritage;
- objects of scientific or technological interest;
- books, records, documents, photographic positives and negatives, graphic material, film or video or sound recordings, excluding those that are public records as defined in section 1 (xiv) of the National Archives of South Africa Act, 1996 ( Act No. 43 of 1996), or in a provincial law pertaining to records or archives; and
- any other prescribed category.

Under the National Heritage Resources Act (Act No. 25 of 1999), provisions are made that deal with, and offer protection to, all historic and prehistoric cultural remains, including graves and human remains.

#### **Graves and cemeteries**

Graves younger than 60 years fall under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925) as well as the Human Tissues Act (Act 65 of 1983) and are under the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the Office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning, or in some cases the MEC for Housing and Welfare. Authorisation for exhumation and reinternment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. In order to handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

Graves older than 60 years, but younger than 100 years, fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act) as well as the Human Tissues Act (Act 65 of 1983) and are under the jurisdiction of the South African Heritage Resources Agency (SAHRA). The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in the category located inside a formal cemetery

administered by a local authority will also require the same authorisation as set out for graves younger than 60 years, over and above SAHRA authorisation.

If the grave is not situated inside a formal cemetery but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws set by the cemetery authority must be adhered to.

Appendix C  
**PROPOSED DEVELOPMENT LAYOUT PLAN**

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## DEVELOPMENT PLAN OF PROPOSED DEVELOPMENT SITUATED ON PORTIONS 68, 69 AND 112 - 116 UNDERSTEEPPOORT NO. 266-J.R.

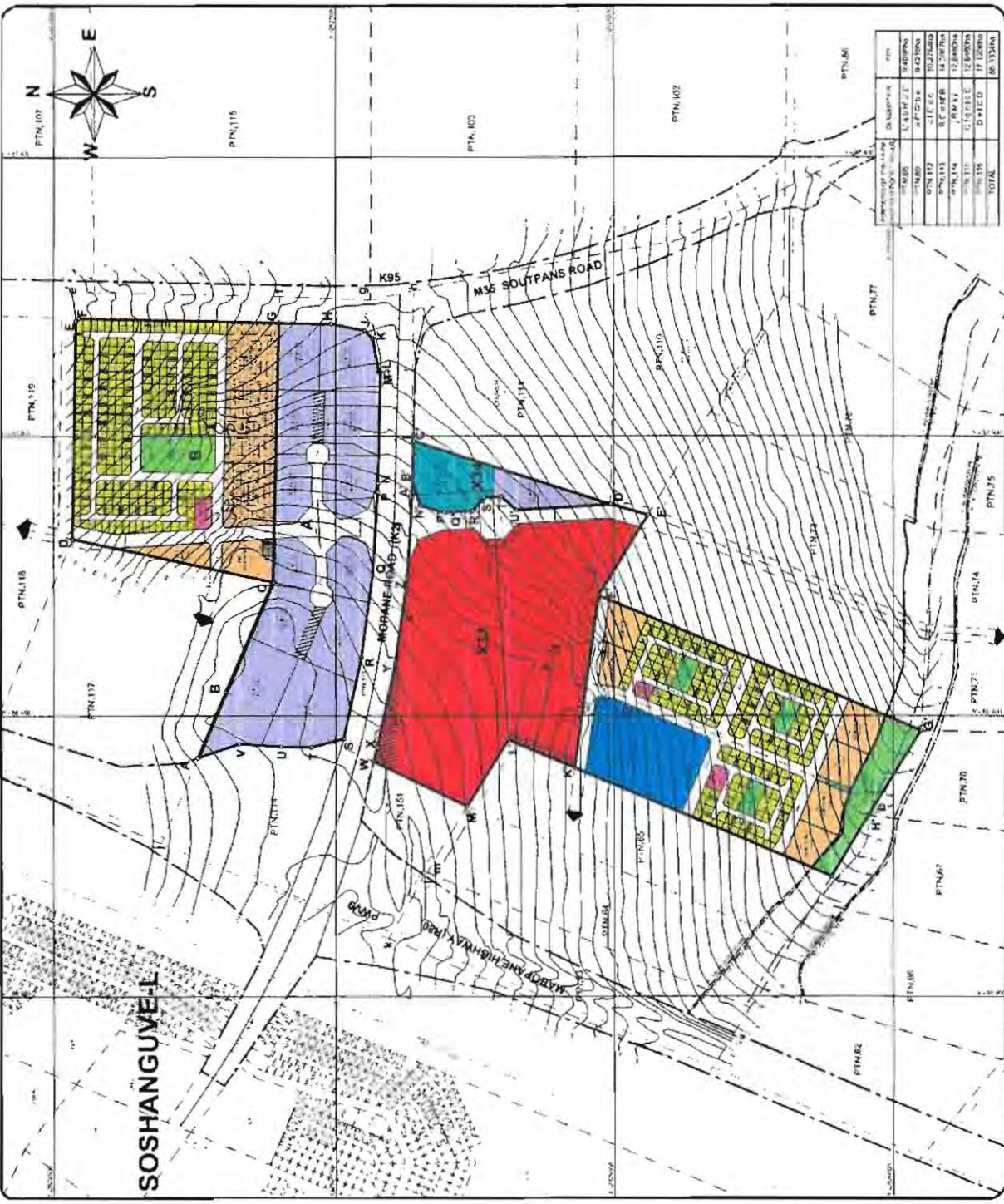
**REFERENCE:**  
 ONDERSTEEPPOORT EXT. 33 (WVYZABN P'OR'S TUDE FKL'WW)  
 ONDERSTEEPPOORT EXT. 34 (BC'CUIT'S ROP'NB)  
 ONDERSTEEPPOORT EXT. A (ABC'UJL'IMP'ORS'UWA)  
 ONDERSTEEPPOORT EXT. B (DEF'CD)  
 ONDERSTEEPPOORT EXT. C (K'F'FN'U'K)

**NOTES:**  
 1.) Proposed Phases  
 2.) All measurements in m, are approximate.

PLAN NUMBER: D187204 Development Plan  
 LOCAL AUTHORITY: City of Tshwane

**PLANDEV**  
 Stellenbosch Street  
 Tloane and Gaborone (Tloane)

SCALE: 1 : 2500      DATE: JUNE 2012



Appendix D

**PALAEONTOLOGICAL DESKTOP STUDY BY PROF. BRUCE RUBIDGE**





## BPI for Palaeontological Research

Private Bag 3, WITS 2050, South Africa • Telephone +27 11 717-6682 • Fax +27 11 717-6694

Email: [bruce.rubidge@wits.ac.za](mailto:bruce.rubidge@wits.ac.za)

14 July 2012

Mr Polke Birkholtz  
PGS Heritage & Grave Relocation Consultants

Email: [polke@gravesolutions.co.za](mailto:polke@gravesolutions.co.za)

Dear Mr Birkholtz

### **Proposed Soshanguve Development, Onderstepoort Farm – Palaeontological Desktop Study**

As requested, I have undertaken a desk top study to assess the possible affect on palaeontological heritage which will result from a mixed development on roughly 86 hectares of land on portions 68,69, 112, 113, 114, 115 and 116 of the Farm Onderstepoort 266 JR in the vicinity of Soshanguve north of Pretoria (Figure 1).

Following the 1:2500 Geological Map (sheet 2528 Pretoria, 1978), the entire locality is situated on Precambrian igneous rocks of the Rашoop Granophyre Suite of the Bushveld Igneous Complex.

As there is no chance of these rocks hosting fossils the proposed development here offers no threat to palaeontological heritage I recommend that, from a palaeontological perspective, the development may proceed.

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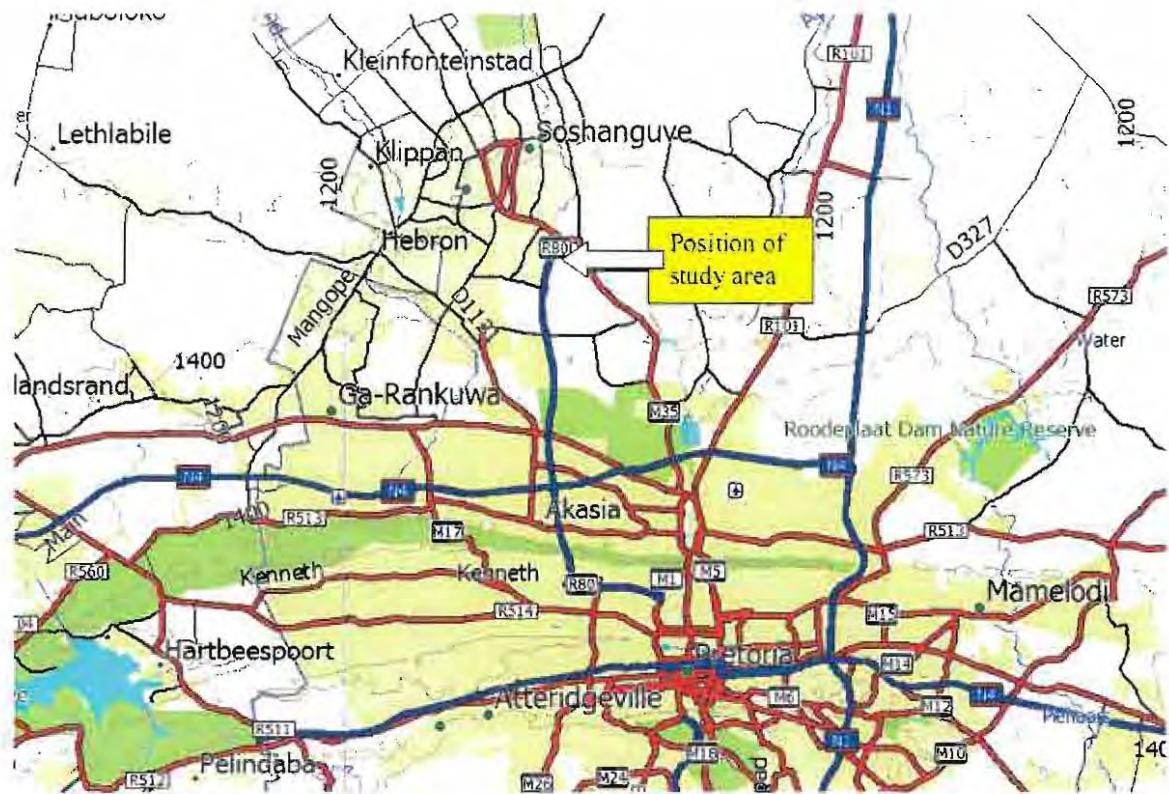


Figure 1: Map showing the locality of the study area on the farm Onderstepoort 266-JR.

Yours sincerely

**Professor Bruce Rubidge** PhD, FGSSA, FRSSA, Pr Sci Nat

## **ANNEXURE O – GDARD FEEDBACK**

Ian Roos

**From:** GDARD Biodiversity Information (GDARD) [GDACE\_BiodiversityInfo@gauteng.gov.za]  
**Sent:** 01 June 2012 03:09 PM  
**To:** Ian Roos  
**Subject:** RE: ONDERSTEPOORT DEVELOPMENT  
**Follow Up Flag:** Follow up  
**Flag Status:** Red

With regard to the above project, specialist biodiversity studies are required to investigate the following aspects

- \* Plants, with specific reference to *Ceropegia fuscata*.
- \* Vegetation
- \* Wetlands

Please note that this information is relevant solely for the study site specified in your request. Red/Orange Listed plant species information relevant to a wider geographic area can be obtained from Lorraine Mills (Lorraine.Mills@gauteng.gov.za).

All specialist studies must comply with GDARD Requirements for Biodiversity Assessments. The most recent version of this document (currently version 2) can be obtained by e-mailing GDARD\_BiodiversityInfo@gauteng.gov.za.

Should the environmental assessment practitioner be of the opinion that any of the above specialist studies are unnecessary for the site/activity in question, then an ecologically-based motivation justifying why the studies are deemed unnecessary must be submitted to GDARD as part of the application. This submission will be evaluated and either accepted or returned to the applicant for the completion of the necessary studies.

Please do not send follow up inquiries to this message as they will not be processed. For further queries please contact Phuli Mlamleli (Phuli.Mlamleli@gauteng.gov.za)

**From:** Ian Roos [mailto:ecologic@mweb.co.za]  
**Sent:** Tue 2012/05/22 07:06 AM  
**To:** GDARD Biodiversity Information (GDARD)  
**Subject:** FW: ONDERSTEPOORT DEVELOPMENT

Please find attached shapefile for proposed mixed use development on Ptn 68, 69, 112-116 of Onderstepoort 266-JR, Tshwane. The project reference is Gaut.002/12-13/E0033

Regards

Ian Roos  
ecologic AFRIKA  
Del: 011 433 3316  
Tel: 011 401 4893  
Fax: 011 681 5251  
ecologic@mweb.co.za  
P.O. Box 9079  
Cullindaan  
0048



**ANNEXURE P – TSHWANE METRO FEEDBACK**





## Environmental Management Services Department

Nr 11 Schoeman Street | Pretoria 0001  
PO Box 1454 | Pretoria | 0001  
Tel 012 358 8671 | Fax 012 358 8934  
Email: [livituwants@tshwane.gov.za](mailto:livituwants@tshwane.gov.za) | [www.tshwane.gov.za](http://www.tshwane.gov.za)

My ref: B/A/R/Z  
Your ref: GAUT 002/13-14/E0343  
Contact person: T Mphahlele  
Section: Environmental Planning & Open Space Management Section  
Tel: 012 358 8648  
Fax: 012 358 8934  
Email: [Tshinva@tshwane.gov.za](mailto:Tshinva@tshwane.gov.za)  
Date: 23 September 2014

EcologicAfrica Planning & Design Studio  
P.O. Box 8079  
Centurion  
0046

Attention: Christiaan J Roos  
Tel: (012) 661 4863  
Fax: (012) 661 5251  
Email: [ecologic@rweb.co.za](mailto:ecologic@rweb.co.za)

Dear Sir/Madam

### ENVIRONMENTAL IMPACT ASSESSMENT SCOPING REPORT FOR THE PROPOSED MIXED USE TOWNSHIP ESTABLISHMENT ON PART OF PORTION 68,69,112,113 & 115 AND PORTIONS 114 & 116 OF THE FARM ONDERSTEEPOORT 226-JR, CITY OF TSHWANE

The above application dated July 2014 refers

#### 1. INTRODUCTION

The Environmental Management Services Department (the Department) has considered the Environmental Impact Assessment Scoping Report dated July 2014 in respect of the abovementioned application. The Environmental Impact Assessment Scoping Report is submitted to the Environmental Management and Parks Division of the City of Tshwane, hereafter referred to as 'the City', as a commenting authority as required in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2010.

#### 2. PROJECT LOCATION AND DESCRIPTION

EcologicAfrica planning & design studio was appointed as Environmental Assessment Practitioner for the EIA Scoping Study and application for environmental authorisation for the proposed mixed use township establishment on part of portion 68,69,112,113 & 115 and portions 114 & 116 of the Farm Onderstepoort 226-JR, Tshwane Metro. The proposed development is located on both sides of Mopanie Road (link road between R80 Mopane freeway and road M35 (Onderstepoort to Soutpan). The site measures 48, 95 ha.

The EIA Scoping for the proposed development use township establishment forms part of another EIA basic assessment study for the proposed Business 2 development (mail) (Gaut 002/13-14/E0344) adjacent south of Mopanie Road. The proposed mixed use township establishment will consist of Residential 1 (21, 3653)ha, Special for Mixed Uses (9,39)ha, Public Open Space (8,0937)ha, Public Streets (7,604)ha, Special for Public Garage/Car Wash/Place of Refreshment

(1,39ha), Special for Various Uses (0,83ha), Special for Community Uses (0,224 ha) and Municipal(0,06ha).

The activity entails undertaking the following listed activity in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2010.

- **GNR 545 Activity (15):** Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more
- **GNR 544 Activity 22:** The construction of a road, outside urban areas, (i) with a reserve wider than 13,5 meters or, (iii) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice 545 of 2010.

#### 3. KEY FACTORS INFORMING THE COMMENTS

In making its comments in respect of the proposed activity the Department has taken, *inter alia*, the following into consideration:

- a) The information contained in the Environmental Impact Assessment Scoping Report compiled by EcologicAfrica Planning & Design Studio dated July 2014 and received by the Department on 02 September 2014.
- b) Information obtained from the Section's information base including *inter alia*:
  - Geographic Information System (GIS), and
  - Gauteng Open Space Plan (GOSP)
- c) Compliance with applicable Municipal, provincial and national policies and guidelines including:
  - The National Environmental Management Act 1998 (Act 107 of 1998) (NEMA) its decision-making principles and Environmental Impact Assessment Regulations;
  - The Tshwane Integrated Environmental Policy (TIEP);
  - The Tshwane Open Space Framework (TOSF) Policy Statements and Typologies;
  - The Bioregional Plan for the Gauteng Metropolitan Municipalities

#### 4. DISCUSSION

In reviewing the application the Department made the following findings:

- a) According to the Tshwane Open Space Framework the following open space typologies influence and/or in close proximity of the proposed development:
  - A **Blue Node**, namely *Metsi Metsuane, Slinkwater Spruit and associated wetlands*. Blue Nodes are essential in the provisioning of environmental goods and services, the protection of biodiversity, endangered species and ecological systems, as well as eco-based activity. The value of Blue Nodes furthermore lies in their ability to maintain natural hydrological and ecological cycles, such as conserving valuable aquatic systems, purifying water, recharging water tables, preventing flooding and providing drinking and irrigation water. Blue nodes have a secondary socio-economic and place-making function. Therefore Blue Nodes must be conserved.
  - A **Blue Way**, namely *Metsi Metsuane, Slinkwater Spruit and its tributaries*. Blue Ways are essential in the provisioning of environmental goods and services, the protection of biodiversity, endangered species and ecological systems, as well as eco-based activity. The value of Blue Ways lies in their ability to maintain natural hydrological and ecological cycles, such as conserving valuable aquatic systems, purifying water, recharging water tables and

preventing flooding. They also provide in the drinking and irrigation water needs of the city. Blue Ways have a secondary socio-economic and place-making function. Therefore Blue Ways must be conserved.

- **A Green Node, namely High Sensitivity Site; Rooiwal/Honingnesikrans/Bullfontein.** Green Nodes are essential in the provisioning of environmental goods and services, the protection of biodiversity, endangered species and ecological systems, as well as eco-based activity. Green Nodes must be protected for conservation purposes.
  - **A Red Node, namely Mabopane Freeway/Soshanguve Entrance/Soulpan Road.** The value of Red Nodes lies in their place-making function and in creating a high quality urban environment which supports the image of Tshwane as a capital city. Red Nodes include the most important "place making moments" in the city structure.
- b) According to the Bioregional Plan for the Gauteng Metropolitan Municipalities the proposed site is situated within and adjacent to the following areas:
- **Critical Biodiversity Area 1:** Any terrestrial or aquatic area required to meet biodiversity pattern and/or process thresholds. These include any area that is required for meeting pattern thresholds, namely remaining areas of Critically Endangered vegetation types and areas required to protect threatened species; any area that is required for meeting process thresholds such as areas important for climate change adaptation; and hydrological process areas such as high priority wetlands and catchments, pen clusters and pans within priority catchments. In addition to the above areas where there is little or no choice of area identified, CBAs include all 'best design' sites in terms of meeting pattern and process thresholds, identified by the iterative conservation planning process. 'Best design' refers to an identified network of natural sites that meet pattern and process thresholds in all vegetation types and features in a spatially efficient and ecologically robust way, and aim to avoid conflict with other activities (e.g. economic activity) where it is possible to achieve biodiversity thresholds elsewhere.
  - **Ecological Support Area 2:** Areas with no natural habitat which retain potential importance for supporting ecological processes. These include urban and cultivated landscapes on floodplains, in buffers around wetlands and in bottlenecks in key climate change corridors. Inappropriate management or intensification of land use in these areas could result in additional impacts on ecological processes.
  - **Other Natural Area:** Natural areas not included in the above categories.
- c) The Department is of the view that the above mentioned Open Space typologies, (In this case the High Sensitivity Site; Rooiwal/Honingnesikrans/Bullfontein on portion 68, 69 and 112) are essential in the provisioning of environmental goods and services, the protection of biodiversity, endangered species and ecological systems, as well as eco-based activity. They must be protected for conservation purposes. Therefore the proposed development could pose threat to the conservation of these valuable ecological resources should it take place on the proposed site.
- d) The report indicates that the site is on a slight ridge with crest, fairly undisturbed, somewhat overgrazes and has been used primarily for grazing.
- e) The report indicates that two wetlands occur on site, one towards the northeast of the site and the other along the southern boundary.
- f) The report indicates that the site is located east of Soshanguve, both sides (north and south) of Mopane road and adjacent east of the R80 Mabopane freeway, typically with residential and agricultural activity.
- g) The report indicates that the site consist apparently of sandy soils underlain by granite of the Lebowa Granite Suite and granophyre of the Rashoop Granophyre Suite.

- h) The report indicates that the site appears to have fairly sandy soils of varying depth in the higher-lying areas, but shallow with moderate clay content in lower lying areas.
- i) The report indicates that the site is located on a slight ridge with crest towards the north of the site.
- j) The report indicates that the average rainfall in the areas is approximately 500-700mm during November to March.
- k) The report indicates that the site is classified as transition between central Sandy Bushveld and Marikana Thornveld (Musina & Rutherford) dominated by *Hyphantaria hirta* and *Trachypogon spicatus*.
- l) The report indicates that one red data species has been identified for the site *Boophae disticha* which will be transplanted.
- m) The report indicates that no mammals have been observed on site, although small mammals, reptiles, amphibians and insects may occur. One red data species have been identified for the site *Pylhon natalensis*, which will be relocated.
- n) The report indicates that the traffic generation will increase overtime, linked with the progression of the development.
- o) The report indicates that bulk infrastructure such as water, storm water, sewer, electricity, and Telkom will have to be provided to the site.
- p) The report indicates that the current land use of the site consists of agricultural activity (grazing).
- q) The report indicates that signs of historical significance have been found on the site.
- r) The report indicates that the agricultural potential of the site is deemed low, with the carrying capacity for grazing and the low soil fertility negating the sustainable use on an economic basis.
- s) The report indicates that corridors for the movement of wildlife consist of the Metsi Metsuane Spruit tributary south of the site, as well as the Soulpan Spruit northeast of the site.
- t) The report indicates that the Haakdoornboom Spatial Development Framework has recently been revised and supports the proposed development of the area.
- u) The report indicates that no public participation process is required since no parties registered as Interested and Affected Parties.
- v) The report indicates that the following specialist studies will be undertaken and included as part of the EIA report:
- Geotechnical Investigation Study.
  - Biodiversity Study (wildlife, vegetation & wetlands)
  - Traffic Impact Study
  - Heritage Impact Assessment Study
  - Visual Impact Assessment Report.
  - Engineering Services Reports.

## 5. RECOMMENDATIONS

The Department recommends that the following issues be taken into consideration:

- a) A detailed layout plan, overlaying all sensitivities shall be included within the EIA report and submitted to this Department for perusal. The layout plan shall also be made available for the surrounding Interested and Affected parties to evaluate and comment on.
- b) A detailed storm water management plan should be compiled that ensures that storm water generated on site is discharged in such a way that the receiving environment is not adversely impacted upon.
- c) All identified specialist studies must be conducted and included in the EIA Report. The Assessment must indicate all potential impacts of the proposed development and appropriate mitigation measures.
- d) Confirmation of service capacity (water, electricity, storm water and sewer) from the relevant service providers must be included within the final report. Should no capacity exist for any of these services, an alternative should be discussed within the Report.
- e) All identified specialist studies identified above must be conducted and included in the EIA Report. The Assessment must indicate all potential impacts of the proposed development and appropriate mitigation measures.
- f) A General Rehabilitation plan shall be included within the EIA Report which will aim to prevent erosion and aid the return of natural, endemic and indigenous vegetation cover to at least 80% of the rehabilitated area.
- g) An Environmental Management Plan should be included within the EIA Report. The EMP should address impacts and mitigation measures for the pre-construction, construction and post-construction activities. All issues and recommendations from Specialist studies should be included within the final and approved EMP. An Environmental Control Officer and contact details should also be included within the EMP.

## 6. CONCLUSION

The Department will deliver final comments on the proposed application upon the review of the Environmental Impact Assessment Report.

Yours faithfully,

 23/09/2016

Mr Livhuwani Siphuma Date:  
EXECUTIVE DIRECTOR: ENVIRONMENTAL MANAGEMENT AND PARKS DIVISION  
Letter signed by: Rudzani Mukheli  
Designation: Deputy Director: Environmental Planning and Open Space Management  
Section

Cc: Gauteng Department of Agriculture and Rural Affairs Mr Tshone Loku Tel: (011) 240 3421  
Development Fax: (011) 240 2700

**ANNEXURE Q – ENVIRONMENTAL MANAGEMENT PROGRAMME**

ENVIRONMENTAL MANAGEMENT PROGRAMME

FOR

PROPOSED MIXED USE DEVELOPMENT

AT

PARTS OF PORTIONS 68, 69, 112, 113 and 115 AND PORTIONS  
114 & 116 OF THE FARM ONDERSTEPOORT 266-JR, TSHWANE  
METRO

CONSULTANT

ecologic AFRIKA  
PO Box 8079  
CENTURION  
0046

Tel 012-6614863  
Fax 012-6615251

October 2014



## TABLE OF CONTENTS

1. Background
2. Environmental aspects addressed
3. Environmental Control Officer
4. Environmental Liaison Officer
5. Environmental Management Programme
6. Conclusion
7. Recommendations

## ANNEXURES

- A Environmental Incident Log
- B Environmental Management Programme

## 1. Background

This Environmental Management Programme (EMPr) is submitted in support of the Environmental Impact Report (EIR) done for the proposed mixed use development on Parts of Portions 68, 69, 112, 113 & 115 and Portions 114 & 116 of the farm Onderstepoort 266-JR, Tshwane Metro

## 2. Environmental aspects addressed

The process which was followed is in compliance with Sections 21, 22, and 26 of the National Environmental Management Act, 1998 (Act 107 of 1998) and applied the principles of Integrated Environmental Management (IEM). The purpose of this EMP is to formulate mitigatory measures that shall be binding on the Developer and all Contractors during especially the construction phase of the proposed development.

Three phases of development are identified (planning, construction, and operational phases), of which emphasis is placed on the construction phase.

- Planning phase

During this pre-construction phase important measures shall be incorporated in the planning, design, and construction/contract documentation to ensure that this EMPr is adhered to during the construction phase.

- Construction phase

The bulk of impacts during this phase will have immediate effect (ie access, construction camp, protection of existing services, pollution). Monitoring and control on a regular basis shall minimize these impacts. This is the critical phase of disruption to adjacent properties and communities.

- Operational phase

This post-construction phase will be fully integrated with the existing municipal services (emergency services, waste collection and removal) and infrastructure (water, stormwater, sewer, electricity) in the area, and shall become an integral part of the existing urban fabric of the area.

### 3. Environmental Control Officer (ECO)

The Environmental Control Officer (ECO) should be an independent consultant, with appropriate environmental background and experience, appointed by the Developer.

The ECO shall be responsible for the following:

- Attend all site meetings
- Conduct audits to assess compliance with EMPr
- Provide feedback regarding potential environmental problems
- Liaise with Contractors and site personnel regarding environmental awareness
- Provide monthly feedback regarding compliance with EMPr

### 4. Environmental Liaison Officer (ELO)

The Environmental Liaison Officer (ELO) shall be appointed by the Contractor to assist with regular monitoring of environmental controls and construction activities. All issues raised by the ECO shall be forwarded to the ELO for the Contractor's attention. The ELO shall be permanently on site to ensure daily compliance with the EMPr and shall be a competent senior and responsible member of the construction crew. The ELO shall keep the Incident Log updated on a daily basis and shall report regularly to the ECO.

### 5. Environmental Management Programme

The Environmental Management Programme (EMPr) is presented in table form for the different phases of the development. The table shall be used as a checklist on site during all construction. Compliance with this EMPr shall be audited monthly and reported to Province during construction, and once upon completion of construction.

## 6. Conclusion

The proposed mixed use development on Parts of Portions 68, 69, 112, 113 & 115 and Portions 114 & 116 of the farm Onderstepoort 266-JR, Tshwane Metro according to this EMPr shall ensure environmental harmony, especially during the construction phase. Environmental impacts shall be mitigated, monitored, and controlled and the developed shall be integrated into the existing surrounding environment.

## 7. Recommendations

This EMPr must form the basis during planning, design, and construction of the proposed project. Records should be kept on a daily basis according to the guidelines presented in the EMPr, and should be submitted to Province monthly. Parties responsible for transgression of this EMPr should be held responsible for repair, rehabilitation and compensation where applicable. A penalty clause should be incorporated into the construction contract for non-compliance with the EMPr.

ANNEXURE A – INCIDENT LOG





## ANNEXURE B – ENVIRONMENTAL MANAGEMENT PROGRAMME

ENVIRONMENTAL MANAGEMENT PLAN FOR ONDERSTEPSPOORT X34, A, B, C & D - Gaut 002/13-14/E0343

PHASE	IMPACTS/ISSUES	ACTION	RESPONSIBILITY	FREQUENCY
Planning	Documentation	Contract documents to include EMPr as part thereof. DWA application for stormwater outlets and crossing of spruit to be submitted	Developer and consultants	Once off
Planning	Liaison with Authorities	Liaison with GDARD, Gautrans, DWA and Tshwane Metro	Environmental consultant	As necessary
Planning	Legislation	All National, Provincial and Local laws and regulations to be adhered to	Developer/Contractor	As necessary
Planning	Boundary pegs	Corner pegs and servitudes to be clearly demarcated	Consultant/Contractor	Once off
Planning	Existing vegetation	All vegetation to be retained to be clearly marked	Consultant/Contractor	Once off
Planning	Site conditions and drawings	Check site conditions and contract document prior to commencement of construction	Consultant/Contractor	Once off
Planning	Access to the site	To be clearly indicated	Consultant/Contractor	As necessary
Planning	Working hours	Reasonable hours to be defined, 7-6 on weekdays, 8-2 on Saturdays	Consultant/Contractor	Daily
Planning	Environmental awareness	Familiarise with necessity and benefit	Consultant/Contractor	As necessary
Planning	ECO and ELO	Finalise appointments	Developer/Contractor	Once off
Planning	Compliance with EMPr	Developer to take responsibility to implement EMPr and to appoint ECO	Consultant/Contractor	As necessary
Planning	Ecological management plan	Management guidelines in wetland and vegetation reports to be implemented upon Authorisation of application	Environmental consultant	Once off
Construction	Geotechnical precautions	Test pits to be dug for all foundations	Contractor/engineer	As necessary
Construction	Foundations	Foundations and reinforcing according to engineering design and specifications	Contractor	Daily
Construction	Blasting	Community within a 2km radius must be notified prior to blasting. Requirements of the Explosives Act 1056 shall be adhered to. Blasting to be done at appropriate times to minimise disruption. Any damage resulting from blasting to be repaired at own cost.	Contractor	As necessary
Construction	Topsoil	To be removed and stockpiled separate from spoil for later use	Contractor	Once off
Construction	Clearing and grubbing	All organic material, including roots and topsoil layer to be cleared from construction areas	Contractor	Once off
Construction	Stormwater management	Cutoff drains to be provided around excavations	Contractor	Daily

PHASE	IMPACTS/ISSUES	ACTION	RESPONSIBILITY	FREQUENCY
Construction	Stormwater management	Stormwater management plan by engineers to be implemented	Contractor	As necessary
Construction	Indigenous vegetation	Existing vegetation, especially along watercourses, wetlands, hillslope seepage areas, and prominent koppie in the northeast to be protected and access to these areas to be restricted	Contractor/ELO/ECO	As necessary
Construction	Wildlife, birdlife and indigenous vegetation	No wildlife, birdlife, or vegetation to be harvested for food or any other use.	ELO/ECO	Daily
Construction	Implementation of ecological management guidelines	Management guidelines to be enforced during construction and rehabilitation phase of project	ELO/ECO	Daily
Construction	Wetlands	Both watercourses to be protected at all times. No construction activities to be allowed below 1:100year floodline or 32m buffer zone, except for one dedicated vehicular crossing to be applied for from DWA	ELO/ECO	Daily
Construction	Environmental awareness	All staff to be informed	ELO	As necessary
Construction	Access to the site	Access to be provided in accordance with Gautrans and Tshwane Metro engineering design and specifications.	Contractor	As necessary
Construction	Delivery of materials	Controlled access to the site. Care to be taken not to clear areas of indigenous trees which could be retained	Contractor	Daily
Construction	Storage of materials and goods	Toxic/dangerous material to be stored separate from others, under lock and in bunded area. Wet and dry materials to be stored separately.	Contractor/ECO	Once off
Construction	No trespassing	No trespassing onto adjacent or other properties	Contractor/ELO	Daily
Construction	Construction camp	Position of camp to be clearly demarcated. Camp to be at least 100m away from spruit	Contractor/ECO	Once off, monitor weekly
		Site facilities to include kitchen and ablution facilities. Chemical toilets to be provided.	Contractor	Once off
		Toilets to be serviced regularly for cleanliness and hygiene, and toilet paper to be available at all times.	Contractor/ELO/ECO	Daily
		Refuse to be collected regularly.	Contractor/ELO	Daily
		Refuse to be removed from the site regularly, and to be disposed of at a registered dumping site. Recycling of plastic, paper, glass and aluminium	Contractor/ELO/ECO	Weekly

PHASE	IMPACTS/ISSUES	ACTION	RESPONSIBILITY	FREQUENCY
Construction	Construction camp	Pollution to be handled as per guidelines prescribed under POLLUTION in this EMP.	Contractor/ELO/ECO	As necessary
		Potable water shall be sufficient for drinking, cooking, and ablutions and shall be available at all times.	Contractor	As necessary
		Camp to be presentable and neat at all times	Contractor/ELO/ECO	As necessary
		Dangerous and toxic materials, such as fuel/oil/paint and herbicides shall be stored under key in well-ventilated and bunded areas. Sufficient precautions shall be taken during handling to prevent any pollution. Any spillage shall be reported to the ELO/ECO for cleanup instructions.	Contractor/ELO/ECO	As necessary
		Fuelling and servicing of vehicles shall be done off site. If fuelling to take place on site, then bunded area to be provided around fuelling point, and plastic lining to be provided under soil where vehicles park to refuel. In the event of a breakdown immediate steps shall be taken to prevent any spillage. If spillage occur, it shall be reported to the ELO immediately, and it shall be contained and cleaned up.	Contractor/ELO/ECO	As necessary
		Cement mixing shall only occur in areas demarcated by the Engineer, in consultation with the ECO. Cleaning of cement mixing and handling equipment shall only be done using proper cleaning trays. All empty containers shall be removed from the site. Any spillage shall be reported to the ELO/ECO for cleanup instructions.	Contractor/ELO/ECO	As necessary
Construction	Safety and security	Safety officer to be appointed and all safety precautions and legislation to be adhered to	Contractor/ELO/ ECO	Daily
Construction	Rehabilitation of construction camp site	Rehabilitation of the campsite shall include removal and cleanup of all plant/equipment/materials/waste and breaking up of all compacted soil areas and shaping area to as close to original condition as possible. Then the area shall be seeded with an indigenous veldgrass mixture, and maintained until a satisfactory cover is established.	Contractor/ELO/ECO	As necessary



PHASE	IMPACTS/ISSUES	ACTION	RESPONSIBILITY	FREQUENCY
Construction	Working hours	Reasonable hours for construction activities. 07h00-18h00 weekdays and 08h00-14h00 on Saturdays	Contractor/ELO	Daily
Construction	Grave sites	All grave sites to be protected in situ, and no access allowed into the area. Sites to be clearly demarcated. Information in Heritage study.	Contractor/ELO	Daily
Construction	Historical/archaeological finds	Any excavation/uncovering of human, historical, or archaeological nature shall be reported immediately and all work shall be stopped	Contractor/ELO/ECO	As necessary
Construction	Existing buildings/structures identified in Heritage report	Buildings/structures to be recorded and permits to be obtained from SAHRA prior to demolition	Developer/Contractor	As necessary
Construction	Construction specifications	Compliance with environmental and engineering specifications	Contractor/Developer	As necessary
Construction	Materials and workmanship	All work to be done in accordance with national and local laws and regulations, and to proper workmanship and finishes. All work to be done in accordance with contract documents. All procedures, service connections, levies, tests, inspections, records, and payments in accordance with contract, legislation, NBR, NHBRC, SABS/SANS, supplier and manufacturer specifications and local regulations	Contractor	Daily
Construction	EMPr	Monitor compliance with EMPr.	ELO/ECO	Daily
Construction	Pollution	Noise by workers to be kept down. All plant and equipment to be in good working order. Builders rubble to be removed monthly from site. Litter to be gathered daily and be disposed of. Oil/petrol/diesel/cement spills to be contained, reported and to be cleaned up immediately. Water leaks to be repaired. Stormwater to be controlled and managed to prevent erosion and ponding. No burning of rubble on site. Cooking fires to be controlled - no excessive smoke. No concrete to be dumped on site	Contractor/ELO/ECO	As necessary
Construction	Signage	Ensure that signs to the site do not interfere with visibility for access. Erect adequate warning signs for non smoking, no open fires, traffic signs - all to satisfaction of Tshwane Metro Traffic & Health	Engineer/ Contractor	As necessary

PHASE	IMPACTS/ISSUES	ACTION	RESPONSIBILITY	FREQUENCY
Construction	Damage to properties and infrastructure	Investigate and record condition of buildings, structures and services prior to work done in such areas	Contractor	As necessary
Construction	Dust control	All haul roads to be sprayed with water during construction activities. All exposed soil areas to be sprayed or protected by tarpaulin during windy conditions	Contractor	As necessary
Construction	Weather conditions	All weather conditions shall be recorded - precipitation, temperature, wind	ELO	Daily
Construction	Waste disposal	All builders rubble shall be removed from the site at regular intervals. All litter/rubbish shall be gathered daily and disposed of in containers with lids, and to be removed from site weekly	Contractor/ELO	As necessary
Construction	Rehabilitation of site	Site shall be cleaned up and properly rehabilitated/seeded upon completion of construction	Contractor/ELO/ECO	Once off
Construction	Employment opportunities	Contracts and job opportunities for contractors, sub-contractors, labourers, suppliers and manufacturers.	Contractor	As necessary
Construction	Records	Daily records to be kept on site to conform to the EMPr. Records to be submitted to GDARD monthly.	ELO/ECO	As necessary
Operational	Hydrology	Monitor stormwater flow for erosion damage.	Developer	As necessary
Operational	Management and maintenance	Management and maintenance of buildings, structures, services and landscaping to be kept at a high standard	Developer	As necessary
Operational	Bulk services	Monitor and maintain routes and servitudes.	Developer	As necessary
Operational	Safety and security	Monitor and report any issues of concern.	Developer	As necessary
		Provide emergency services to the development.	Local Authority	As necessary

**FIGURE 1 – SITE PHOTOGRAPHS**



1. Southern portion of site, looking west



2. Southern portion of site, looking north



3. Southern portion of site, looking northeast



4. Southern portion of site, looking east (trees not on site)





5. Hillslope seepage collection after rain



6. Hillslope seepage area in south of site



7. Natural koppie in northeast, looking west



8. Indigenous vegetation on koppie



9. Drainage towards Soutpanspruit in the northeast of the site



10. Half-completed church east of the site





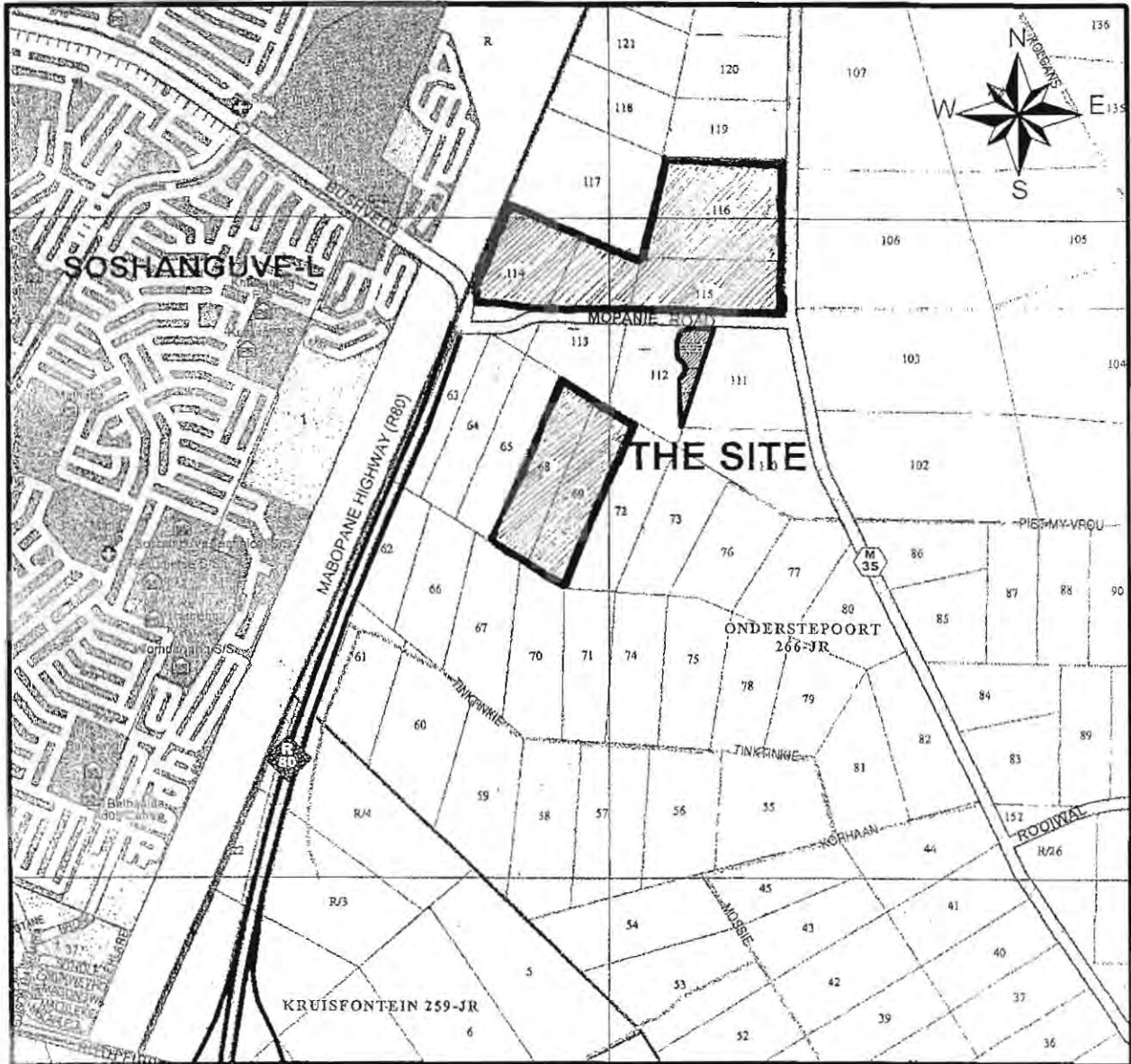
11. Central north of the site, looking northeast



12. Illegal waste dump northwest of site

**DRAWING 1- LOCALITY PLAN**





REFERENCE:



THE APPLICATION SITE

## LOCALITY PLAN PROPOSED TOWNSHIP

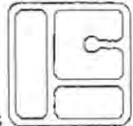
SITUATED ON PART OF PORTION 112, 114 - 116, 66, 69  
THE FARM ONDERSTEPOORT 266-JR

Plandev House  
Highveld Office Park  
Charles de Gaulle Crescent  
Highveld  
Centurion

7710, CENTURION, 0046  
Tel: (012) 665-2330/1/2  
Fax: (012) 665-2333  
e-mail: plandev@iafrica.com

# PLANDEV

Stads- en Streekbeplanners  
Town and Regional Planners

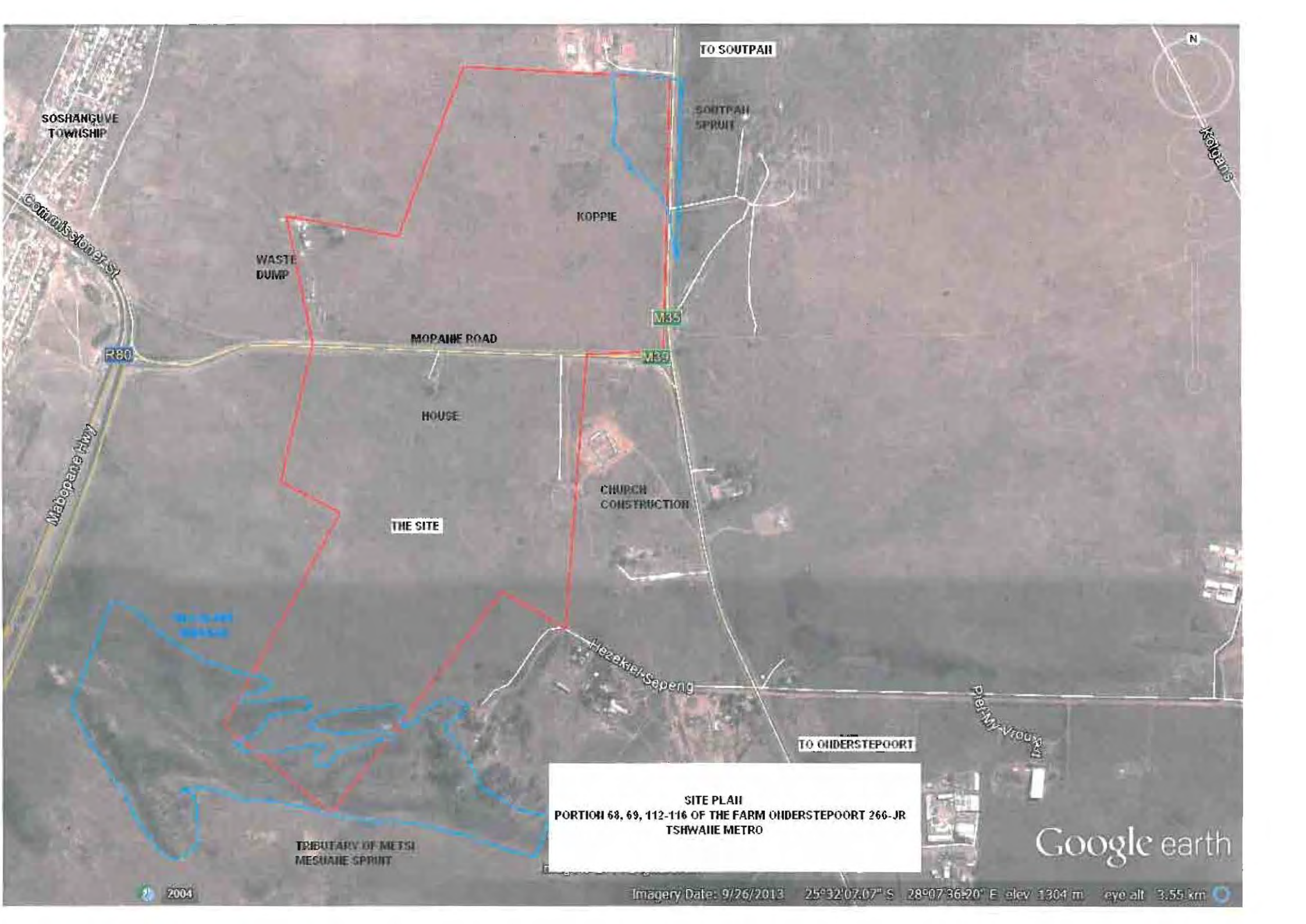


PLAN NO: D1887-LOCALITY PLAN

SCALE: 1 : 20 000

DATE: MARCH 2012

**DRAWING 2 – SITE PLAN**



SOSHANGUVE TOWNSHIP

TO SOUTPAAN

SOUTPAAN SPRUIT

KOPPIE

WASTE DUMP

MOPAIHE ROAD

M35

M39

HOUSE

CHURCH CONSTRUCTION

THE SITE

Comau'sfontein

R80

Mabopane Hwy

Hezekiel-Sepeng

TO OUDERSTEEPOORT

Pietrus-Vrolijk

TRIBUTARY OF METSI MESUANE SPRUIT

**SITE PLAN**  
**PORTION 68, 69, 112-116 OF THE FARM OUDERSTEEPOORT 266-JR**  
**TSHWANE METRO**

Google earth

© 2004

Imagery Date: 9/26/2013 25°32'07.07" S 28°07'36.20" E elev 1304 m eye alt 3.55 km

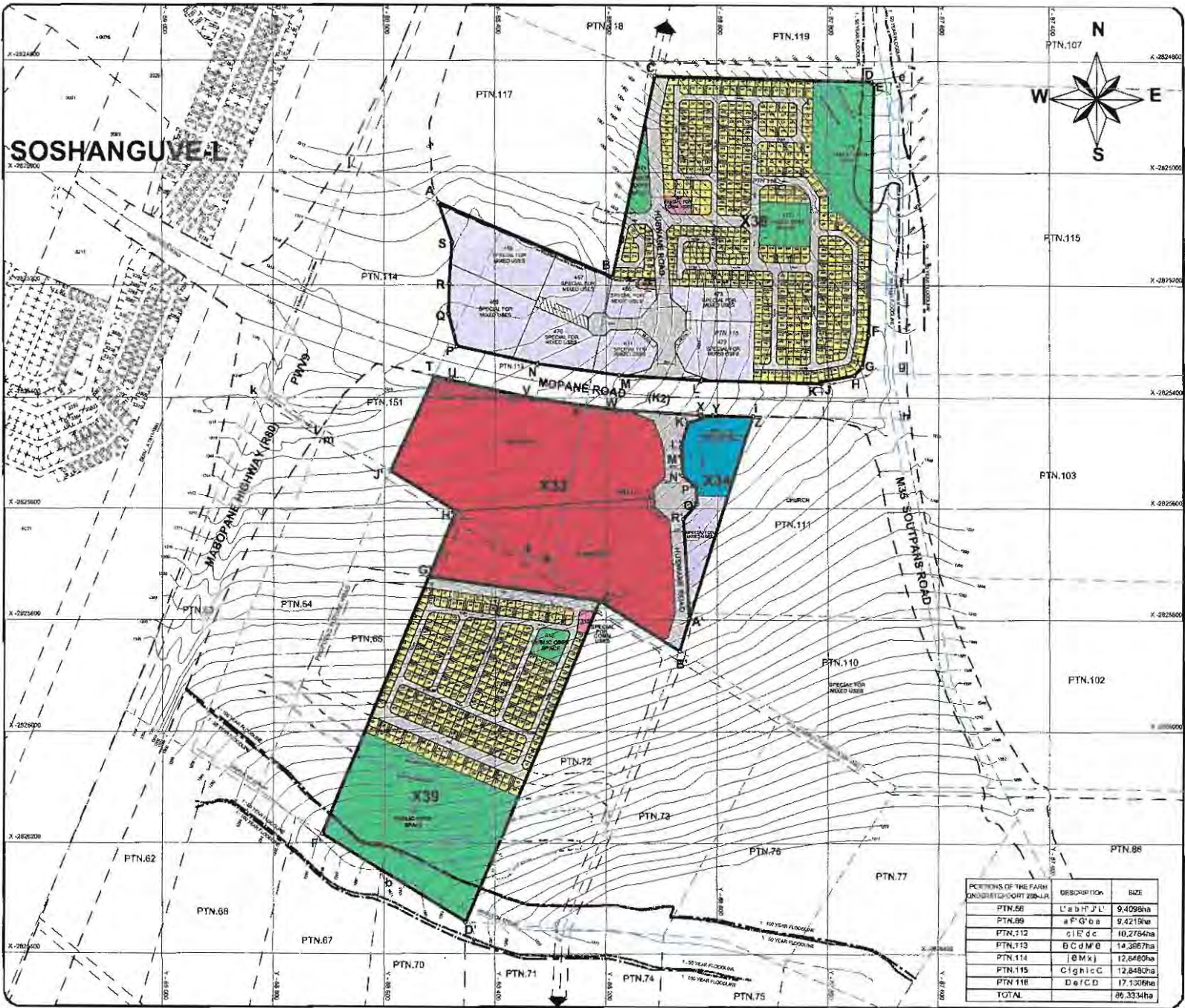
**DRAWING 3 - ALTERNATIVE 1: INITIAL LAYOUT PLAN**



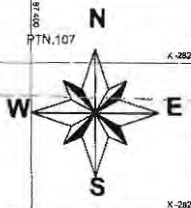




**DRAWING 4 – ALTERNATIVE 2: PREFERRED LAYOUT PLAN**



**SOSHANGUVE I**



PORTIONS OF THE FARM	DESCRIPTION	SIZE
PTN.66	L' a b h' J' L'	9,409ha
PTN.69	a' F' Q' b a	9,421ha
PTN.112	c' E' d c	10,276ha
PTN.113	B C d M' b	14,366ha
PTN.114	j @ M x j	12,646ha
PTN.115	C i g h i c	12,848ha
PTN.116	D e f c D	17,106ha
TOTAL		89,334ha

**DEVELOPMENT PLAN OF  
PROPOSED DEVELOPMENT  
ONDERSTEPSOORT EXTENSIONS  
33, 34, 38 AND 39**  
SITUATED ON PORTIONS 68, 69 AND 112-116  
ONDERSTEPSOORT NO. 266-J.R.

REFERENCE:

**ONDERSTEPSOORT EXT. 33**

USES	ERF NO.	AMOUNT	AREA (ha)	FAR	BULK (m <sup>3</sup> )	DENSITY (units/ha)	TOTAL UNITS	%
BURROWS	ERVEN 1-3	2	45.88	0.3	41100			90.37%
PUBLIC STREET			1.84					3.64%
TOTAL	ERVEN 1-3	2	47.72		41100			100.00%

**ONDERSTEPSOORT EXT. 34**

USES	ERF NO.	AMOUNT	AREA (ha)	FAR	BULK (m <sup>3</sup> )	DENSITY (units/ha)	TOTAL UNITS	%
SPECIAL FOR PUBLIC GARAGE AND ANCILLARY USES	ERF 1	1	1.26	0.3	6000			62.01%
SPECIAL FOR MIXED USER	ERF 2	1	0.83	0.2	3800			37.99%
TOTAL	ERVEN 1-2	2	2.09		10700			100.00%

**ONDERSTEPSOORT EXT. 38**

USES	ERF NO.	AMOUNT	AREA (ha)	FAR	BULK (m <sup>3</sup> )	DENSITY (units/ha)	TOTAL UNITS	%
RESIDENTIAL I	ERVEN 1-40	40	15.27				40	48.19%
SPECIAL FOR COMMUNITY USES	TRF 64	1	0.14					0.17%
MUNICIPAL	ERF 43	1	0.06					0.07%
SPECIAL FOR MIXED USER	ERVEN 44-75	3	3.39	0.3				3.14%
PUBLIC OPEN SPACE	ERVEN 47-77	3	1.00					2.60%
PUBLIC STREET			0.72					12.83%
TOTAL	ERVEN 1-77	47	22.58				40	100.00%

**ONDERSTEPSOORT EXT. 39**

USES	ERF NO.	AMOUNT	AREA (ha)	FAR	BULK (m <sup>3</sup> )	DENSITY (units/ha)	TOTAL UNITS	%
RESIDENTIAL I	ERVEN 1-24	24	5.97				24	41.28%
SPECIAL FOR COMMUNITY USES	ERF 21	2	0.20					0.33%
PUBLIC OPEN SPACE	ERVEN 31-41	2	6.04					11.30%
PUBLIC STREET			2.85					18.89%
TOTAL	ERVEN 1-51	28	15.06				24	100.00%

NOTES:

- 1.) Proposed Phases ———
- 2.) All measurements are approximate.

PLAN NUMBER: D1872/08 Development Plan  
LOCAL AUTHORITY: City of Tshwane

Plandev House  
Highway Office Park  
Chapel of Goshwe  
Highway  
CENTURION  
259 7710, Centurion, 0068  
Tel: (012) 855-2302/12  
Fax: (012) 855-2350  
e-mail: plandev@plandev.com

**PLANDEV**

Stads- en Streeklanners  
Town- and Regional Planners

SCALE: 1 : 2500      DATE: JUNE 2014