

CITY OF EKURHULENI

PROPOSED FILLING STATION – ON ERF 1 OF THE TOWNSHIP WATERVALSPRUIT EXTENSION 51 (Revision 0)



FEASIBILITY & ACCESS INVESTIGATION JULY 2020



PREPARED FOR:

GMI Property Group
Regency Drive
Route 21 Business Park
Centurion

Tel No.: 064 153 7461
Email: anthony@gmigroup.co.za

PREPARED BY:

Mariteng Consulting Engineers
P.O. Box 8864
VERWOERD PARK
1453

Cell: 082 854 7358
Email: louis@mariteng.co.za

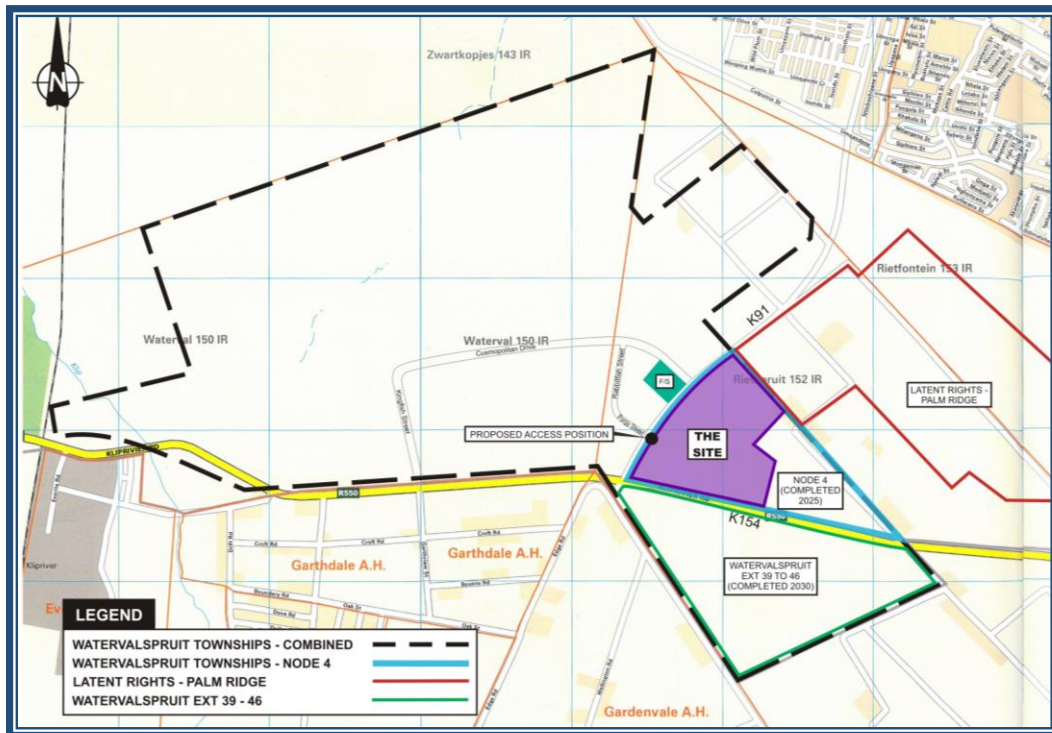
EXECUTIVE SUMMARY

This report contains a feasibility investigation and access assessment for the proposed filling station on Erf 1 of the Township Watervalsspruit Extension 51. The evaluation is for:

- ✓ A standard filling station, with a canopy-covered forecourt, pump islands with petrol and diesel nozzles;
- ✓ A modern retail trade area; and
- ✓ The site can also make provision for an ATM.

The proposed development is an interceptor of traffic and will generate less than 50 trips, during the weekday morning and weekday afternoon peak hour respectively.

Access is proposed from Rice Eel Street.



MARITENG INFORMATION PAGE

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PREPARED BY:	Mariteng Consulting Engineers P.O. Box 8864 VERWOERD PARK 1453 Tel: (082) 854 7358 Fax: (086) 547 8882 E-mail: louis@mariteng.co.za	
	Name	Signature
AUTHOR/S OF REPORT	: L J du Toit	
		Date
		02-07-2020
TECHNICAL SUPPORT	: Mr. R du Toit : Me. E du Toit : Me. E Muller : Me. L du Toit : Me. M.E. Nkonde	
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Revision No.	Date	Comments

**FEASIBILITY & ASSESSMENT INVESTIGATION:
PROPOSED FILLING STATION ON
ERF 1 OF WATERVALSPRUIT EXTENSION 51
(REVISION 0)**

TABLE OF CONTENTS

	PAGE
1. INTRODUCTION.....	1
2. STUDY AREA.....	2
3. SCOPE OF WORKS.....	3
4. TRAFFIC GROWTH IN THE STUDY AREA.....	3
5. EMPIRIC FORMULA.....	3
6. TRAFFIC COUNTS.....	4
7. FUTURE ROAD NETWORK CHANGES.....	4
8. PROPOSED ACCESS ARRANGEMENTS.....	4
9. TRIP GENERATION CHARACTERISTICS.....	5
9.1 INTRODUCTION.....	5
9.2 INTERCEPTION RATE.....	5
10. FEASIBILITY OF FILLING STATION.....	6
10.1 AVERAGE FILL.....	6
10.2 DAILY INTERCEPTION RATE.....	8
10.3 AVERAGE TRADING DAYS PER MONTH.....	9
10.4 ESTIMATED MONTHLY FUEL SALES.....	10
11. IMPACT ON EXISTING FILLING STATION SITES.....	11

12.	PARKING, SITE CIRCULATION AND OFF-STREET LOADING.....	11
12.1	ON-SITE PARKING.....	11
12.2	SITE CIRCULATION AND OFF-STREET LOADING	12
13.	IMPACT OF FUTURE PROVINCIAL ROADS	12
14.	DEVELOPMENT COST	12
15.	CONCLUSION	14

ANNEXURE

ANNEXURE A:	PROPOSED TOWNSHIP LAYOUT WATERVALSPRUIT EXTENSIONS
ANNEXURE B:	TRAFFIC COUNTS EXTRACTED FROM DHUBECON REPORT
ANNEXURE C:	PROPOSED ROAD UPGRADE – DHUBECON DRAWING NO.: 0249(N4)CL/02 & 04
ANNEXURE D:	PROPOSED FILLING STATION LAYOUT & ACCESS ARRANGEMENTS – MARITENG PLAN NO.: 188-84-01
ANNEXURE E:	EXTRACT FROM GUIDELINE DOCUMENT ENTITLED SOUTH AFRICAN TRIP GENERATION RATES, DATED MARCH 1994
ANNEXURE F:	EXTRACT FROM HISTORICAL DATA - SOURCE WSP SA CIVIL & STRUCTURAL ENGINEERS
ANNEXURE G:	DETAILED MONTHLY FUEL SALE CALCULATIONS

LIST OF TABLES

Table 1:	Estimated Fuel Sales Per Month – Target Year (2025)	-10-
Table 2:	Estimated Fuel Sales Per Month – Target Year (2030)	-11-
Table 3:	Typical Cost Associated with New Filling Stations.....	-13-

LIST OF FIGURES

Figure 1:	Locality Plan
Figure 2:	Gauteng Strategic Road Network
Figure 3:	Future 2025 Peak Hour Traffic + 100% Palm Ridge Latent Trips + Service Plan Stage 2 Trips (With Development)
Figure 4:	Future 2030 Peak Hour Traffic + 100% Palm Ridge Latent Trips + Service Plan Stage 3 Trips (With Development)

1. INTRODUCTION

This report contains a feasibility investigation and access assessment for the proposed filling station on Erf 1 of the Township Watervalspruit Extension 51. The evaluation is for:

- ✓ A standard filling station, with a canopy-covered forecourt, pump islands with petrol and diesel nozzles;
- ✓ A modern retail trade area; and
- ✓ The site can also make provision for an ATM.

Also refer to **Annexure A** for overall township layout.

The traffic report is prepared for:

- ✓ GMI Property Group
Regency Drive
Route 21 Business Park
Centurion
Tel No.: 064 153 7461
Email: anthony@gmigroup.co.za

This study is prepared by traffic engineer:


Mr. Louis du Toit, P.O. Box 8864, Verwoerd Park, 1453

The traffic engineer has the following qualifications for undertaking Traffic Impact Assessment:

- ✓ Registered as a professional engineering technologist (Registration No. 200270072);
- ✓ Baccalaureus Technologiae – Engineering Civil (Transportation) (1997); and

-
- ✓ Experienced in the field of evaluating the traffic impact of developments.

"I Louis du Toit, author of this report, hereby certify that this study has been prepared according to requirements of the South African Traffic Impact and Site Traffic Assessment Manual. I take full responsibility for the content of the report, including all calculations, conclusions and recommendations made herein"

Signature:


2. STUDY AREA

The proposed site is in the south-western quadrant of Road K91 & Cosmopolitan Drive intersection, in Watervalspruit Extension 51.

The location of the site is shown in **Figure 1**.

The existing surrounding road network is briefly discussed hereafter and the location of the roads is shown in **Figure 1 and 2** respectively, as well as an extract from the Watervalspruit township layout appended in **Annexure A**:

- ✓ Road K91 is a single lane road and link the study area with Heidelberg Road (R550/K145) in the south and Palm Ridge in the northwest. The main access into the Watervalspruit Extensions is also provided from the K91. The road is a Class 2 road and falls under the jurisdiction of Gauteng Province.
- ✓ Cosmopolitan Drive extension is planned along the northeastern side of the to the site. The road will function as a Class 3 road and will falls under the jurisdiction of the City of Ekurhuleni.
- ✓ Rice Eel Street is a planned new road on the southern side of the site. The road is identified a Class 5a road and will fall under the jurisdiction of the City of Ekurhuleni.

3. SCOPE OF WORKS

The study covers the following technical aspects:

- ✓ Extend of the development and study area;
- ✓ Detailed traffic data;
- ✓ Determine the interception rates;
- ✓ Determine the trip generation for the filling station;
- ✓ Assess the access points;
- ✓ Calculate the expected monthly fuel sales;
- ✓ Prepare a concept access and internal layout;
- ✓ Discuss on-site parking, circulation and loading/unloading; and
- ✓ Conclusions and Recommendations.

4. TRAFFIC GROWTH IN THE STUDY AREA

The area is relatively underdeveloped, and the key residential areas to be developed in the area over the next 10 years are Watervalspruit Townships and Palm Ridge.

Thus, no growth factor is applied, and traffic related data for the area is extracted from the updated study report prepared by Dhubecon Consulting Engineers, entitled “*Watervalspruit Extensions 37, 38 & 47 – 51 (Node 4)*”, dated October 2019. The details are appended in **Annexure B**.

5. EMPIRIC FORMULA

The feasibility of the development is based on the empiric formula used to calculate the expected average month fuel sales. The formula is summarised as follows:

$$L = ADT \times F \times p \times d$$

$$\begin{aligned} \text{Average litres per month (L)} = & \text{[Daily vehicles passing the site (ADT)]} * \\ & \text{[Average fill per vehicle (F)]} * \\ & \text{[Percentage interception of pass-by traffic (p)]} * \\ & \text{[Average full normal trading days in a month (d)]} \end{aligned}$$

6. TRAFFIC COUNTS

Traffic volumes were extracted from the Dhubecon report, for the weekday morning and weekday afternoon peak hour traffic volume. The base year (2019) volumes, appended in **Annexure B**, is relatively low on both the K91 and the Heidelberg Road (R550/K154). This coincide with the existing undeveloped area abutting the applicant site.

In terms of the Dhubecon report substantial development is earmarked for the area, which in turn will increase the traffic demand in the area. The projections for area considered for the applicant site are as follows (refer to **Annexure A**, as well as **Figure 1**):

- ✓ Watervalspruit Extensions 37, 38 to 51 (Node 4) – Target year 2025; and
- ✓ Watervalspruit Extensions 39 to 46 – Target year 2030.

Note: The area on the western side of Road K91 is conserved to serve the proposed filling station planned on the business site in Watervalspruit Extension 1.

The traffic volumes extracted from the Dhubecon report (refer to **Annexure B**), is summarised in **Figure 3 and Figure 4**, for the 2025 and 2030 target years.

7. FUTURE ROAD NETWORK CHANGES

The southern leg of Cosmopolitan Drive and Rice Eel Street will be constructed as part of the township development. The details are shown in Dhubecon **Drawing No.: 0249(N4)/CL/02 & 04**, appended in **Annexure C**. These roads will form the main access roads serving the applicant site.

8. PROPOSED ACCESS ARRANGEMENTS

The access arrangements for the proposed filling station is from Rice Eel Street, as shown in **Mariteng Plan No.: 188-84-01**, appended in **Annexure D**.

9 TRIP GENERATION CHARACTERISTICS

9.1 INTRODUCTION

For the purpose of the filling station assessment two trip interception rates are considered. The first rate is to determine the weekday morning and afternoon peak hour interception and the second trip rate is to determine the feasibility of the filling station.

9.2 INTERCEPTION RATE

For the purpose of this study three data sources are consulted and discussed briefly hereafter:

a) South African Trip Data Manual (TMH 17)

The "**South African Trip Data Manual (TMH 17)**", makes no provision for trip generation rates for filling stations, other than an hourly trip rate of 60 trips per site, based on the "**Annual Average Daily Traffic**".

b) South Africa Trip Generation Manual

The South African Trip Generation Rates provides the following guideline on the split for fuel trips and convenience store trips (refer to extract appended in **Annexure E**):

- Interception rate : 4% weekday morning and afternoon peak hours respectively.
- Primary Fuel Trips : 12.7%
- Pass-by Fuel Trips : 69.1%
- Primary convenience store trips : 3.1%
- Pass-by convenience store trips: 15.1%

From the guideline split, fuel trips accounts for 81.8% of the total trips and the convenience store for 18.2%. Furthermore 15.8% (12.7% plus 3.1%) is new traffic generated by the filling station. In terms of the document, filling station are mainly interceptors of traffic, already travelling on the existing road network. A negligible portion of the trips are considered new or primary trips to the network. Thus, the proposed filling station is rather seen as an interceptor of traffic than a generator of new trips to the study area.

NOTE: The results are typically used to assess the impact the filling station will have on the road network, which is not required as part of the feasibility report.

c) Surveys Conducted by WSP

The historical data obtained from surveys conducted by WSP SA Civil and Structural Engineers (Pty) Ltd reveals a relationship between the interception rate and the pass-by traffic. These results are based on traffic surveys conducted at more than 350 filling stations - refer to trip generation table appended in **Annexure F** for details. The interception rate is determined by the following factors:

- ✓ Convenience (clean new facility and easily accessible);
- ✓ Visibility (clear view of site over a long distance or is the filling station obstructed by roadside furniture and other roadside activities);
- ✓ The number of pass-by traffic;
- ✓ Type of traffic (commuter, residential or transient);
- ✓ Nearby filling station sites;
- ✓ Service provided to the general public, i.e. carwash, ATM, convenience store, etc.;
- ✓ Good accesses, clearly defined;
- ✓ Location of site, i.e. homebound or work bound; and
- ✓ Site layout – adequate on-site parking, circulation area, etc.

NOTE: Details from the historical surveys will be used to determine the feasibility of the site.

10. FEASIBILITY OF FILLING STATION

10.1 AVERAGE FILL

The applicant site is planned in an area to be developed over the next 5 to 10 years. The Watervalspruit Townships are earmarked for a mixed land use development and includes residential, businesses, community facilities, etc.

Dhubecon Consulting Engineers prepared a traffic report entitled “Traffic Impact Assessment: Proposed Watervalspruit Townships”, in May 2015. Subsequently, Dhubecon prepared an updated traffic report in October 2019, entitled

“Watervalspruit Extensions 37, 38 & 47 – 51 (Node 4)”. The land-use for the node is as follows:

- ✓ Extension 37 : “Res 2 - 184 erven
- ✓ Extension 38 (Erf 2) : “Bus 2” - 5 387m² GLA
- ✓ Extension 38 (Erf 1) : “Special” – filling station
- ✓ Extension 47 : “Res 4” – 557 apartments
- ✓ Extension 48 : “Res 4” – 543 apartments
- ✓ Extension 49 : “Res 2” – 83 erven
- ✓ Extension 50 : “Res 2” – 433 erven
- ✓ Extension 51 (Erf 3) : “Special” - car dealership/fitment centre: 4 170m² GLA
- ✓ Extension 51 (Erf 4) : “Special” – clinic and/or college – 7 633m² GLA

In addition to the aforementioned land uses, the report also includes the impact the following latent rights will have on the road network:

- ✓ Watervalspruit Proper
- ✓ Watervalspruit Extension 1
- ✓ Watervalspruit Extension 9
- ✓ Watervalspruit Extensions 10 to 13, 21, 27 & 28
- ✓ Watervalspruit Extensions 16 to 21
- ✓ Watervalspruit Extensions 30 & 35
- ✓ Watervalspruit Extensions 14, 15, 22 to 26, 31 to 33 & 39 to 46
- ✓ Palm Ridge Extensions 31 to 33

The combined land use for the latent rights is as follows:

- ✓ Residential : 10 073 erven
- ✓ Residential : 1 576 units
- ✓ Retail/Special : 31 415m² GLA
- ✓ Educational : 12 schools

Based on the above land uses, the latent rights will generate approximately 4 515 and 4 160 trips, during the weekday morning and afternoon peak hours

respectively.

10.2 DAILY INTERCEPTION RATE

The historical data obtained from surveys conducted by WSP SA Civil and Structural Engineers (Pty) Ltd reveals a relationship between the interception rate and the pass-by traffic. These results are based on traffic surveys conducted at more than 350 filling stations - refer to **Annexure F** for details.

The interception rate is determined by the following factors:

- ✓ Convenience (clean new facility and easily accessible);
- ✓ Visibility (clear view of site over a long distance or is the filling station obstructed by roadside furniture and other roadside activities);
- ✓ The number of pass-by traffic;
- ✓ Type of traffic (commuter, residential or transient);
- ✓ Nearby filling station sites;
- ✓ Service provided to the general public, i.e. carwash, ATM, convenience store, etc.;
- ✓ Good accesses, clearly defined;
- ✓ Location of site, i.e. homebound or work bound; and
- ✓ Site layout – adequate parking, circulation area, etc.

Further to the above, the following aspects were also taken into consideration:

- ✓ Access of the filling station in relation to the surrounding roads, from which vehicles will be intercepted.
- ✓ Probability a motorist travelling on a certain road section will consider the site favourable to visit to refuel.
 - Cosmopolitan Drive – Eastbound = 100%
 - Cosmopolitan Drive – Westbound = 100%
 - Rice Eel Street – Southern leg = 100%
 - Rice Eel Street – Northern leg = 100%
 - Salamanderfish Street – Northbound = 80%
 - Salamanderfish Street – Southbound = 80%
 - Road K91 – Southbound through movement = 60%

-
- ✓ Also taking into consideration that a second filling station is planned on the business site in Watervalspruit Extension 1, expected to share traffic from Road R91, as well as serving the Watervalspruit area located to the west of Road K91.
 - ✓ Taking cognisance of the Dhubecon report, which identified two development periods with specific land uses to be completed namely, target years 2025 and 2030. This includes completion timelines for development in the Palm Ridge area and other latent rights assumed.

Considering all the above factors the daily interception rate considered for calculations are as follows:

a) Watervalspruit Extensions 37, 38 & 47 to 51 (Node 4) – Target year 2025

- ✓ Cosmopolitan Drive – Eastbound = 11.39%
- ✓ Cosmopolitan Drive – Westbound = 12.79%
- ✓ Rice Eel Street – Southern leg = 6.10%
- ✓ Rice Eel Street – Northern leg = 14.13%
- ✓ Salamanderfish Street – Northbound = 19.94%
- ✓ Salamanderfish Street – Southbound = 18.91%
- ✓ Road K91 – Eastbound = 3.21%

b) Watervalspruit Extensions 39 to 46 – Target year 2030

- ✓ Cosmopolitan Drive – Eastbound = 10.51%
- ✓ Cosmopolitan Drive – Westbound = 11.54%
- ✓ Rice Eel Street – Southern leg = 6.10%
- ✓ Rice Eel Street – Northern leg = 14.13%
- ✓ Salamanderfish Street – Northbound = 19.94%
- ✓ Salamanderfish Street – Southbound = 18.91%
- ✓ Road K91 – Eastbound = 2.23%

Note: The results are based on the data extracted from **Annexure F and G**.

10.3 AVERAGE TRADING DAYS PER MONTH

Based on studies conducted by WSP, the definition of full normal trading days per month is the number of typical weekday sales per month. A normal day is Tuesday, Wednesday and a Thursday, during a week with no holidays or public holidays during the week. It is therefore incorrect to assume a default value of

30.5 days per month, as a result of weekend traffic lower compare with the normal weekdays or the impact of holidays/public holidays on the typical traffic flow pattern.

Based on the studies conducted by WSP, a default value of 28 days/month should be used.

10.4 ESTIMATED MONTHLY FUEL SALES

The current daily traffic does not support a filling station on the applicant site. The calculations are thus based on the expected increase in the background traffic, the development of more Watervalspruit Extensions and other latent rights, earmarked for the study area over the next 5 to 10 years.

Considering the above, the monthly fuel sales are calculated and is summarised in **Table 1** for the target year 2025 and **Table 2** for the target year 2030, with detailed calculations appended in **Annexure G**.

Table 1: Estimated Fuel Sales Per Month – Target Year (2025)

DESCRIPTION	ALL FUEL SALES							
	Cosmopolitan		Rice Eel		Salamanderfish		Road K91 – Southbound Through	TOTAL
	EB	WB	South Leg	North leg	NB	SB		
Estimated 24-Hour Traffic Flow	1 022	850	2 759	725	294	320	3 407	9 376
Interception Rate (%)	11.39%	12.79%	6.10%	14.13%	19.94%	18.91%	3.21%	-
Traffic Flow (veh's/day)	116	109	168	102	59	60	109	724
Average Fill (Litres/Veh)	18	18	18	18	18	18	18	18
No. of Trading Days/Month	28	28	28	28	28	28	28	28
Total Month Sales (Litres)	58 669	54 793	84 865	51 654	29 532	30 477	55 074	365 064

Based on the results summarised in **Table 1** the expected monthly fuel sales are estimated at 365 064 litres.

Table 2: Estimated Fuel Sales Per Month – Target Year (2030)

DESCRIPTION	ALL FUEL SALES							
	Cosmopolitan		Rice Eel		Salamanderfish		Road K91 – Southbound Through	TOTAL
	EB	WB	South Leg	North leg	NB	SB		
Estimated 24-Hour Traffic Flow	1 162	1 001	2 759	725	294	320	6 082	12 343
Interception Rate (%)	10.51%	11.54%	6.10%	14.13%	19.94%	18.91%	2.23%	-
Traffic Flow (veh's/day)	122	116	168	102	59	60	136	763
Average Fill (Litres/Veh)	18	18	18	18	18	18	18	18
No. of Trading Days/Month	28	28	28	28	28	28	28	28
Total Month Sales (Litres)	61 545	58 222	84 865	51 654	29 532	30 477	68 315	384 610

Based on the results summarised in **Table 2** the expected monthly fuel sales are estimated at 384 610 litres.

11. IMPACT ON EXISTING FILLING STATION SITES

Based on the site location, no existing sites are located within a 3.0km radius that could affect the monthly fuel sales with the construction of the new filling station site. However, a new site is planned within the boundaries of the business stand in Watervalspruit Extension 1. The study takes cognisance of this in the fuel calculations.

12. PARKING, SITE CIRCULATION AND OFF-STREET LOADING

12.1 ON-SITE PARKING

All parking provided on the site and the number of bays should be in line with the requirements of the local town planning scheme. No parking is proposed for heavy vehicles.

The concept filling station layout allows for a 200m² GLA retail space (including office ancillary to the filling station). The parking requirements are as follows:

- Retail : 6 bays/100m² GLA

Based on the areas provide a total of 12 bays is required.

12.2 SITE CIRCULATION AND OFF-STREET LOADING

The on-site circulation and off-street loading activities are shown in **Mariteng Plan No. 188-84-01**, appended in **Annexure D**.

13. IMPACT OF FUTURE PROVINCIAL ROADS

The applicant site is also evaluated in terms of the provincial requirements and the findings are summarised as follows:

- ✓ The applicant acknowledges the alignment of Road K91, abutting the western property boundary;
- ✓ No access is proposed from the road;
- ✓ Further to this a 16m building line will be adhere to along the section of property line, abutting the road.

14. DEVELOPMENT COST

Mariteng formed part of the professional team involved in the development of several filling stations site in Gauteng. **Table 3** below provides a summary of the typical costs associated with the development of a new filling station site.

Table 3: Typical Cost Associated with New Filling Stations

Item		Cos/Item	Total Cost
1.	Zoned Property		R2 650 000.00
1.1	Rights, EIA, Licenses, etc.	R800 000.00	
1.2	Land cost	R1 000 000.00	
1.3	Developer's profit	R500 000.00	
1.4	Bulk service contributions	R350 000.00	
2.	Civil Engineering Contract		R3 500 000.00
2.1	Access (External roads)	-	
2.2	Internal roads (Incl. paving & kerbs)	R1 800 000.00	
2.3	Earthworks	R500 000.00	
2.4	Services	R300 000.00	
3.	Building Contract		R2 600 000.00
3.1	Building	R1 300 000.00	
3.2	Canopy	R1 000 000.00	
3.3	Signage	R200 000.00	
3.4	Shop fitting	R500 000.00	
3.5	Security system	R300 000.00	
3.6	Generator	R200 000.00	
4.	Other		R250 000.00
4.1	Gardens, irrigation and fencing	R250 000.00	
5.	Professional fees		R850 000.00
5.1	Franchise fee	R250 000.00	
5.2	Professional fees	R600 000.00	
TOTAL			R9 850 000.00

Based on the results the expected development cost could be **R9 850 000.00**.

Given the expected monthly fuel sales the site is still considered feasible.

15. CONCLUSION

Based on the findings of the assessment, the following:

- i. Based on the traffic volumes and assumptions provided the proposed filling station on Erf 1 Watervalspruit Extension 51 is feasible, with an estimated monthly fuel sale of 365 064 liters, based on the target year (2025) traffic demand and development planned for the Township Watervalspruit Extensions and will increase to 384 610 liters in 2030.
- ii. A concept filling station layout is shown in **Mariteng Plan 188-84-01 (Rev 0)**. A final site development plan will be submitted once the fuel company has been identified and their brand image is available.
- iii. Provincial Road K91 is planned along the western side of the applicant site. No access to the applicant site is planned from this road.

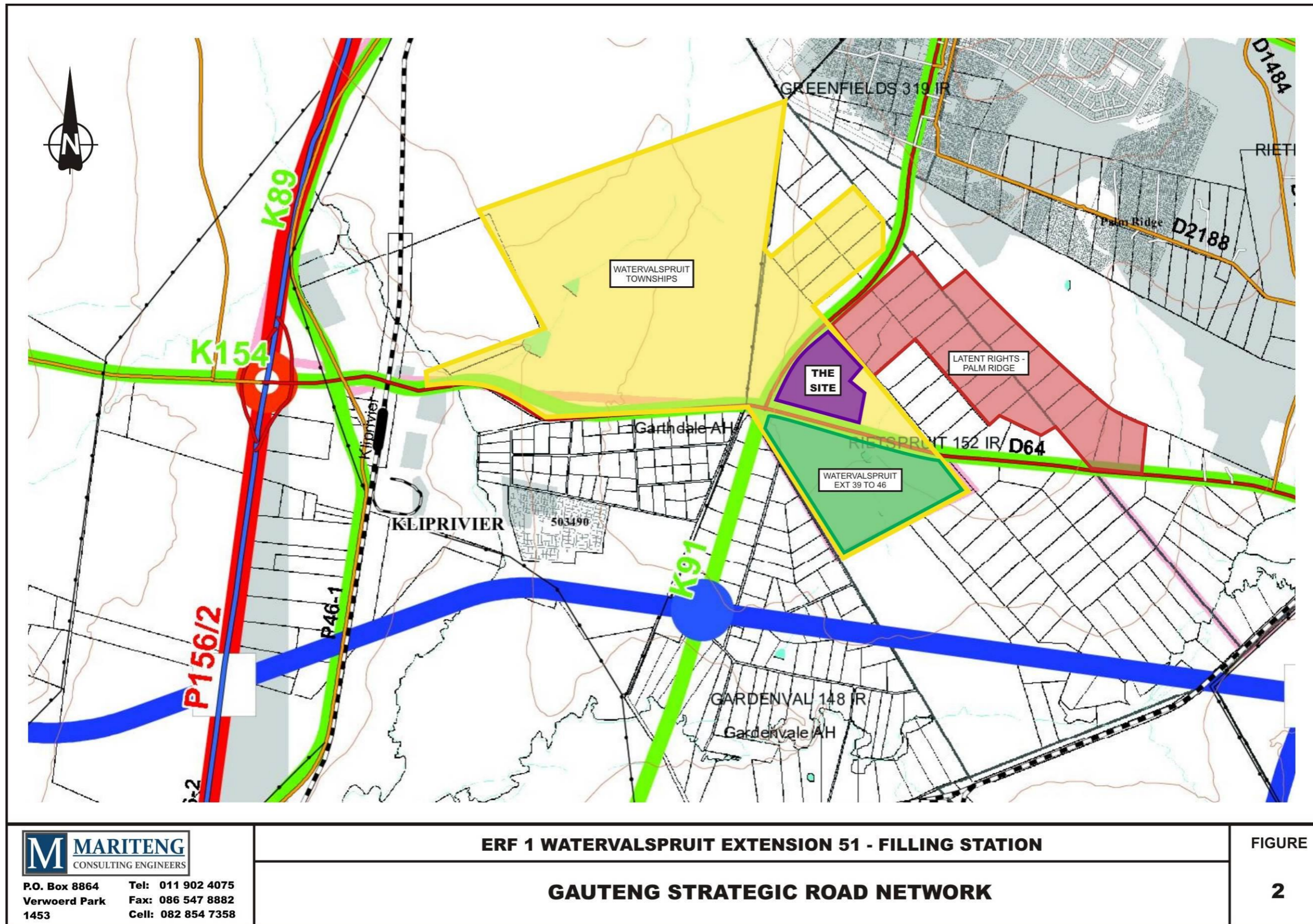
FIGURES

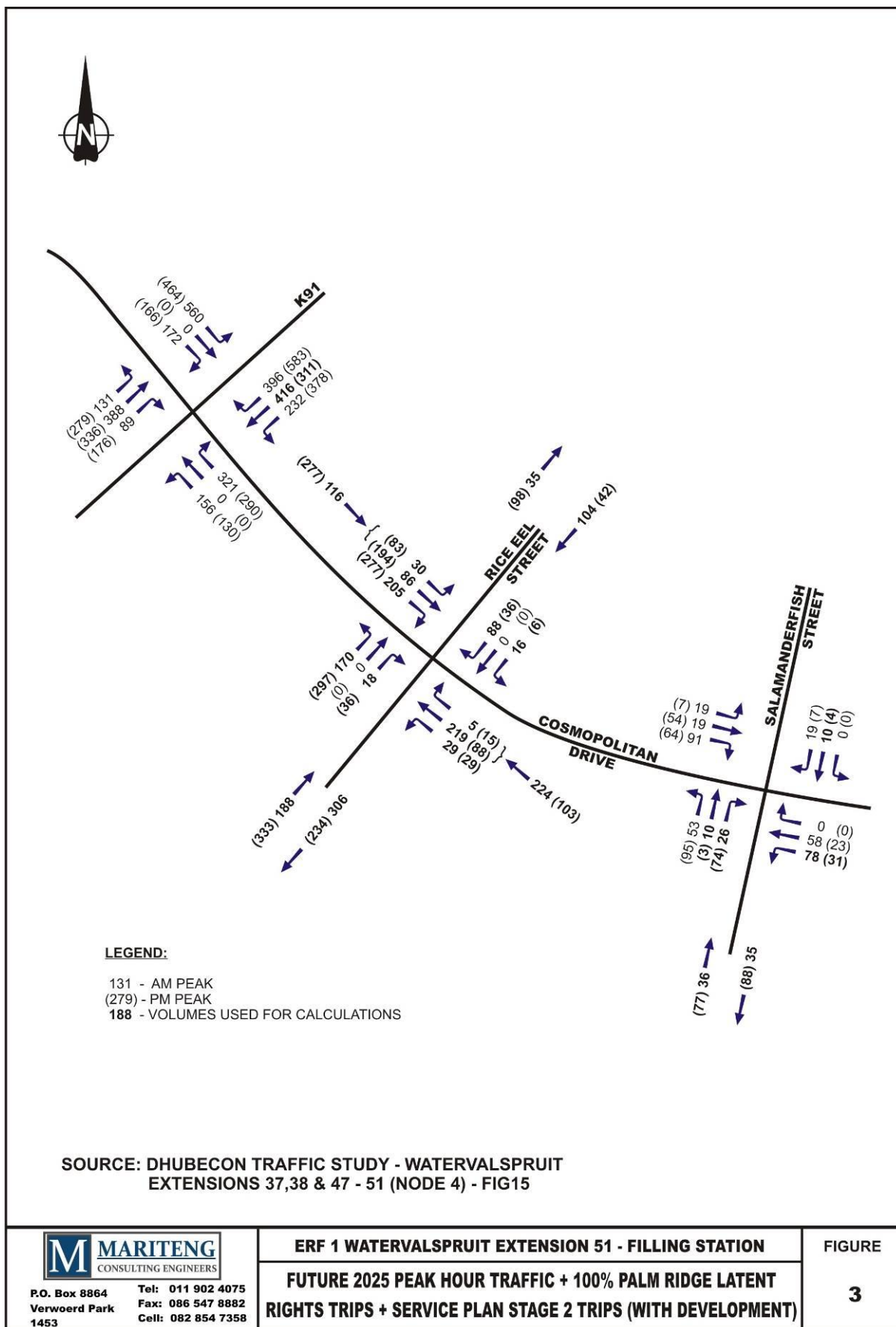
Figure 1: Locality Plan

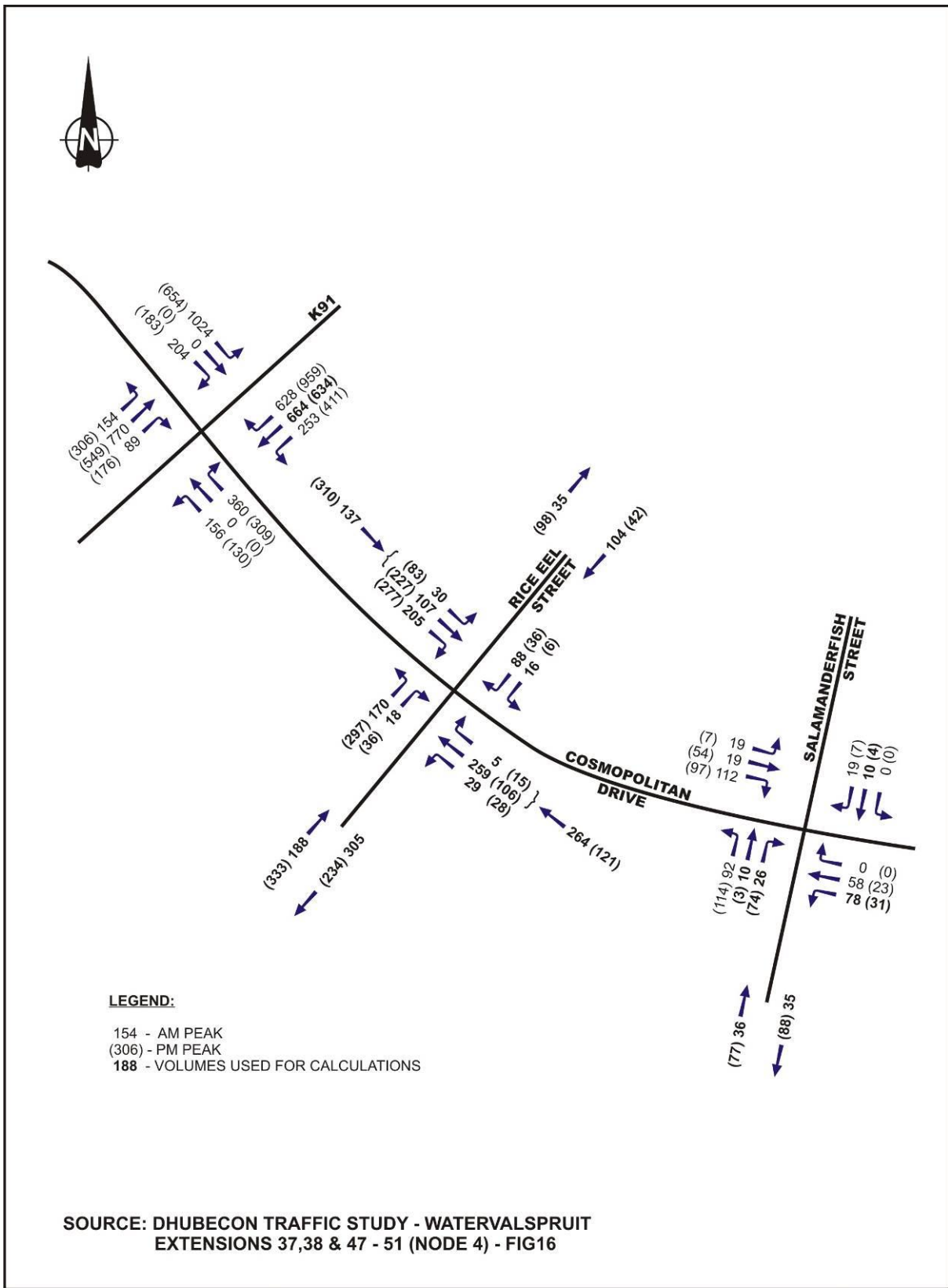
Figure 2: Gauteng Strategic Road Network

Figure 3: Future 2025 Peak Hour Traffic + 100% Palm Ridge Latent Trips + Service Plan Stage 2 Trips (With Development)

Figure 4: Future 2030 Peak Hour Traffic + 100% Palm Ridge Latent Trips + Service Plan Stage 3 Trips (With Development)

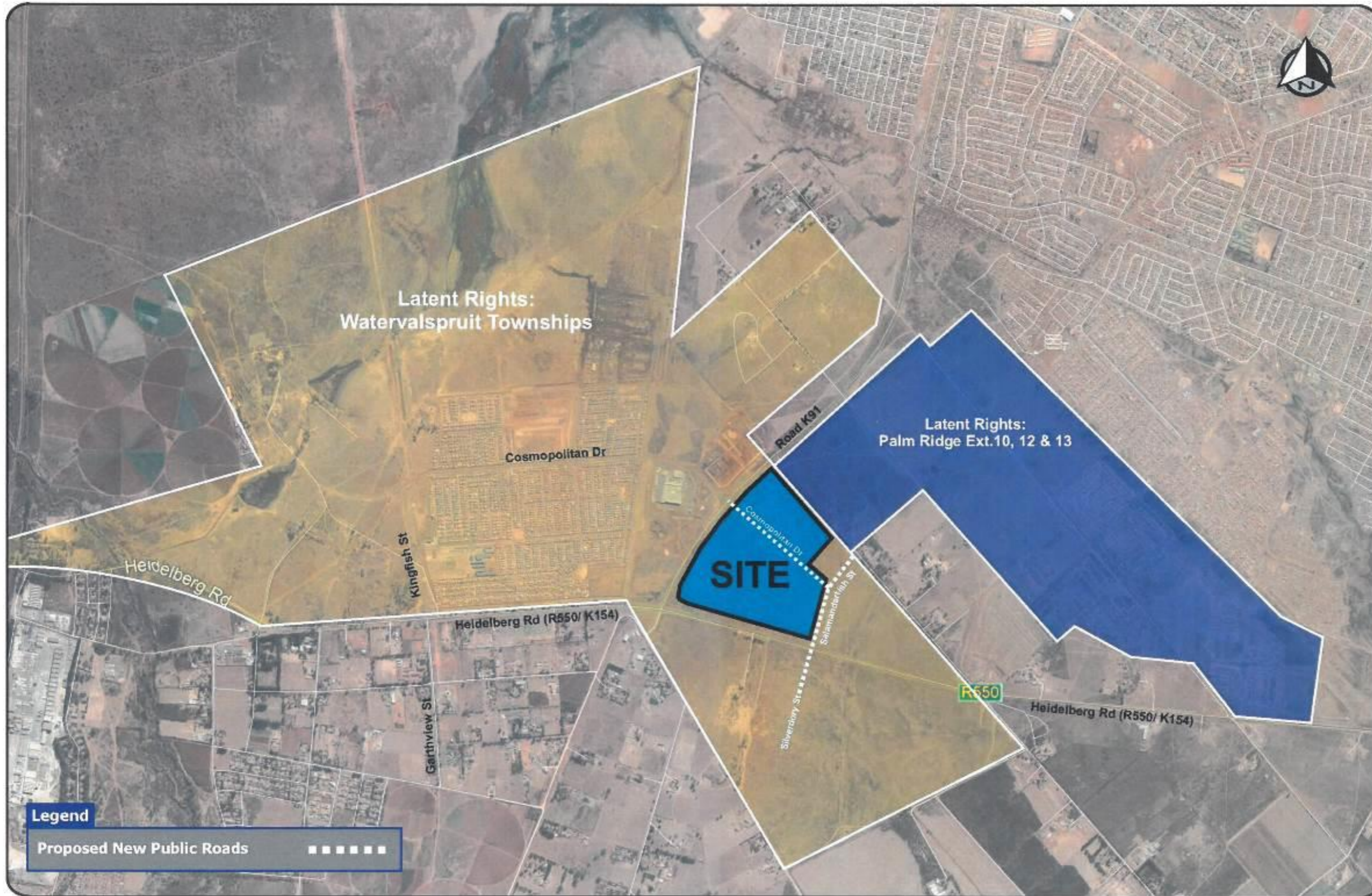






 P.O. Box 8864 Verwoerd Park 1453 Tel: 011 902 4075 Fax: 086 547 8882 Cell: 082 854 7358	ERF 1 WATERVALSPRUIT EXTENSION 51 - FILLING STATION	FIGURE
	FUTURE 2030 PEAK HOUR TRAFFIC + 100% PALM RIDGE LATENT RIGHTS TRIPS + SERVICE PLAN STAGE 3 TRIPS (WITH DEVELOPMENT)	4

**ANNEXURE A:
PROPOSED TOWNSHIP LAYOUT –
WATERVALSPRUIT EXTENSIONS**



Legend

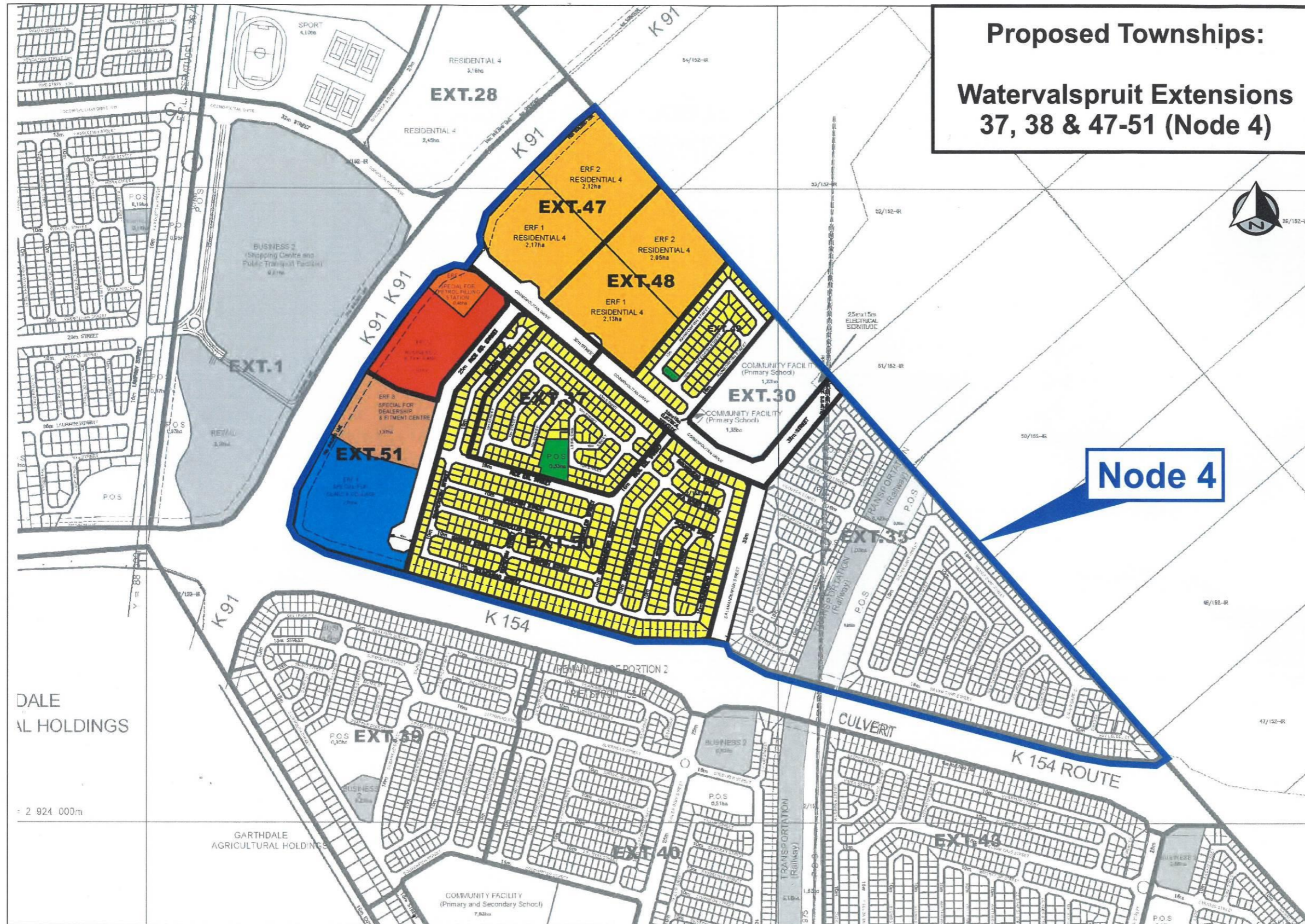
Proposed New Public Roads - - - - -



Client	Author
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Project Name	Watervalspruit Ext. 37, 38 & 47-51 (Node 4)
Description	Site Aerial View & Key Plan

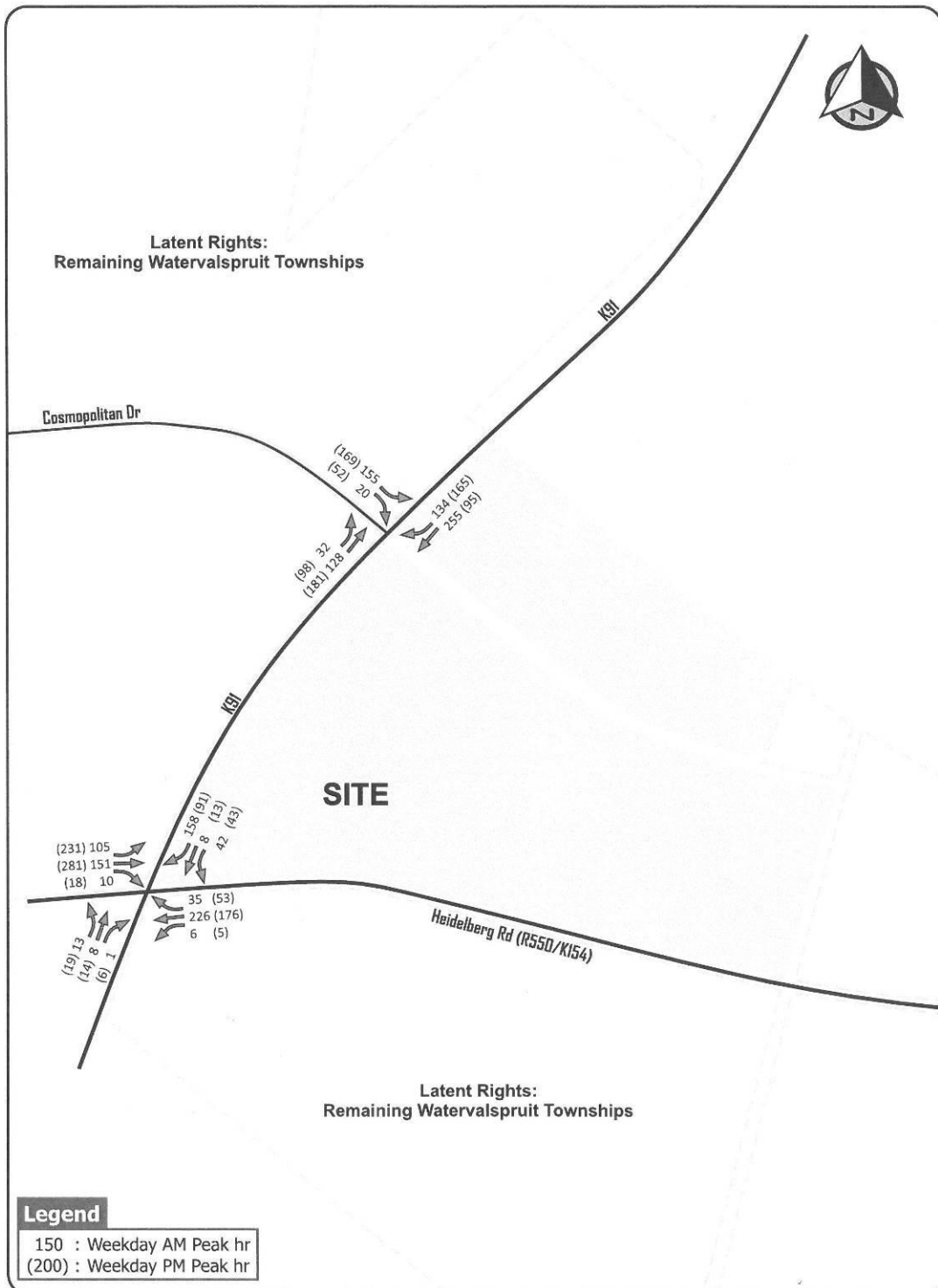
Proj Ref	PO249
Figure	2



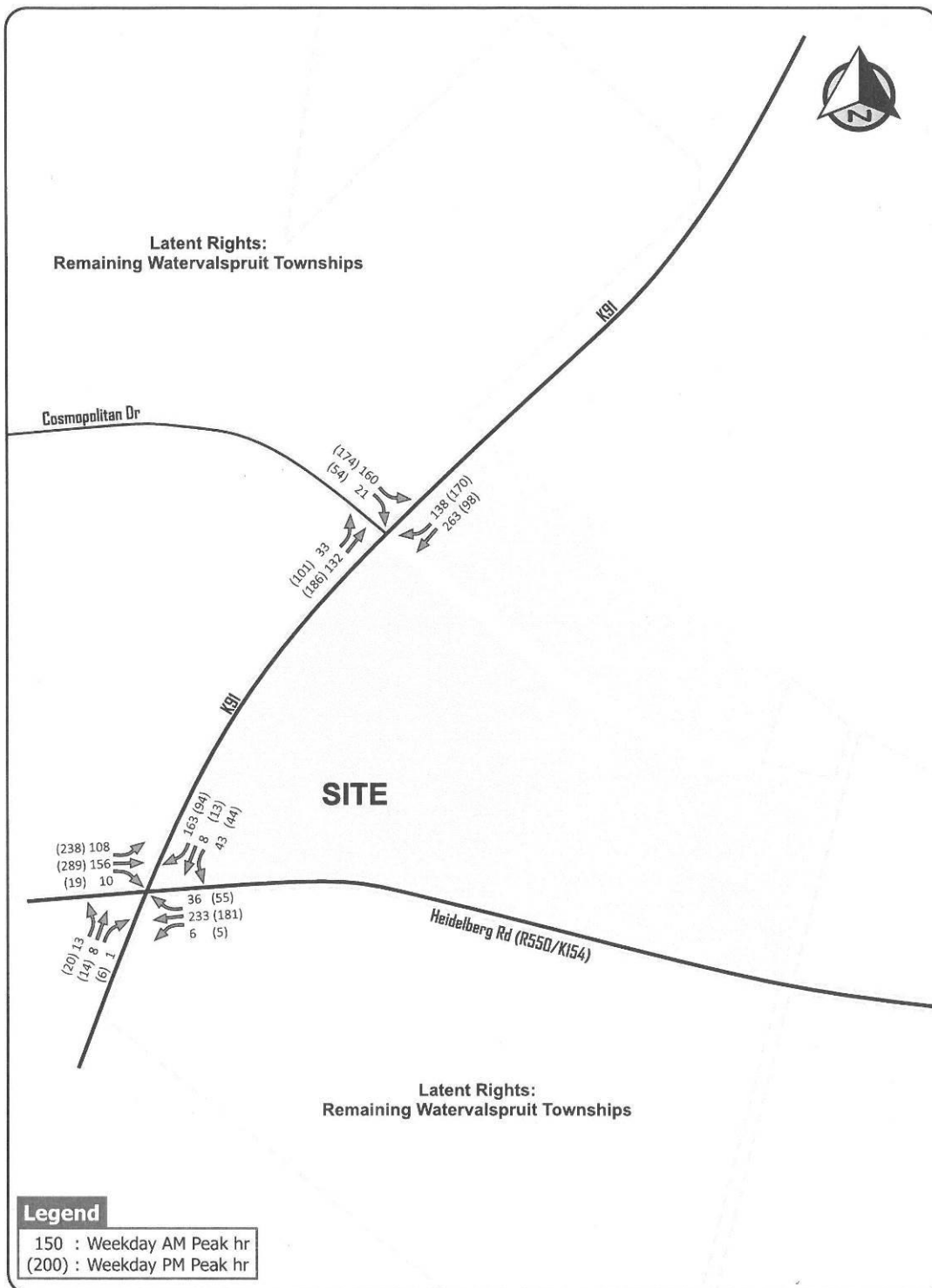
**Proposed Townships:
Watervalspruit Extensions
37, 38 & 47-51 (Node 4)**

Node 4

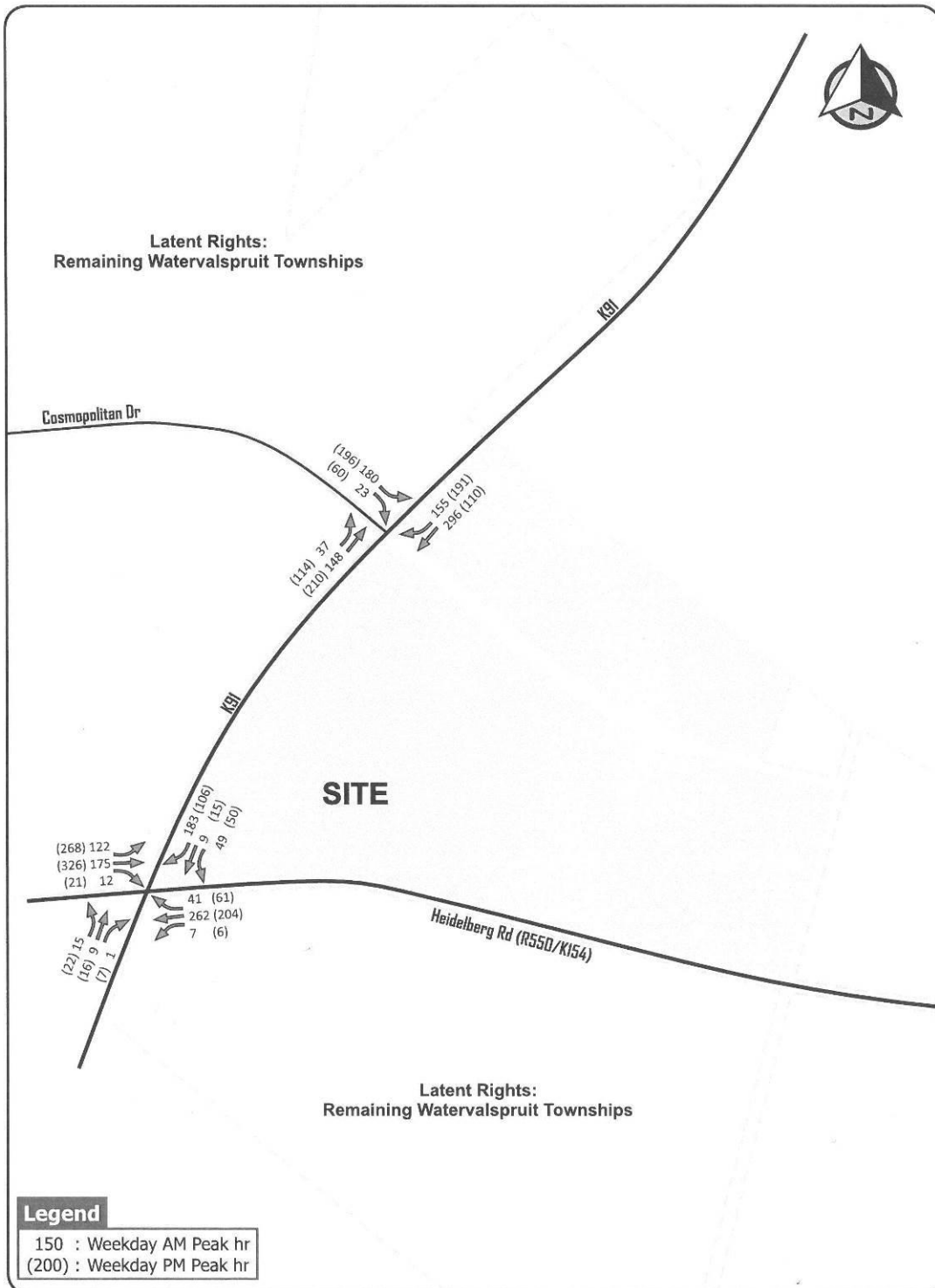
**ANNEXURE B:
TRAFFIC COUNTS EXTRACTED
FROM DHUBECON REPORT**



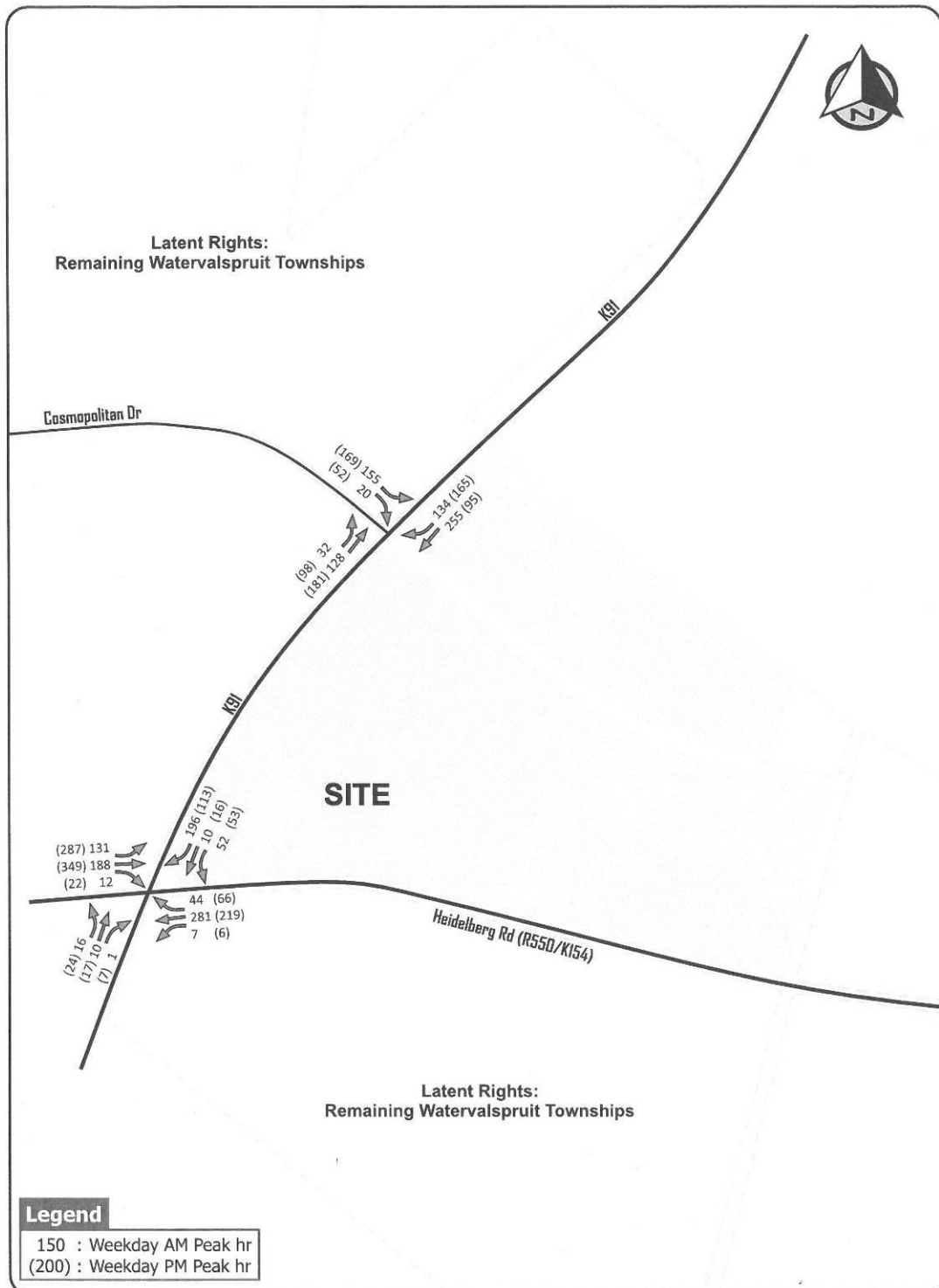
Project Name	Watervalspruit Ext. 37, 38 & 47-51 (Node 4)	Proj Ref.	P0249
Description	Existing 2019 Peak Hour Traffic Volumes	Figure	4



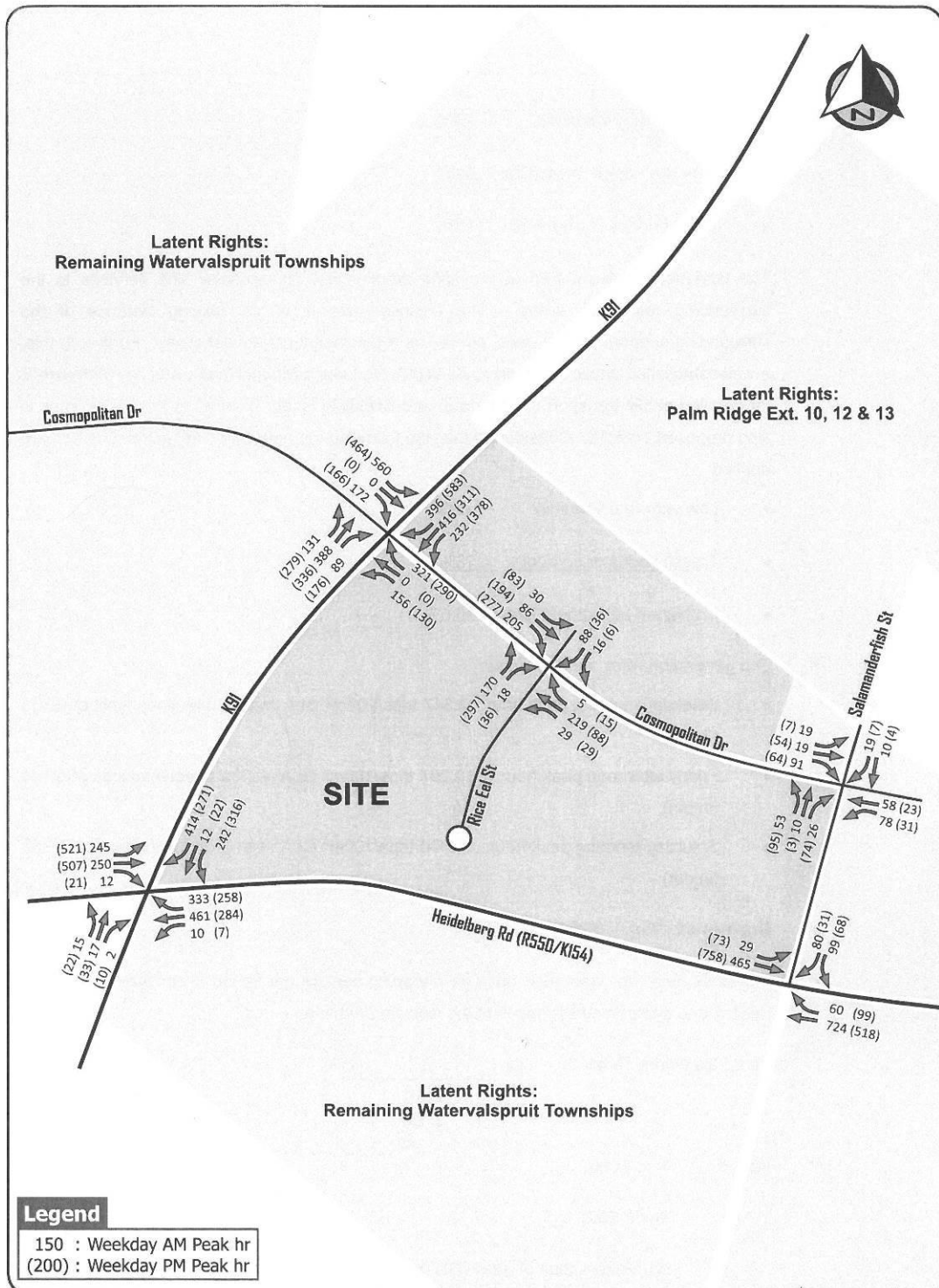
Project Name	Watervalsspruit Ext. 37, 38 & 47-51 (Node 4)	Proj Ref.	P0249
Description	Future 2020 Base Peak Hour Traffic Volumes	Figure	5



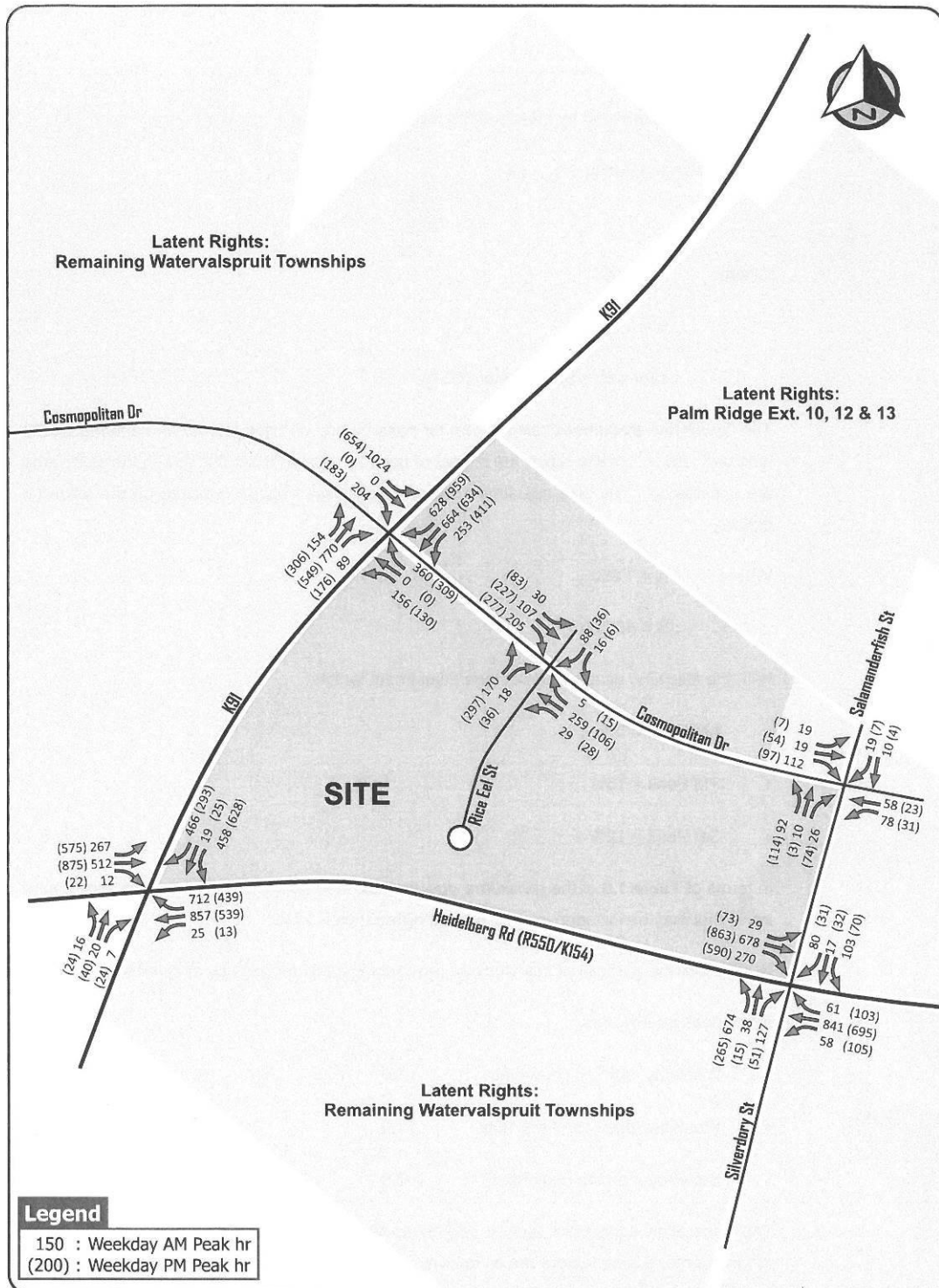
Project Name	Watervalsspruit Ext. 37, 38 & 47-51 (Node 4)	Proj Ref.	P0249
Description	Future 2025 Base Peak Hour Traffic Volumes	Figure	6



Project Name	Watervalspruit Ext. 37, 38 & 47-51 (Node 4)	Proj Ref.	P0249
Description	Future 2030 Base Peak Hour Traffic Volumes	Figure	7

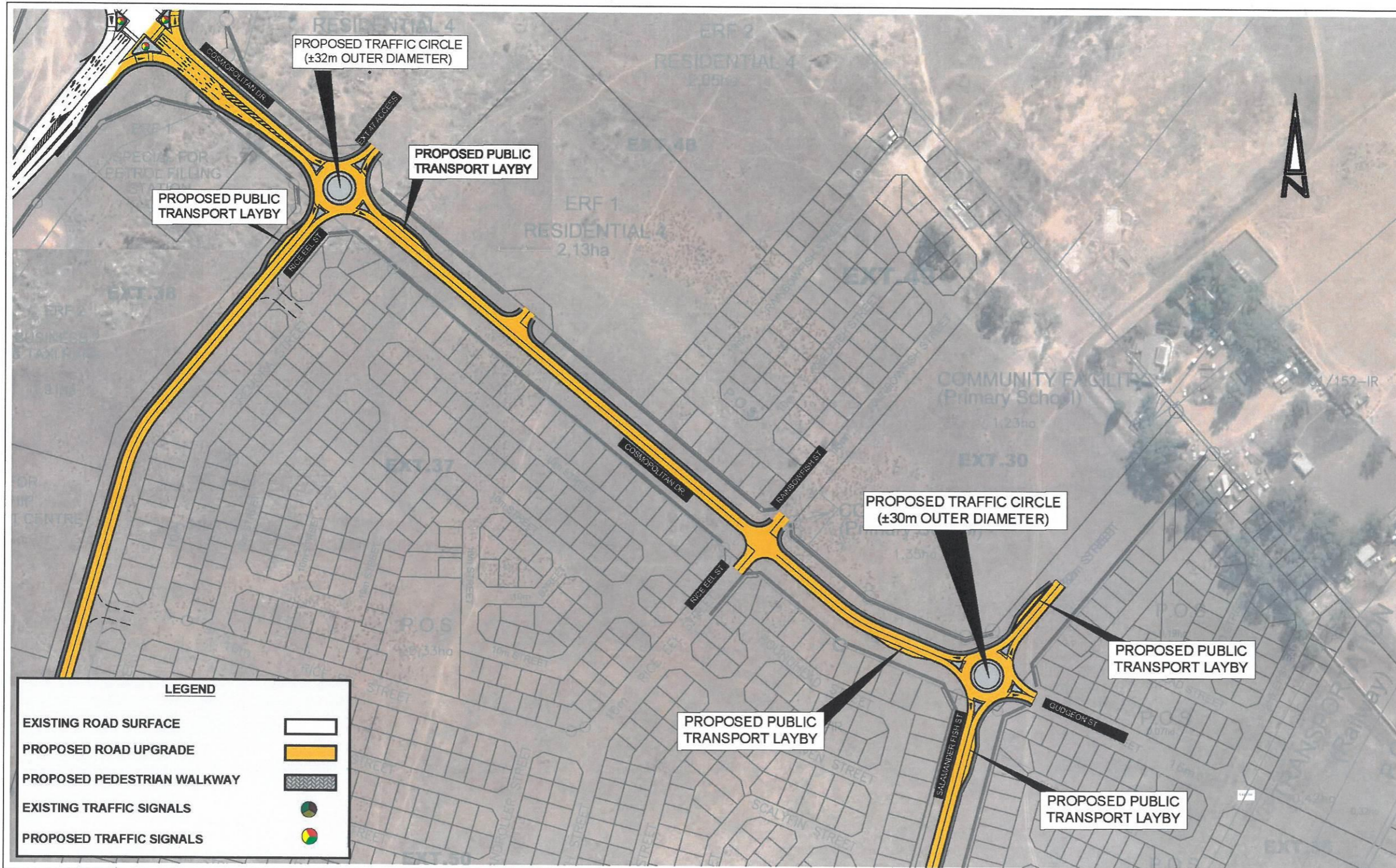


Project Name	Watervalspruit Ext. 37, 38 & 47-51 (Node 4)	Proj Ref.	P0249
Description	Future 2025 Peak Hour Traffic + 100% Palm Ridge Latent Rights Trips + Service Plan Stage 2 Trips (With Development)	Figure	15



Project Name	Watervalspruit Ext. 37, 38 & 47-51 (Node 4)	Proj Ref.	P0249
Description	Future 2030 Peak Hour Traffic + 100% Palm Ridge Latent Rights Trips + Service Plan Stage 3 Trips (With Development)	Figure	16

**ANNEXURE C:
PROPOSED ROAD UPGRADE –
DHUBECON DRAWING NO.: 0249(N4)CL/02 & 04**



REV	DATE	BY	DESCRIPTION	CHK	APD
A	-	-	INITIAL ISSUE	-	-

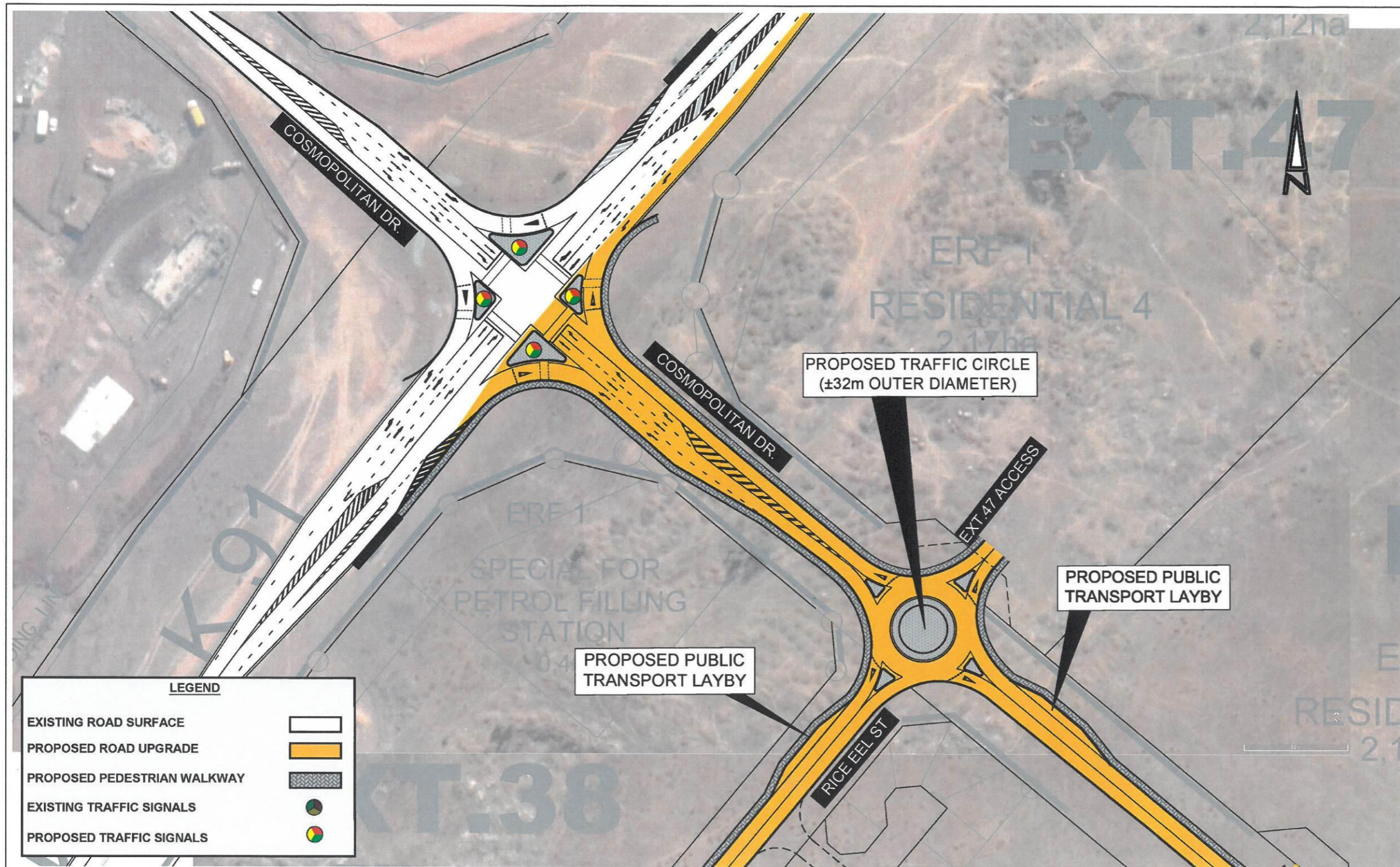
DRAWING STATUS: Traffic Impact Assessment

Dhubecon Consulting Engineers
 2nd Floor, Soetdoring Building
 Soetdoring Office Park
 Cnr Lupin & Protea
 Doringkloof, Centurion
 Tel 012 667 5531



PROJECT: Watervalspruit Ext. 37, 38 & 47-51 (Node 4)
 TITLE: Proposed Internal Road Network: Node 4

SCALE: 1:2000	CHECKED: E LE ROUX	APPROVED: D HUNDERMARK
DESIGN: -	DRAWN: T MALEKANE	DATE: 2019/09/27
PROJECT No: P0249	DRAWING No: 0249(N4)/CL/04	REV: -



REV	DATE	BY	DESCRIPTION	CHK	APD
A	-	-	INITIAL ISSUE	-	-

DRAWING STATUS: Traffic Impact Assessment

Dhubecon Consulting Engineers
 2nd Floor, Soetdoring Building
 Soetdoring Office Park
 Cnr Lupin & Protea
 Doringkloof, Centurion
 Tel 012 667 5531



PROJECT: Watervalspruit Ext. 37, 38 & 47-51 (Node 4)

TITLE: Proposed Intersection Upgrade:
 K91 / Cosmopolitan Drive
 [Intersection 13]

SCALE: 1:1000	CHECKED: E LE ROUX	APPROVED: D HUNDERMARK
DESIGN:	DRAWN: T MALEKANE	DATE: 2019/09/27
PROJECT No: P0249	DRAWING No: 0249(N4)/CL/02	REV: -

**ANNEXURE D:
PROPOSED FILLING STATION LAYOUT &
ACCESS ARRANGEMENTS –
MARITENG PLAN NO.: 188-84-01**

**ANNEXURE E:
EXTRACT FROM GUIDELINE DOCUMENT ENTITLED
SOUTH AFRICAN TRIP GENERATION RATES,
DATED MARCH 1994**

PROJECT REPORT **PR92/228**



DEPARTMENT OF TRANSPORT

South African Trip Generation Rates

2ND EDITION

MARCH 1994

The origin and destination prior to and after the visit to the filling station is the same.

- (iii) **Pass-by fuel trip.** Pass-by fuel trips are intercepted from the adjacent street network, that is the filling station is not the primary destination. Pass-by fuel trips during which the C-Store is also visited are included.
- (iv) **Pass-by C-Store trip.** Pass-by C-store trips are intercepted from the adjacent street network, that is the filling station is not the primary destination. The purpose of the stop at the filling station is to visit the C-Store and not to refuel.

To determine the trip purpose, interviews were conducted with patrons of the filling station. The results of these interviews are summarized in **TABLE 18.2**.

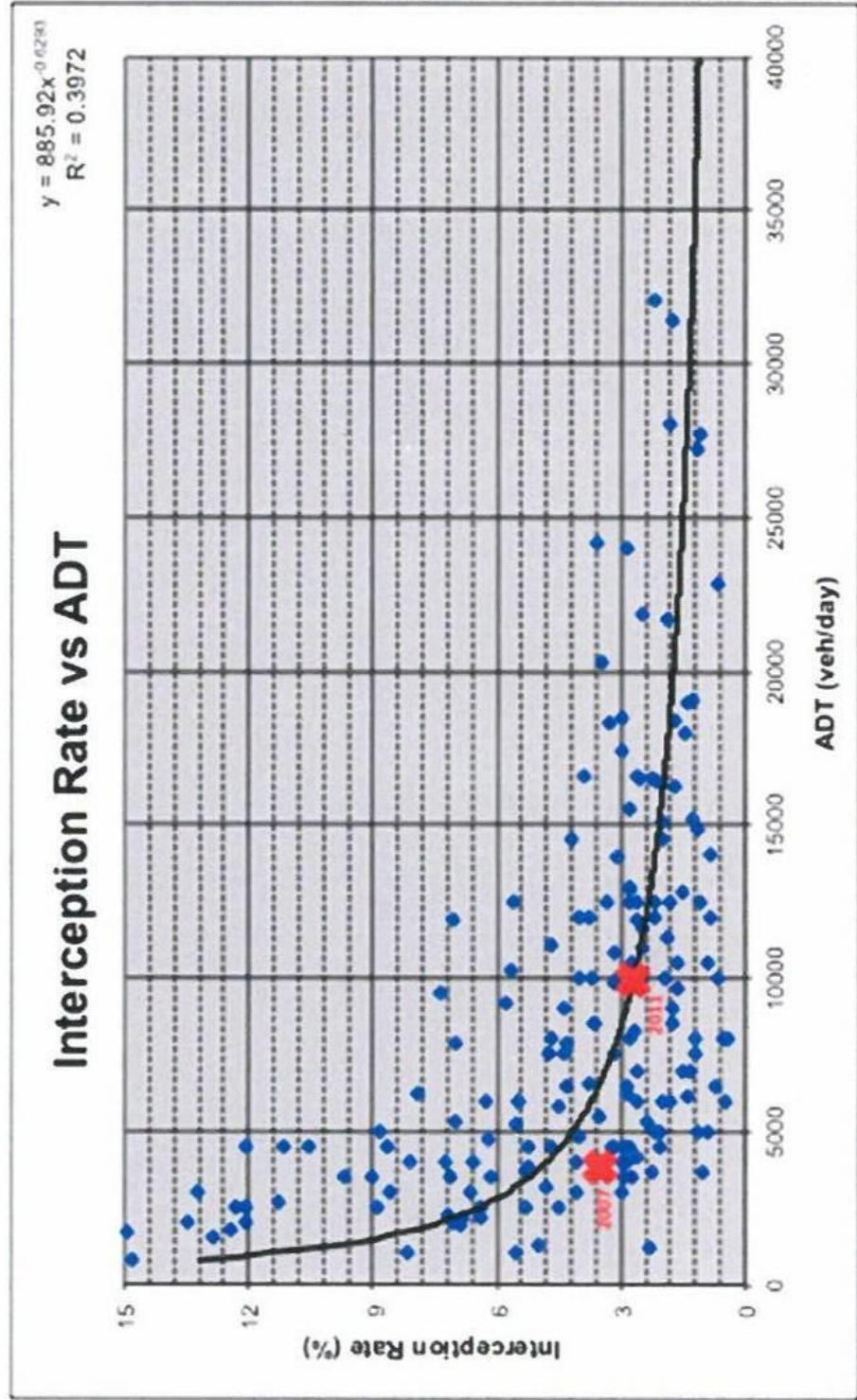
The results indicate that, contrary to previous believe, filling stations do generate a moderate percentage of additional traffic. The results showed that 12,7 % of all trips are primary fuel trips, 3,1 % are primary C-store trips, 69,1 % are pass-by fuel trips and 15,1 % are pass-by C-store trips. The new traffic generated, 15,8 % (12,7 % plus 3,1 %), has to be taken into account when analyzing the traffic impact of filling stations.

18.5 Recommended trip characteristics

The recommended trip generation rate of service stations in urban areas in terms of the percentage traffic attracted from the adjacent street(s) is 4,0 % during the morning peak hour, the afternoon peak hour, and during 12 and 24 hour periods. The corresponding rates for national and provincial freeways are 30 % light vehicles and 40 % heavy vehicles during 12 and 24 hour periods. It is also recommended to assume that 16 % of the trips attracted by service stations are new, that is additional traffic on the street network.

**ANNEXURE F:
EXTRACT FROM HISTORICAL DATA –
SOURCE WSP SA CIVIL & STRUCTURAL ENGINEERS**

WSP has collected interception rate data for the past 14 years on previous filling station projects. The following graph indicates a relationship between the interception rate (%) and the passer-by traffic. Interception rates of more than 350 filling stations were used as data for the illustrated relationship.



**ANNEXURE G:
DETAILED MONTHLY FUEL SALES CALCULATIONS**

Feasibility Calculation - Target Year 2025: Filling Station on the Erf 1 Watervalspruit Extension 51

Project No.: 188/84

Date: 26 June 2020

Description	AM Peak	PM Peak	Average AM/PM	24-hour Conversion Factor	
Peak Hour Traffic Volumes on Cosmopolitan Drive - Eastbound	116	277	196.5	0.1923	
Peak Hour Traffic Volumes on Cosmopolitan Drive - Westbound	224	103	163.5	0.1923	
Peak Hour Traffic Volumes on Rice Eel Street - Southern leg	422	639	530.5	0.1923	
Peak Hour Traffic Volumes on Rice Eel Street - Northern leg	139	140	139.5	0.1923	
Peak Hour Traffic Volumes on Salamanderfish Street - Northbound	36	77	56.5	0.1923	
Peak Hour Traffic Volumes on Salamanderfish Street - Southbound	88	35	61.5	0.1923	
Peak Hour Traffic Volumes on Road K91 - Southbound through movement	416	311	363.5	0.1067	
Estimated 24 Hour volumes on network					
Cosmopolitan Drive - Eastbound	Volumes				
Cosmopolitan Drive - Westbound	1022				
Rice Eel - Southern leg	850				
Rice Eel - Northern leg	2759				
Salamanderfish Street - Northbound	725				
Salamanderfish Street - Southbound	294				
Road K91 - Southbound through movement	320				
Total 24 Hour traffic demand	3407				
Interception rate (%)	Interception rate (%) (WSP Diagram)	Probability Factor	Final Interception Rate	Estimated Intercepted veh's	Avg Monthly Sales/ Approach (l/month)
Cosmopolitan Drive - Eastbound	11.39%	100%	11.39%	116	58669
Cosmopolitan Drive - Westbound	12.79%	100%	12.79%	109	54793
Rice Eel - Southern leg	6.10%	100%	6.10%	168	84865
Rice Eel - Northern leg	14.13%	100%	14.13%	102	51654
Salamanderfish Street - Northbound	24.93%	80%	19.94%	59	29532
Salamanderfish Street - Southbound	23.64%	80%	18.91%	60	30477
Road K91 - Southbound through movement	5.35%	60%	3.21%	109	55074
Total Interception trips					
Average No. of days/month					
Ave fill (litres/veh)					
Average Monthly Sales (litres/month) - Sub Total 1				365064	365064

Feasibility Calculation - Target Year 2030: Filling Station on the Erf 1 Watervalspruit Extension 51

Project No.: 188/84

Date: 26 June 2020

Description	AM Peak	PM Peak	Average AM/PM	24-hour Conversion Factor
Peak Hour Traffic Volumes on Cosmopolitan Drive - Eastbound	137	310	223.5	0.1923
Peak Hour Traffic Volumes on Cosmopolitan Drive - Westbound	264	121	192.5	0.1923
Peak Hour Traffic Volumes on Rice Eel Street - Southern leg	422	639	530.5	0.1923
Peak Hour Traffic Volumes on Rice Eel Street - Northern leg	139	140	139.5	0.1923
Peak Hour Traffic Volumes on Salamanderfish Street - Northbound	36	77	56.5	0.1923
Peak Hour Traffic Volumes on Salamanderfish Street - Southbound	88	35	61.5	0.1923
Peak Hour Traffic Volumes on Road K91 - Southbound through movement	664	634	649	0.1067

Estimated 24 Hour volumes on network	
Volumes	
Cosmopolitan Drive - Eastbound	1162
Cosmopolitan Drive - Westbound	1001
Rice Eel - Southern leg	2759
Rice Eel - Northern leg	725
Salamanderfish Street - Northbound	294
Salamanderfish Street - Southbound	320
Road K91 - Southbound through movement	6082
Total 24 Hour traffic demand	12343

Interception rate (%)	Interception rate (%) (WSP Diagram)	Probability Factor	Final Interception Rate	Estimated Intercepted veh's	Avg Monthly Sales/ Approach (l/month)
Cosmopolitan Drive - Eastbound	10.51%	100%	10.51%	122	61545
Cosmopolitan Drive - Westbound	11.54%	100%	11.54%	116	58222
Rice Eel - Southern leg	6.10%	100%	6.10%	168	84865
Rice Eel - Northern leg	14.13%	100%	14.13%	102	51654
Salamanderfish Street - Northbound	24.93%	80%	19.94%	59	29532
Salamanderfish Street - Southbound	23.64%	80%	18.91%	60	30477
Road K91 - Southbound through movement	3.71%	60%	2.23%	136	68315
Total Interception trips				763	-
Average No. of days/month				28.0	-
Ave fill (litres/veh)				18	-
Average Monthly Sales (litres/month) - Sub Total 1				384610	384610