

LIBERTY LANE TRADING 111 (PTY) LTD

THE HILL RESIDENTIAL DEVELOPMENT

**PORTION 82 OF THE FARM RUYGTE VALLEY
205 AND ERF 1638, SEDGEFIELD**

TRAFFIC IMPACT ASSESSMENT

AUGUST 2015

K&T PROJECT REFERENCE: 14731R

REVISION 0



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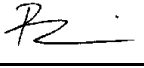
Report Revision Record

Revision	Date	Description
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For and on behalf of	
Kantey & Templer (Pty) Ltd	
Approved by:	<u>B A PHILLIPS</u>
Signed:	
Position:	<u>Executive Associate</u>
Date:	<u>17 August 2015</u>

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TABLE OF CONTENTS

ITEM	PAGE
EXECUTIVE SUMMARY	1
PROJECT DESCRIPTION.....	1
STUDY AREA AND ANALYSIS SCENARIOS.....	1
SIGNIFICANT IMPACTS	1
1. INTRODUCTION.....	2
2. LANDUSE & TRANSPORTATION.....	3
3. ROAD NETWORK.....	3
4. EXISTING TRAFFIC CONDITIONS.....	4
5. TRIP GENERATION	4
6. SITE TRAFFIC DISTRIBUTION.....	6
7. POTENTIAL IMPACT	7
8. GEOMETRIC IMPROVEMENTS	9
9. ACCESS TO SITE.....	10
10. PARKING REQUIREMENTS	10
11. PEDESTRIANS	10
12. PUBLIC TRANSPORT	11
13. REFUSE COLLECTION.....	11
14. LEVEL CROSSING	11
15. FUTURE ROAD NETWORK.....	11
16. CONCLUSIONS AND RECOMMENDATIONS.....	12
17. REFERENCES	15

FIGURES

Figure 1: Site Locality Sketch.....	3
Figure 2: Existing Road Geometry.....	8
Figure 3: Future Road Geometry with Signals.....	9

TABLES

Table 1: Trip generation rates	5
Table 2: Level-of-Service definitions based on delay (HCM method)	7
Table 3: Traffic Operations at intersection of N2 Highway / Egret Road	8
Table 4: Traffic Operations at signalised intersection of N2 Highway / Egret Road	10

APPENDICES

Appendix A: Traffic Count Data	
Appendix B: Sidra Movement Summaries	

EXECUTIVE SUMMARY

This report documents the traffic impacts of the proposed residential development to be situated on a Portion of 82 of the farm Ruygte Valley 205 and Erf 1638, Sedgefield.

PROJECT DESCRIPTION

The proposed development will be located North West on Egret Road Coming from Sedgefield. The client, Liberty Lane Trading 111 (Pty) Ltd intends on developing the property for residential and commercial purposes. The development will consist of 130 single residential units, 30 large townhouses, 40 medium townhouses, 40 small townhouses and approximately 1,600m² GLA of offices.

This Traffic Impact Assessment Report forms part of the engineering and built environment planning. The objective of this project is to provide residential and commercial opportunities for Sedgefield and surrounding areas.

STUDY AREA AND ANALYSIS SCENARIOS

The study intersection listed below was selected in consultation with the Knysna Municipality namely for the entrance Egret Road and N2 Highway intersection for the TIS study for the AM and PM peak hour traffic operations evaluation as it would be the only major intersection affected by traffic generated by the proposed development.

1. N2 Highway / Egret Road

For this study, the following scenarios were evaluated:

- **Existing** – Existing Conditions (2015)
- **Future** – Future Conditions with implementation (2016)
- **Future** – Future Conditions with five year horizon (2021)

SIGNIFICANT IMPACTS

The study found that the implementation of the proposed project is expected to have a significant impact on the traffic operations at the above mentioned key intersections. The site traffic is expected to be well absorbed within the road network.

1. INTRODUCTION

This chapter discusses the purpose of the traffic impact assessment, identifies the study area and criteria used to identify significant project impacts.

Kantey & Templer was appointed by Liberty Lane Trading 111 (Pty) Ltd (herein referred to as “the Client”) to prepare a Traffic Impact Statement Report in respect of the proposed residential development a Portion 82 of the Farm Ruygte Valley 205 and Erf 1638, Sedgefield (herein referred to as “the site”).

Refer to Figure 1 for the locality plan.

The additional traffic resulting from the proposed development is the subject of this Traffic Impact Assessment (TIA), which pertains to developments generating more than 150 trips during peak hours.

This TIA is prepared in accordance with standards set by the South African Committee of Transport Officials¹ (COTO) and the Knysna Zoning Scheme Regulations. The specific objectives of the report are to:

- (i) Describe the extent of the proposed development
- (ii) Assess the existing traffic operations on the road network in the vicinity of the site
- (iii) Predict the extent of the traffic generated by the new development and estimate the distribution of that new traffic
- (iv) Assess the effect that this generated traffic is likely to have on the existing road network
- (v) Make recommendations for improvements to the existing road network and intersections affected by the generated traffic.

¹ COTO, TMH17 Vol 1, South African Trip Data Manual, Sep 2012.

2. LANDUSE & TRANSPORTATION

The site is located directly north of Sedgefield. The site will serve the following land use purpose(s), namely:

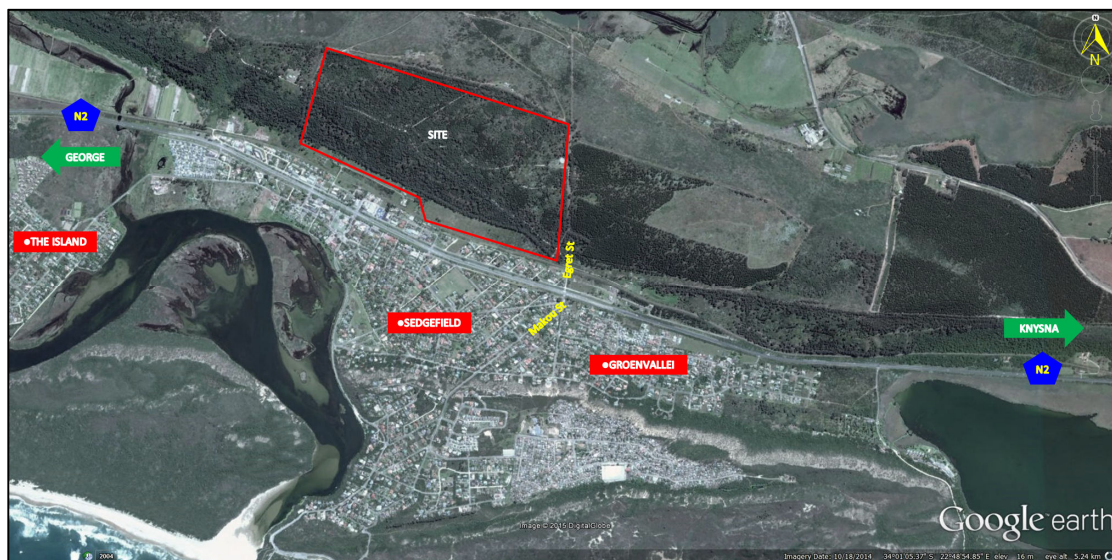
- Residential: Single Residential Units – 130 units
- Townhouses – 110 units
- Commercial: Offices – 1,600m² GLA

3. ROAD NETWORK

The site is well served by existing road infrastructure. The access to the development is via Egret Road.

Egret Road has a two-lane undivided cross section. Direct access to Egret Road is achievable via the N2 Highway and Main Service Road.

Figure 1: Site Locality Sketch



4. EXISTING TRAFFIC CONDITIONS

Existing background traffic information was obtained from traffic counts conducted by Kantey and Templer (Pty) Ltd on the road network taken on Wednesday, 27 July 2015. The key intersection in the study area was analysed in order to assess the existing traffic operations during the typical weekday peak commuter periods.

The existing traffic data is illustrated in the traffic diagrams at the back of the report. The details of the traffic count are contained in Appendix A.

The key intersection in the study area is as follows:

1. N2 Highway / Egret Road

According to the results of the SIDRA analysis it appears that the traffic operations at the existing intersections are currently operating at a LOS C in the AM and PM peak hours, respectively.

5. TRIP GENERATION

The trip generation requires an estimation of the additional traffic to be generated by the additional land uses. This estimation was based on the COTO TMH 17 Trip Data Manual.

The development will consist of the following land use(s):

- | | | | |
|----------------|--------------------------|---|-------------------------|
| • Residential: | Single Residential Units | – | 130 units |
| | Townhouses | – | 110 units |
| • Commercial: | Offices | – | 1,600m ² GLA |

The expected additional trip generation for the development is estimated as follows:

Table 1: Trip generation rates

1. Residential: Single Residential Units				
Dwelling Units (DU)	130			
Trip Generation Rate (TGR) / DU	Weekday AM		Weekday PM	
	1.0		1.0	
Trips Generated (TG)	130		130	
Directional Split & Vehicular Trips	Weekday AM		Weekday PM	
	IN	OUT	IN	OUT
	25%	75%	70%	30%
	33	98	91	39
2. Residential: Townhouses				
Dwelling Units (DU)	110			
Trip Generation Rate (TGR) / DU	Weekday AM		Weekday PM	
	0.85		0.85	
Trips Generated (TG)	95		95	
Directional Split & Vehicular Trips	Weekday AM		Weekday PM	
	IN	OUT	IN	OUT
	25%	75%	70%	30%
	24	71	66	29
3. Commercial: Offices				
GLA	1,600			
Trip Generation Rate (TGR) / 100m ² GLA	Weekday AM		Weekday PM	
	2.10		2.10	
Trips Generated (TG)	35		35	
Directional Split & Vehicular Trips	Weekday AM		Weekday PM	
	IN	OUT	IN	OUT
	85%	15%	20%	80%
	28	6	7	27
Total	Weekday AM		Weekday PM	
	IN	OUT	IN	OUT
	85	175	164	95

1. COTO [Code: 210] | 2. COTO [Code: 231] | 3. COTO [Code: 710]

Definitions of the subject land uses according to COTO (TMH17) are as follows:

210 Single Dwelling Unit

Single dwelling units are detached houses on individual erven. The units usually have individual accesses to streets.

231 Townhouses (Simplexes and Duplexes)

Dwelling units typically provided in clusters or in complexes. Units could be detached or provided within one building structure. Parking is often provided within a communal area.

710 Offices

This land-use includes developments at which affairs of businesses, commercial or industrial organisations are conducted.

The additional traffic is to be superimposed on the existing background traffic on the road network during the weekday AM and PM peak hours. It can be seen that 85 inbound trips and 175 outbound trips is expected during the weekday AM peak period; as well as 164 inbound trips and 95 outbound trips is expected during the weekday PM peak period. Therefore a total of 260 and 259 trip ends occur during the AM and PM peak hours, respectively.

6. SITE TRAFFIC DISTRIBUTION

Traffic that is expected to be generated by a development project must be distributed and assigned to the road network so that the impact of the proposed project on the roadway links and intersections within the study area can be analysed.

The gravity model is used to distribute the trips manually based on the likelihood that the number of trips between two zones is proportional to the magnitude of each zone, and inversely proportionate to the distance between the two zones.

The site traffic will be distributed 40% towards George, 30% towards Knysna and 30% across Egret Road into Sedgefield.

The trip distribution patterns are illustrated in Figure 4 at the back of the report.

7. POTENTIAL IMPACT

The traffic operations were analysed using Signalised and Unsignalised Intersection Design and Research Aid software package² (SIDRA). The software package determines the existing and future operational Levels of Service (LOS) and expected average delays at the key intersections in the study area with the additional traffic from the proposed development.

ANALYSIS METHODOLOGY

Level of Service

Traffic operations at intersections are typically described in terms of “Level of Service” (LOS). LOS is a qualitative measure of the effect of several factors on traffic operating conditions, including speed, travel time, traffic interruptions, freedom to manoeuvre, safety, driving comfort, and convenience. It is generally measured quantitatively in terms of vehicular delay and described using a scale that ranges from LOS A to F, with LOS A representing essentially free-flow conditions and LOS F indicating over-capacity conditions with substantial congestion and delay.

Table 2 summarizes the relationships between the average control delay per vehicle and LOS for signalized intersections, roundabouts and stop and yield controls.

Table 2: Level-of-Service definitions based on delay (HCM method)

Level of Service		Control delay per vehicle in seconds (d) (including geometric delay)	
		Signals and Roundabouts	Stop Signs and Give Way (Yield) Signs
A	Good progression, few stops, short cycle lengths	$d \leq 10$	$d \leq 10$
B	Good progression and/or short cycle lengths, more vehicle stops	$10 < d \leq 20$	$10 < d \leq 15$
C	Fair progression, significant proportion of vehicles must stop	$20 < d \leq 35$	$15 < d \leq 25$
D	Congestion becomes noticeable; longer delays, high v/c ratio	$35 < d \leq 55$	$25 < d \leq 35$
E	At or beyond acceptable delay, poor progression, long queues	$55 < d \leq 80$	$35 < d \leq 50$
F	Unacceptable to drivers. Arrival volumes greater than discharge capacity, unstable unpredictable flows	$80 < d$	$50 < d$

² SIDRA Version 5 Software, SidraSolutions, Australia, 2010.

The traffic generated by the site can be expected to influence the key intersections of the study area, namely:

1. N2 Highway / Egret Road

Figure 2: Existing Road Geometry

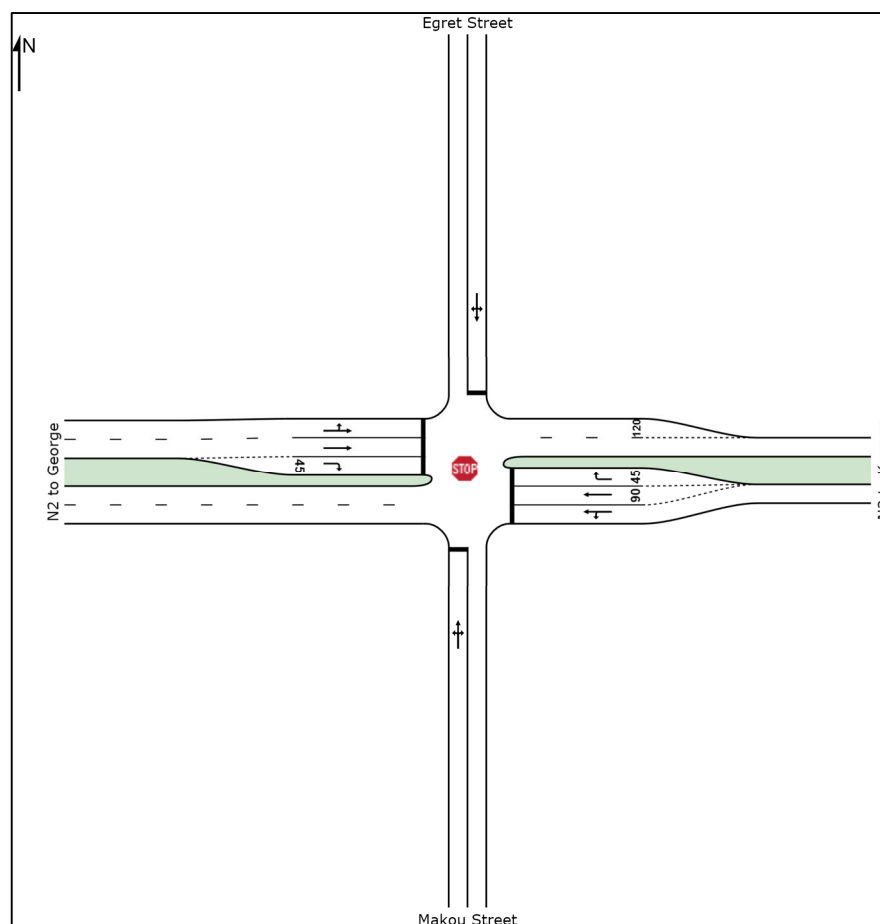


Table 3: Traffic Operations at intersection of N2 Highway / Egret Road

Intersection of N2 Highway / Egret Road						
Measures of Effectiveness	Intersection Type					
	Stop Controlled					
	Existing 2015 Scenario		Future 2016 Scenario		Future 2021 Scenario	
	Peak Hour		Peak Hour		Peak Hour	
	AM	PM	AM	PM	AM	PM
Levels of Service (LOS)	C	C	D	D	E	D
Delay (Sec) Overall	19.1	18.1	29.4	25.2	36.5	30.0
V/C Ratio	0.610	0.509	0.830	0.728	0.940	0.816

8. GEOMETRIC IMPROVEMENTS

It will be necessary to upgrade the intersection to include traffic signals in future and the resultant levels of service will be in the range of LOS B overall for the AM and PM peak hours in the year 2021. The road improvements will have a positive effect on traffic operations by providing the necessary capacity for the development traffic and reserve capacity for other planned developments in the area.

Figure 3: Future Road Geometry with Signals

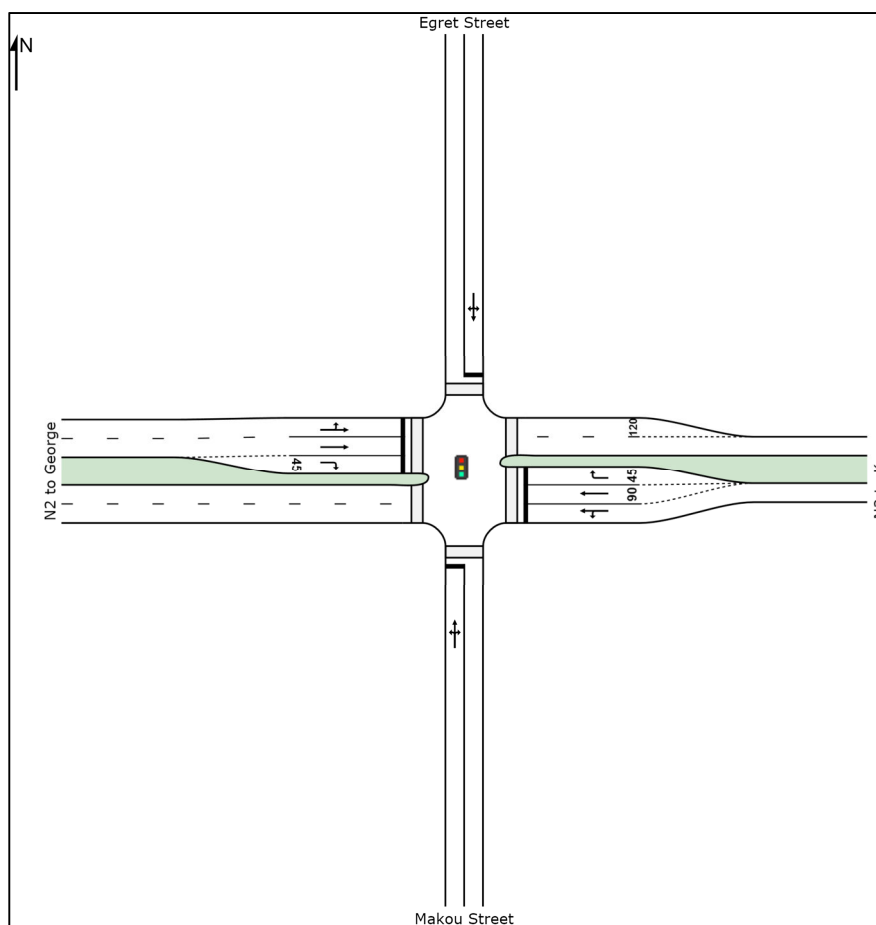


Table 4: Traffic Operations at signalised intersection of N2 Highway / Egret Road

Intersection of N2 Highway / Egret Road		
Measures of Effectiveness	Intersection Type	
	Signalised	
	Future 2021 Scenario	
	Peak Hour	
	AM	PM
Levels of Service (LOS)	B	B
Delay (Sec) Overall	14.4	15.1
V/C Ratio	0.430	0.419

9. ACCESS TO SITE

The development will gain access from the existing road that extends from the N2/Egret Road intersection across the railway line into the property. The proposed internal road layout curves along the contours of the site and follow, where possible, the alignment of the existing farm roads.

10. PARKING REQUIREMENTS

The parking requirements for residential development of this nature are in accordance with the local authority Town Planning scheme and the minimum parking required is as follows:

Single Residential:	130 units	@ 2 bays / unit	=	260 bays
Residential Apartments:	110 units	@ 2 bays / unit	=	220 bays
Offices:	1,600 m ²	@ 1 bays / 25 m ²	=	64 bays
Total parking required:				= 544 bays

It should be noted that the parking will be located in double garages and open lots and possibly basement parking for the apartments.

11. PEDESTRIANS

It would be preferable for the project to be pedestrian friendly internally with adequate sidewalks and traffic calming devices that enable a conducive non-motorised transport environment.

12. PUBLIC TRANSPORT

The site will be served by public transport that will consist mainly of minibus taxis that will stop at the bottom of Egret Road and the final journey will probably be a short walk up and down the hill to the entrance gatehouse. If the demand for PT is found to be significant then the taxis may divert up the access road and drop passengers in front of the gatehouse.

13. REFUSE COLLECTION

A refuse room is required in order to adequately serve the development. Municipal refuse collection or private refuse collection will need to be carefully planned in order to obtain a reasonable level of service.

14. LEVEL CROSSING

The safety of the level crossing of the Transnet Railway line is the subject of a risk assessment and given the relatively high traffic generation from the proposed development, Transnet Freight Rail (TFR) will probably require a signalised crossing with boom controls to improve safety.

This proposed improvement will need to be allowed for in the overall development cost estimate for the project.

15. FUTURE ROAD NETWORK

The N2 will in future be realigned to the north of the railway line. Our discussions with SANRAL indicate that in future the existing access to Egret Road from the north will be eliminated and the access to the N2 will be via a servitude road in an easterly direction linking up to the planned Karatara interchange several kilometres away.

This has long term implications for the development of The Hill as the existing access arrangement cannot be guaranteed in perpetuity.

The timing of the realignment of the N2 could not be ascertained from SANRAL, but it is expected to occur in the long term (20 years hence).

16. CONCLUSIONS AND RECOMMENDATIONS

It can be concluded that:

1. The site development plan consists of 130 single residential units; 30 large, 40 medium and 40 small townhouses; and 1,600m² GLA of office space. It will be located at the site known as The Hill to the north of Sedgefield.
2. The access to the development will gain access from the existing road that extends from the N2/Egret Road intersection across the existing TFR railway line into the property
3. The level crossing of the Transnet Railway line should be upgraded to a signalised crossing with booms to enhance safety at this junction.
4. The Conceptual Planning should include the possibility of the N2 being realigned to the north of the Spoornet Railway line in which case an alternative connection to the N2 will be required.
5. Parking to the scheme is provided at 2 bays per unit for the residential component and 1 bay per 25m² of gross leasable area. The total amount of parking required is 544 bays.
6. The key intersections were studied in detail and analysed in terms of the LOS, Delay and V/C ratios. The Level of Service (LOS) for the current traffic operations at the key intersections is operating at favourable levels of service during peak hours.
7. The traffic generation of the project is approximately 85 inbound and 175 outbound vehicular trips in the weekday AM peak hour and 164 inbound and 95 outbound in the weekday PM peak hour.
8. The 4% per annum growth rate was used to estimate the 2016 and 2021 traffic scenarios.
9. The trip distribution adopted in this study is based on the anticipated pattern of travel to and from the site. The assumptions are 30% of all the trips originating from Sedgefield, 40% from George and 30% from Knysna.
10. The additional traffic generated by the proposed development is expected to have a significant impact on the road network during the peak hours. This is verified by the traffic analysis of the key intersection of N2 / Egret.
11. This significant impact will, however, be mitigated by the proposed traffic signals at the intersection of N2 and Egret Road, which has a direct bearing on the project traffic. The

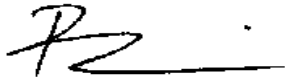
road improvements will have a positive effect on traffic operations by providing the necessary capacity for the development traffic and reserve capacity for other planned developments in the area.

12. The level crossing of the Transnet Railway line requires upgrading to a signalised level crossing with boom controls to enhance safety given the relatively high traffic generation and the net increase of vehicles that are likely to cross the railway line at the level crossing.
13. In the long term, the N2 may be realigned to the north of the Spoornet Railway line and therefore eliminating the access onto Egret Road. The alternative access via a Servitude Road in an easterly direction to the planned Karatara Interchange may be necessary.
14. The project will therefore have no significant traffic impact on the network traffic operations provided that the intersection of N2 and Egret Road is upgraded to traffic signals in within the next five years
15. Mitigating factors and measures to consider when evaluating the impact are:
 - a. Rail level crossing upgrading
 - b. Possible improvements to the intersection in future, if so required.
 - c. Signalisation of the intersection of N2 and Egret Road.
16. Access to the site has been carefully considered and the proposed access is from Egret Road.
17. Pedestrians are well accommodated within the development with universal access to persons with disabilities as required in residential developments.

Accordingly it is recommended that: -

- (i) The Road Authority should approve the proposed development, as the impact of the additional traffic can be mitigated by the improvements associated with the planned traffic signals at the intersection of N2 and Egret Road.
- (ii) The access to the residential development will take the form of an entrance driveway controlled by a gate with two lanes on entry and a single lane on exit.
- (iii) The level crossing of the Transnet Railway line should be upgraded to a signalised crossing with booms to enhance safety at this junction.

- (iv) The Conceptual Planning should include the possibility of the N2 being realigned to the north of the Spoornet Railway line in which case an alternative connection to the N2 will be required.



B A PHILLIPS (Pr Tech Eng)
(Pr No. 200770081)

17 August 2015



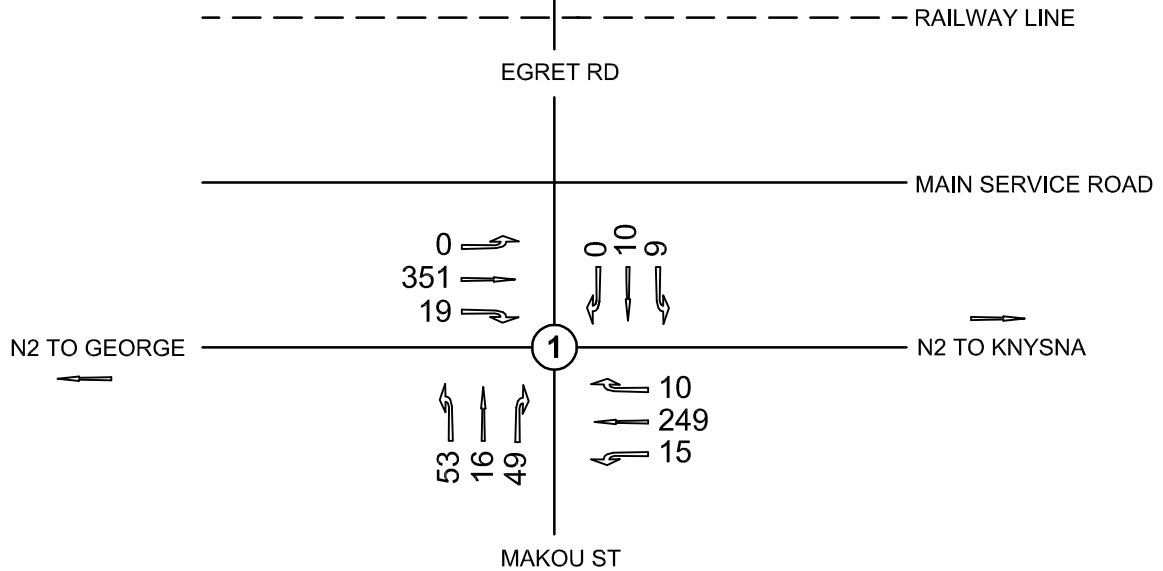
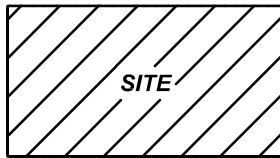
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17. REFERENCES

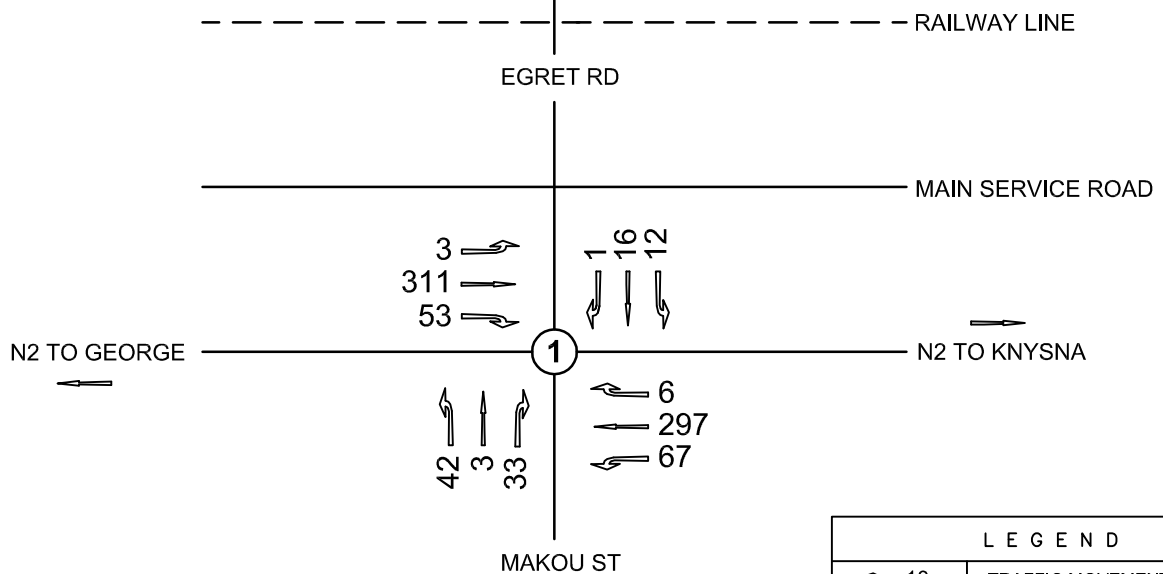
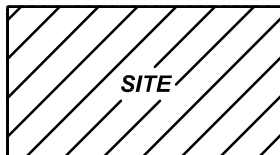
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KNYSNA MUNICIPALITY, "Knysna Zoning Scheme Regulations", 1992

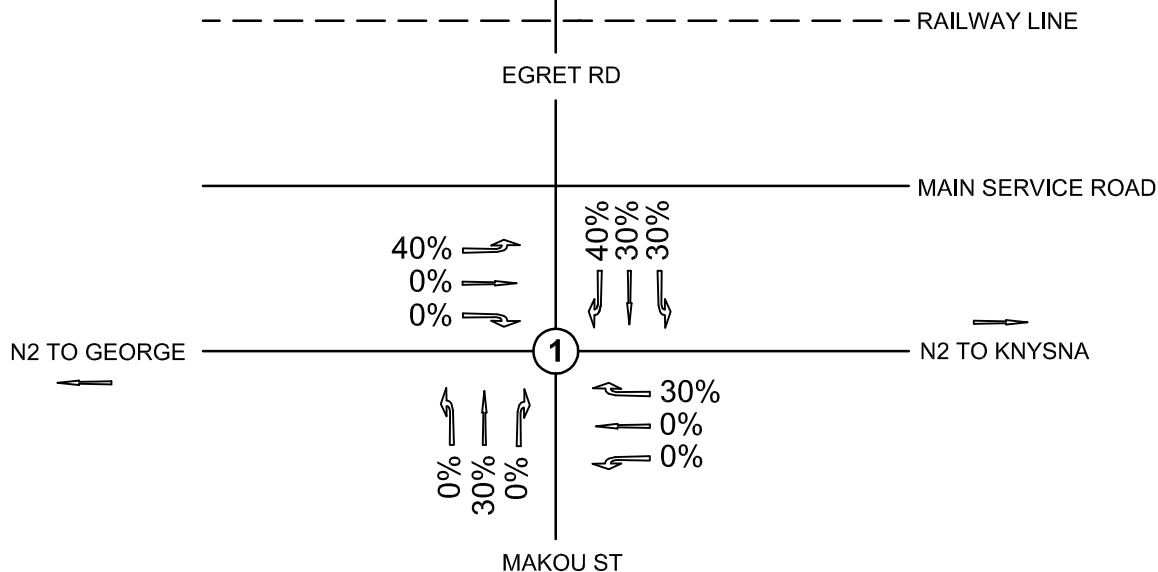
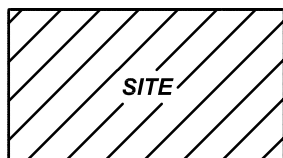


27 JULY 2015
WEEKDAY AM PEAK HOUR 08:00 - 09:00

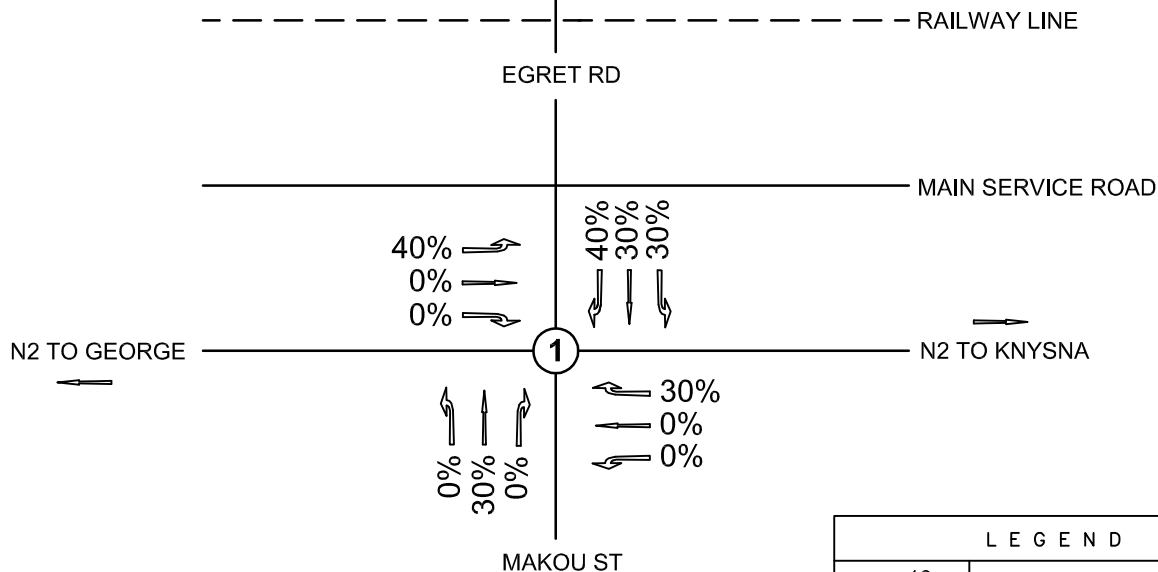
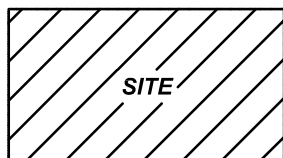


27 JULY 2015
WEEKDAY PM PEAK HOUR 16:30 - 17:30

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		RAILWAY LINE	

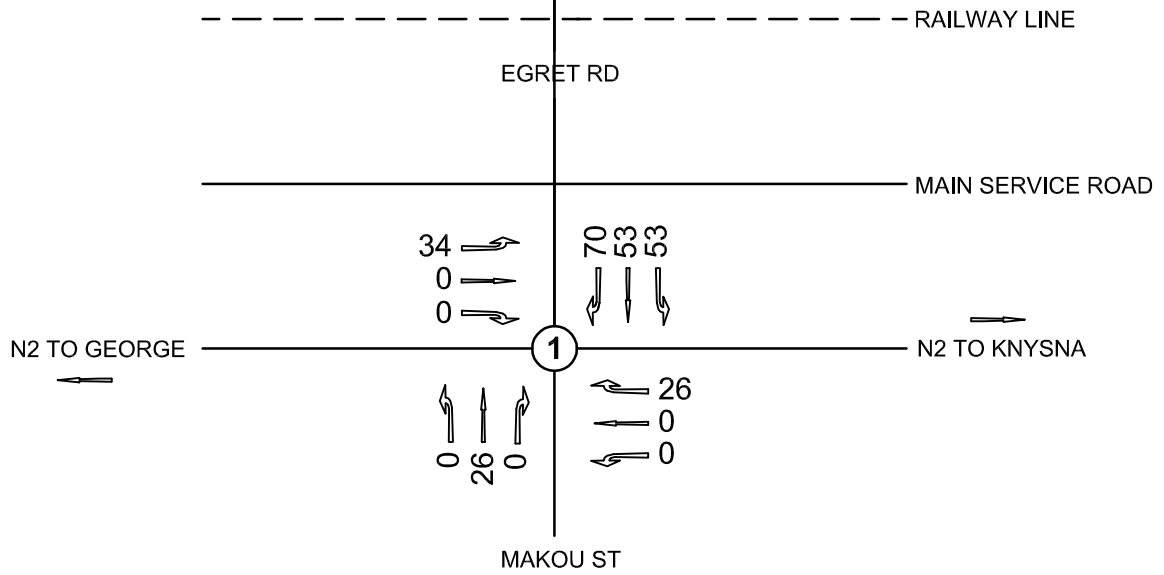
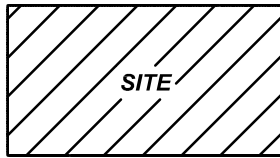


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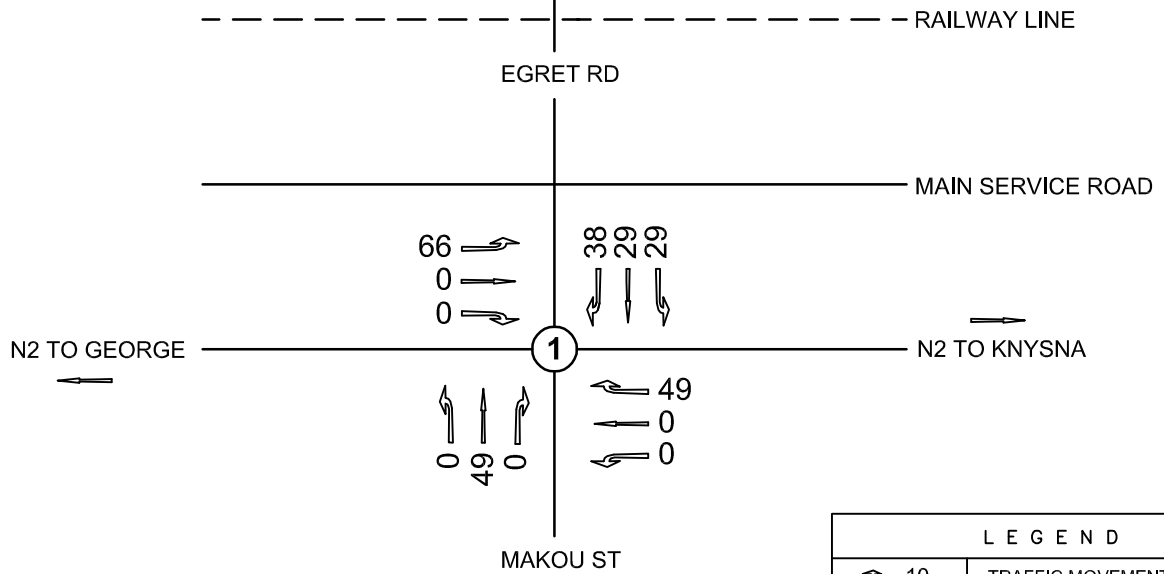
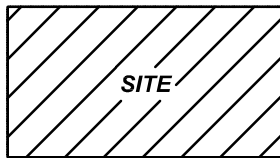


WEEKDAY PM PEAK HOUR

L E G E N D			
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		ACCESS ROAD	
		RAILWAY LINE	

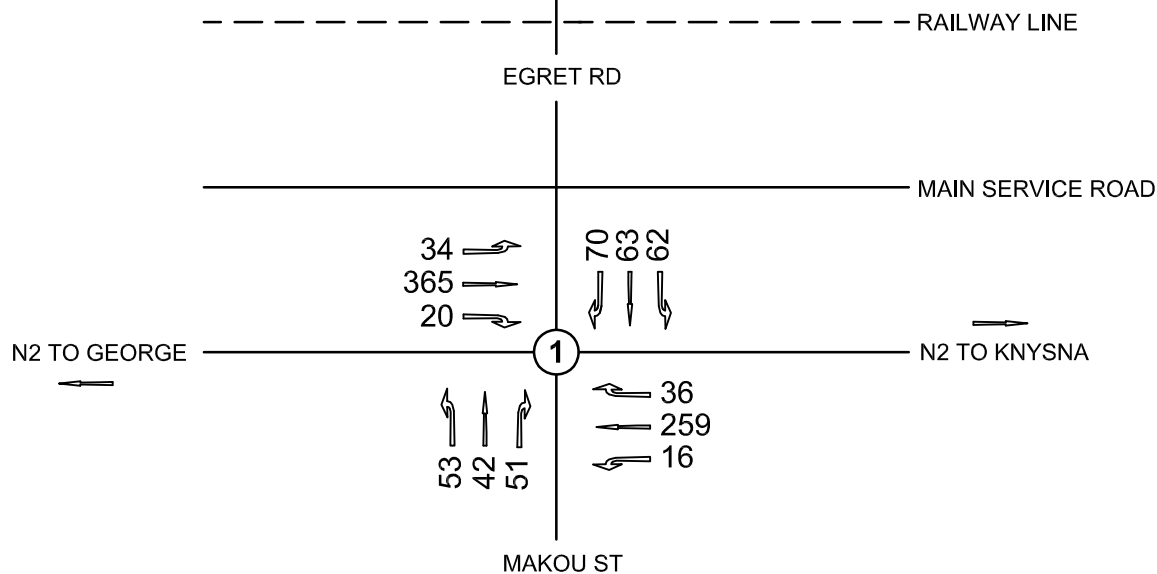
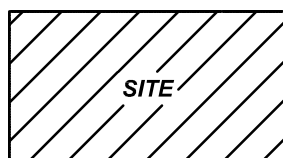


WEEKDAY AM PEAK HOUR

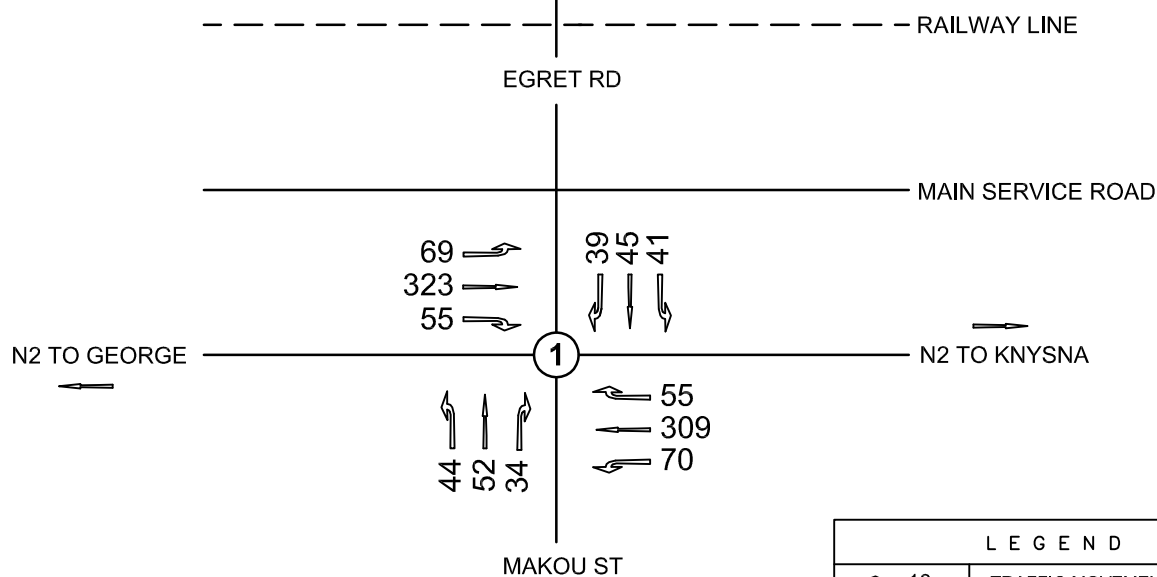
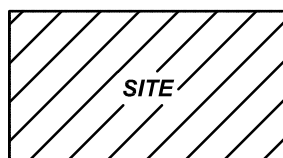


WEEKDAY PM PEAK HOUR

L E G E N D		
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		INTERSECTION NO.
		ACCESS ROAD
		RAILWAY LINE

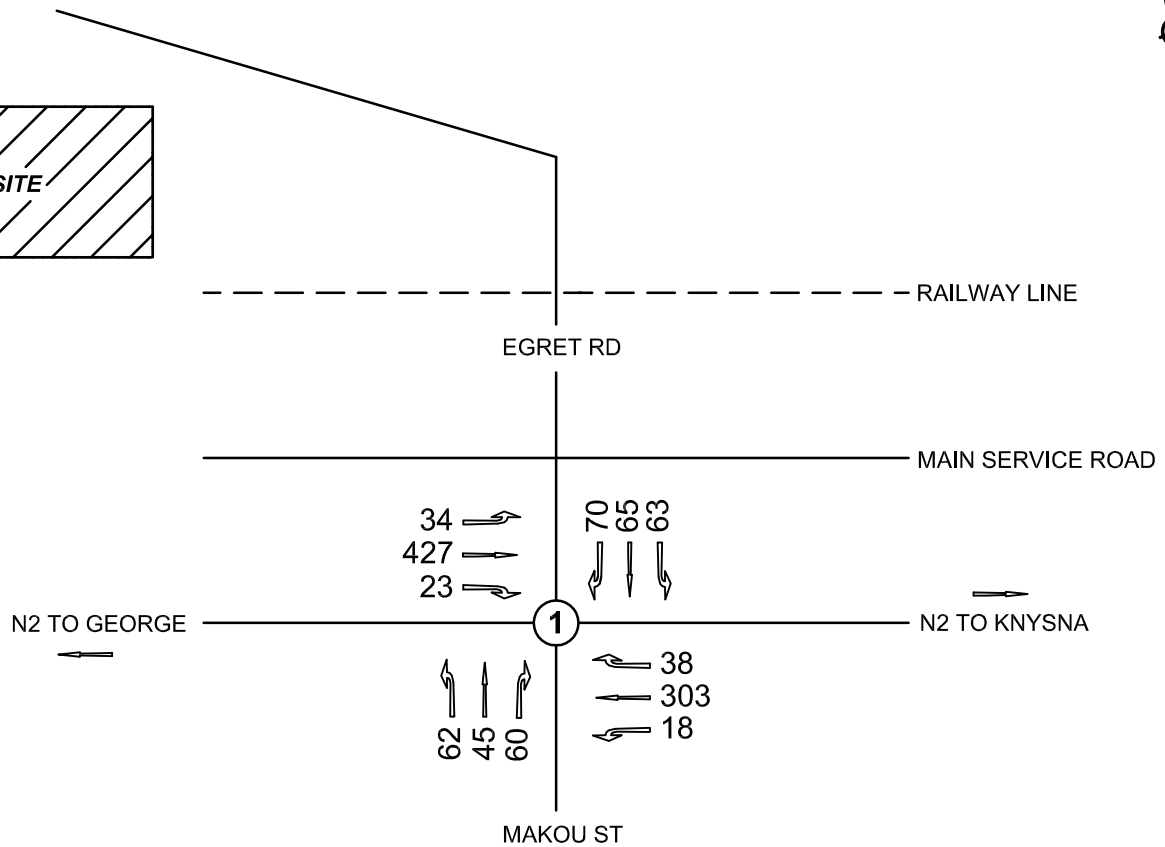
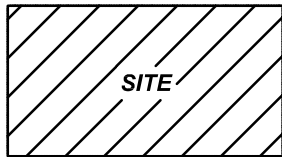


WEEKDAY AM PEAK HOUR

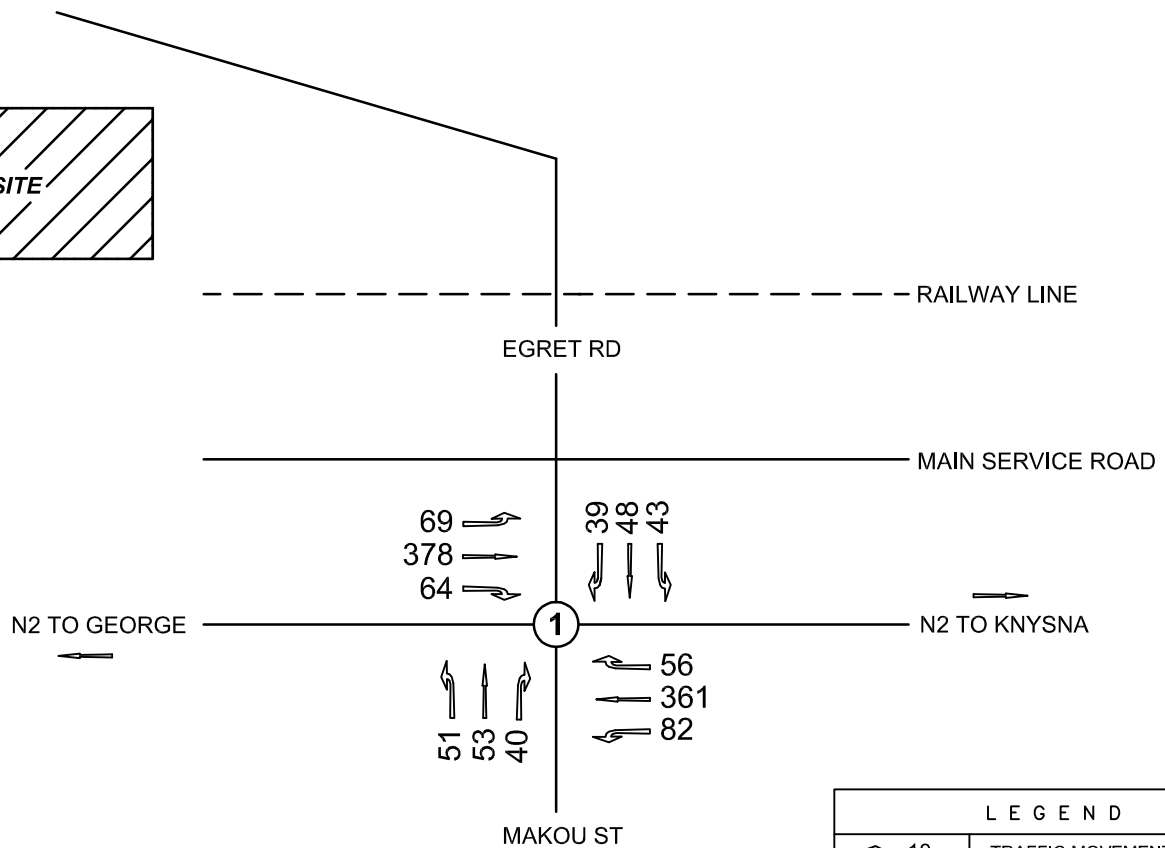
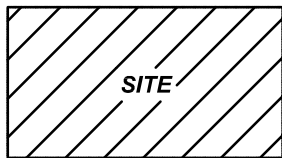


WEEKDAY PM PEAK HOUR

L E G E N D			
	10	TRAFFIC MOVEMENT	
	1	INTERSECTION NO.	
		ACCESS ROAD	
		RAILWAY LINE	




WEEKDAY AM PEAK HOUR



WEEKDAY PM PEAK HOUR

L E G E N D			
	10	TRAFFIC MOVEMENT	
	①	INTERSECTION NO.	
		ACCESS ROAD	
		RAILWAY LINE	

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	APPROVED	BAP	06 - 08 - 15	FUTURE 2021 TRAFFIC				
						14731R	N.T.S	8

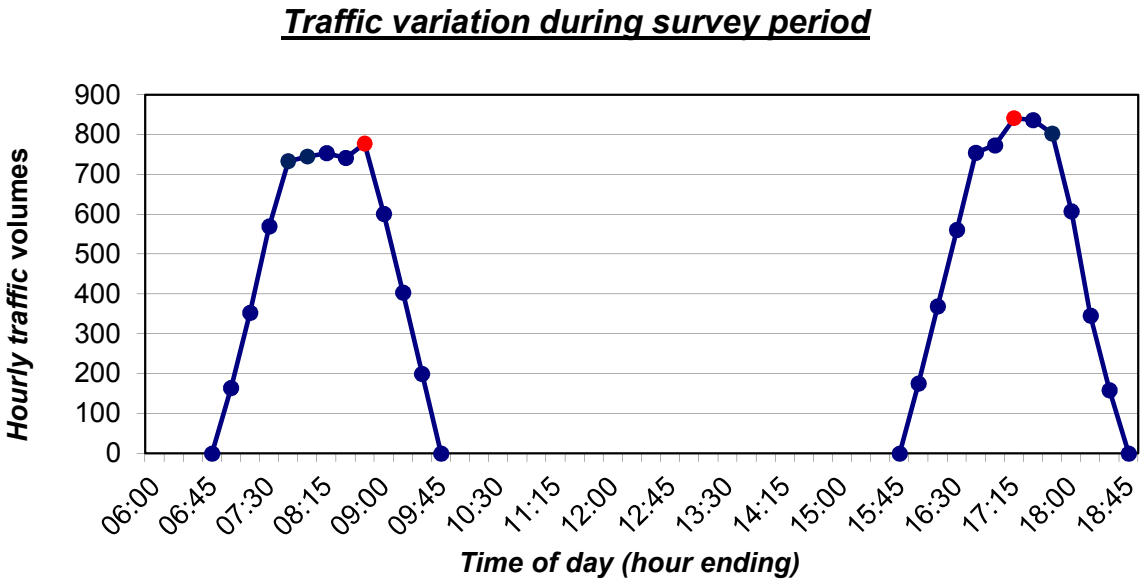
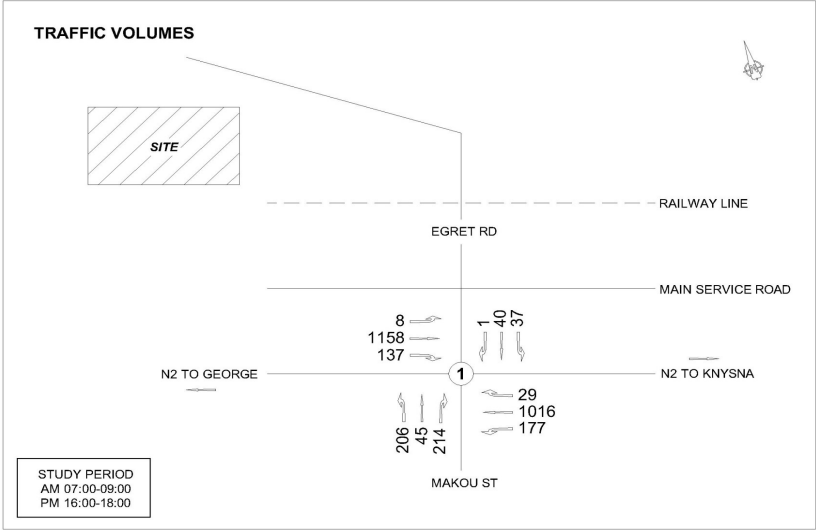
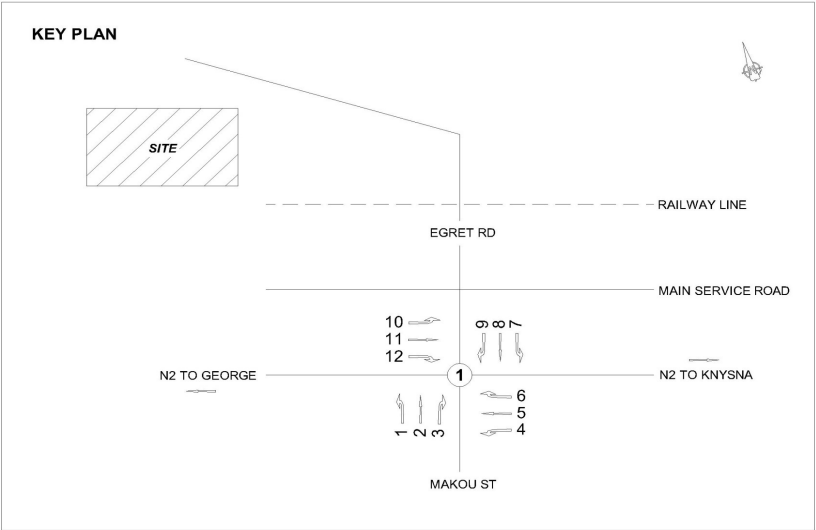
APPENDIX A

TRAFFIC COUNT DATA

TRAFFIC COUNT: THE HILL
INTERSECTION: N2 / EGRET STREET
PERIOD: 4 HRS
DATE: MONDAY, 27 JULY 2015



TOTAL TRAFFIC															HOURLY TOTALS
TIME		TRAFFIC MOVEMENTS													
START	END	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	
06:00	06:15													0	
06:15	06:30													0	
06:30	06:45													0	
06:45	07:00													0	0
07:00	07:15	21	2	27	4	46	4	1	1	0	0	56	5	165	165
07:15	07:30	18	3	28	13	50	1	4	3	0	0	62	8	189	353
07:30	07:45	23	8	31	15	52	2	2	1	0	0	75	9	217	570
07:45	08:00	18	3	21	5	44	0	2	3	0	2	59	9	164	733
08:00	08:15	15	2	16	4	57	3	4	0	0	0	70	6	176	745
08:15	08:30	12	5	11	4	60	3	1	4	0	0	96	2	198	754
08:30	08:45	16	4	10	5	64	3	1	3	0	0	97	3	204	741
08:45	09:00	9	5	14	2	68	1	3	3	0	0	88	8	200	777
09:00	09:15														601
09:15	09:30														404
09:30	09:45														200
09:45	10:00														0
10:00	10:15														
10:15	10:30														
10:30	10:45														
10:45	11:00														
11:00	11:15														
11:15	11:30														
11:30	11:45														
11:45	12:00														
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14:30	14:45														
14:45	15:00														
15:00	15:15														
15:15	15:30														
15:30	15:45														
15:45	16:00														0
16:00	16:15	7	2	5	8	79	4	2	1	0	0	63	5	176	176
16:15	16:30	11	2	7	13	81	0	2	2	0	2	64	10	194	369
16:30	16:45	11	1	4	12	72	1	4	1	1	0	73	13	192	561
16:45	17:00	5	1	7	16	68	1	1	5	0	1	74	14	193	754
17:00	17:15	12	1	12	13	77	2	2	5	0	0	58	13	195	773
17:15	17:30	14	0	10	26	80	2	5	5	0	2	107	13	262	841
17:30	17:45	8	3	8	21	75	3	2	2	0	0	55	11	188	837
17:45	18:00	9	3	7	17	47	0	1	2	0	1	63	9	159	802
18:00	18:15													0	608
18:15	18:30													0	346
18:30	18:45													0	159
18:45	19:00													0	0
TOTAL		206	45	214	177	1016	29	37	40	1	8	1158	137	3066	
AM PEAK HOUR		51	16	49	15	249	10	9	10	0	0	351	19	777	
PM PEAK HOUR		42	3	33	67	297	6	12	16	1	3	311	53	841	
EST. 24 HR		411	90	428	354	2032	58	73	80	2	16	2315	273	6132	



APPENDIX B

SIDRA MOVEMENT SUMMARIES

(COPIES AVAILABLE ON REQUEST)

MOVEMENT SUMMARY

 Site: 01am2015ex

N2 / Egret Street
AM Peak Hour
2015
Stop (All-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Makou Street											
1	L2	51	0.0	0.346	22.3	LOS C	1.4	9.9	0.96	1.34	44.0
2	T1	16	0.0	0.346	22.8	LOS C	1.4	9.9	0.96	1.34	44.2
3	R2	49	0.0	0.346	22.4	LOS C	1.4	9.9	0.96	1.34	44.1
Approach		116	0.0	0.346	22.4	LOS C	1.4	9.9	0.96	1.34	44.1
East: N2 to Knysna											
4	L2	15	0.0	0.393	16.1	LOS C	1.7	11.8	0.96	1.37	48.0
5	T1	249	0.0	0.393	16.1	LOS C	1.7	11.9	0.97	1.37	47.5
6	R2	10	0.0	0.031	9.8	LOS A	0.1	0.7	0.91	1.23	51.5
Approach		274	0.0	0.393	15.9	LOS C	1.7	11.9	0.96	1.36	47.7
North: Egret Street											
7	L2	9	0.0	0.108	27.9	LOS D	0.4	2.7	1.00	1.25	41.3
8	T1	10	0.0	0.108	28.4	LOS D	0.4	2.7	1.00	1.25	41.4
9	R2	1	0.0	0.108	27.9	LOS D	0.4	2.7	1.00	1.25	41.3
Approach		20	0.0	0.108	28.1	LOS D	0.4	2.7	1.00	1.25	41.3
West: N2 to George											
10	L2	1	0.0	0.380	15.8	LOS C	1.6	11.3	0.96	1.36	48.2
11	T1	351	0.0	0.610	20.5	LOS C	3.4	24.0	0.99	1.47	45.0
12	R2	19	0.0	0.056	9.9	LOS A	0.2	1.3	0.90	1.24	51.5
Approach		371	0.0	0.610	19.9	LOS C	3.4	24.0	0.98	1.46	45.3
All Vehicles		781	0.0	0.610	19.1	LOS C	3.4	24.0	0.97	1.40	45.8

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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SIDRA
INTERSECTION 6

MOVEMENT SUMMARY

 Site: 01am2016fu

N2 / Egret Street
AM Peak Hour
2016
Stop (All-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Makou Street											
1	L2	53	0.0	0.460	26.7	LOS D	2.1	14.9	0.99	1.41	41.8
2	T1	42	0.0	0.460	27.2	LOS D	2.1	14.9	0.99	1.41	41.9
3	R2	51	0.0	0.460	26.7	LOS D	2.1	14.9	0.99	1.41	41.9
Approach		146	0.0	0.460	26.9	LOS D	2.1	14.9	0.99	1.41	41.9
East: N2 to Knysna											
4	L2	16	0.0	0.470	20.1	LOS C	2.2	15.4	0.99	1.41	45.6
5	T1	259	0.0	0.470	20.3	LOS C	2.2	15.4	1.00	1.41	45.1
6	R2	36	0.0	0.130	11.9	LOS B	0.5	3.2	0.95	1.26	50.1
Approach		311	0.0	0.470	19.4	LOS C	2.2	15.4	0.99	1.39	45.6
North: Egret Street											
7	L2	62	0.0	0.569	29.5	LOS D	3.0	21.1	1.00	1.49	40.5
8	T1	63	0.0	0.569	30.0	LOS D	3.0	21.1	1.00	1.49	40.6
9	R2	70	0.0	0.569	29.6	LOS D	3.0	21.1	1.00	1.49	40.6
Approach		195	0.0	0.569	29.7	LOS D	3.0	21.1	1.00	1.49	40.6
West: N2 to George											
10	L2	34	0.0	0.517	23.2	LOS C	2.6	17.9	1.00	1.44	43.9
11	T1	365	0.0	0.830	40.4	LOS E	6.9	48.4	1.00	1.76	36.1
12	R2	20	0.0	0.072	10.9	LOS B	0.2	1.7	0.94	1.24	50.8
Approach		419	0.0	0.830	37.6	LOS E	6.9	48.4	1.00	1.71	37.1
All Vehicles		1071	0.0	0.830	29.4	LOS D	6.9	48.4	0.99	1.54	40.6

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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INTERSECTION 6

MOVEMENT SUMMARY



Site: 01am2021fu - Conversion

N2 / Egret Street

AM Peak Hour

2021

Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Makou Street											
1	L2	62	0.0	0.251	15.9	LOS B	2.7	19.0	0.68	0.70	47.4
2	T1	45	0.0	0.251	10.4	LOS B	2.7	19.0	0.68	0.70	48.5
3	R2	60	0.0	0.251	15.9	LOS B	2.7	19.0	0.68	0.70	47.5
Approach		167	0.0	0.251	14.4	LOS B	2.7	19.0	0.68	0.70	47.7
East: N2 to Knysna											
4	L2	18	0.0	0.243	18.6	LOS B	2.9	20.1	0.76	0.63	47.8
5	T1	303	0.0	0.243	13.1	LOS B	2.9	20.3	0.76	0.62	49.1
6	R2	38	0.0	0.125	22.4	LOS C	0.8	5.4	0.82	0.72	42.8
Approach		359	0.0	0.243	14.4	LOS B	2.9	20.3	0.76	0.63	48.3
North: Egret Street											
7	L2	63	0.0	0.294	16.2	LOS B	3.3	23.0	0.70	0.70	47.5
8	T1	65	0.0	0.294	10.6	LOS B	3.3	23.0	0.70	0.70	48.6
9	R2	70	0.0	0.294	16.2	LOS B	3.3	23.0	0.70	0.70	47.6
Approach		198	0.0	0.294	14.3	LOS B	3.3	23.0	0.70	0.70	47.9
West: N2 to George											
10	L2	34	0.0	0.268	18.8	LOS B	3.2	22.4	0.77	0.65	47.5
11	T1	427	0.0	0.430	13.8	LOS B	5.5	38.8	0.80	0.67	48.6
12	R2	23	0.0	0.060	19.4	LOS B	0.4	2.9	0.74	0.69	44.4
Approach		484	0.0	0.430	14.5	LOS B	5.5	38.8	0.80	0.67	48.3
All Vehicles		1208	0.0	0.430	14.4	LOS B	5.5	38.8	0.76	0.67	48.2

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	53	14.5	LOS B	0.1	0.1	0.76	0.76	
P2	East Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88	
P3	North Full Crossing	53	14.5	LOS B	0.1	0.1	0.76	0.76	
P4	West Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88	
All Pedestrians		211	16.9	LOS B			0.82	0.82	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 01am2021fu

N2 / Egret Street
AM Peak Hour
2021
Stop (All-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Makou Street											
1	L2	62	0.0	0.543	30.8	LOS D	2.8	19.5	1.00	1.47	40.0
2	T1	45	0.0	0.543	31.3	LOS D	2.8	19.5	1.00	1.47	40.1
3	R2	60	0.0	0.543	30.9	LOS D	2.8	19.5	1.00	1.47	40.0
Approach		167	0.0	0.543	31.0	LOS D	2.8	19.5	1.00	1.47	40.0
East: N2 to Knysna											
4	L2	18	0.0	0.541	22.9	LOS C	2.8	19.4	1.00	1.47	44.1
5	T1	303	0.0	0.541	23.3	LOS C	2.8	19.4	1.00	1.46	43.5
6	R2	38	0.0	0.136	11.9	LOS B	0.5	3.3	0.95	1.26	50.1
Approach		359	0.0	0.541	22.0	LOS C	2.8	19.4	0.99	1.44	44.2
North: Egret Street											
7	L2	63	0.0	0.611	33.1	LOS D	3.4	24.1	1.00	1.54	39.0
8	T1	65	0.0	0.611	33.6	LOS D	3.4	24.1	1.00	1.54	39.1
9	R2	70	0.0	0.611	33.2	LOS D	3.4	24.1	1.00	1.54	39.0
Approach		198	0.0	0.611	33.3	LOS D	3.4	24.1	1.00	1.54	39.0
West: N2 to George											
10	L2	34	0.0	0.586	26.5	LOS D	3.2	22.2	1.00	1.50	42.2
11	T1	427	0.0	0.940	54.4	LOS F	10.1	70.4	1.00	1.99	31.7
12	R2	23	0.0	0.081	11.0	LOS B	0.3	1.9	0.94	1.25	50.7
Approach		484	0.0	0.940	50.4	LOS F	10.1	70.4	1.00	1.92	32.9
All Vehicles		1208	0.0	0.940	36.5	LOS E	10.1	70.4	1.00	1.65	37.6

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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SIDRA
INTERSECTION 6

MOVEMENT SUMMARY

 Site: 01pm2015ex

N2 / Egret Street
PM Peak Hour
2015
Stop (All-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Makou Street											
1	L2	42	0.0	0.266	22.7	LOS C	1.0	7.2	0.96	1.31	43.9
2	T1	3	0.0	0.266	23.2	LOS C	1.0	7.2	0.96	1.31	44.0
3	R2	33	0.0	0.266	22.7	LOS C	1.0	7.2	0.96	1.31	43.9
Approach		78	0.0	0.266	22.7	LOS C	1.0	7.2	0.96	1.31	43.9
East: N2 to Knysna											
4	L2	67	0.0	0.509	19.0	LOS C	2.5	17.4	0.97	1.44	46.1
5	T1	297	0.0	0.509	19.1	LOS C	2.5	17.5	0.98	1.44	45.7
6	R2	6	0.0	0.018	9.4	LOS A	0.1	0.4	0.89	1.21	51.7
Approach		370	0.0	0.509	19.0	LOS C	2.5	17.5	0.98	1.44	45.9
North: Egret Street											
7	L2	12	0.0	0.157	29.2	LOS D	0.6	4.0	1.00	1.27	40.7
8	T1	16	0.0	0.157	29.7	LOS D	0.6	4.0	1.00	1.27	40.8
9	R2	1	0.0	0.157	29.2	LOS D	0.6	4.0	1.00	1.27	40.7
Approach		29	0.0	0.157	29.4	LOS D	0.6	4.0	1.00	1.27	40.7
West: N2 to George											
10	L2	3	0.0	0.312	13.6	LOS B	1.2	8.7	0.94	1.33	49.6
11	T1	311	0.0	0.501	16.0	LOS C	2.4	17.0	0.95	1.40	47.6
12	R2	53	0.0	0.145	10.6	LOS B	0.5	3.5	0.90	1.26	50.9
Approach		367	0.0	0.501	15.2	LOS C	2.4	17.0	0.95	1.38	48.0
All Vehicles		844	0.0	0.509	18.1	LOS C	2.5	17.5	0.96	1.40	46.4

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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SIDRA
INTERSECTION 6

MOVEMENT SUMMARY

 Site: 01pm2016fu

N2 / Egret Street
PM Peak Hour
2016
Stop (All-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Makou Street											
1	L2	44	0.0	0.476	30.6	LOS D	2.2	15.7	1.00	1.41	40.0
2	T1	52	0.0	0.476	31.1	LOS D	2.2	15.7	1.00	1.41	40.1
3	R2	34	0.0	0.476	30.6	LOS D	2.2	15.7	1.00	1.41	40.1
Approach		130	0.0	0.476	30.8	LOS D	2.2	15.7	1.00	1.41	40.1
East: N2 to Knysna											
4	L2	70	0.0	0.579	23.2	LOS C	3.1	21.8	1.00	1.50	43.8
5	T1	309	0.0	0.579	23.6	LOS C	3.1	21.8	1.00	1.50	43.3
6	R2	55	0.0	0.177	12.0	LOS B	0.6	4.4	0.94	1.27	50.0
Approach		434	0.0	0.579	22.1	LOS C	3.1	21.8	0.99	1.47	44.1
North: Egret Street											
7	L2	41	0.0	0.432	27.6	LOS D	1.9	13.6	0.99	1.39	41.4
8	T1	45	0.0	0.432	28.1	LOS D	1.9	13.6	0.99	1.39	41.5
9	R2	39	0.0	0.432	27.7	LOS D	1.9	13.6	0.99	1.39	41.4
Approach		125	0.0	0.432	27.8	LOS D	1.9	13.6	0.99	1.39	41.4
West: N2 to George											
10	L2	69	0.0	0.453	18.9	LOS C	2.1	14.6	0.99	1.40	46.1
11	T1	323	0.0	0.728	29.6	LOS D	5.0	35.0	1.00	1.63	40.4
12	R2	55	0.0	0.176	11.9	LOS B	0.6	4.4	0.94	1.27	50.1
Approach		447	0.0	0.728	25.8	LOS D	5.0	35.0	0.99	1.55	42.2
All Vehicles		1136	0.0	0.728	25.2	LOS D	5.0	35.0	0.99	1.49	42.6

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY



Site: 01pm2021fu - Conversion

N2 / Egret Street

PM Peak Hour

2021

Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Makou Street											
1	L2	51	0.0	0.205	15.7	LOS B	2.3	16.0	0.67	0.67	48.0
2	T1	53	0.0	0.205	10.1	LOS B	2.3	16.0	0.67	0.67	49.0
3	R2	40	0.0	0.205	15.7	LOS B	2.3	16.0	0.67	0.67	48.0
Approach		144	0.0	0.205	13.6	LOS B	2.3	16.0	0.67	0.67	48.4
East: N2 to Knysna											
4	L2	82	0.0	0.337	19.2	LOS B	4.1	28.7	0.79	0.70	46.6
5	T1	361	0.0	0.337	13.6	LOS B	4.2	29.2	0.79	0.67	48.5
6	R2	56	0.0	0.182	22.7	LOS C	1.2	8.1	0.83	0.74	42.6
Approach		499	0.0	0.337	15.5	LOS B	4.2	29.2	0.79	0.68	47.4
North: Egret Street											
7	L2	43	0.0	0.188	15.6	LOS B	2.0	14.3	0.66	0.66	48.0
8	T1	48	0.0	0.188	10.0	LOS B	2.0	14.3	0.66	0.66	49.1
9	R2	39	0.0	0.188	15.6	LOS B	2.0	14.3	0.66	0.66	48.1
Approach		130	0.0	0.188	13.5	LOS B	2.0	14.3	0.66	0.66	48.4
West: N2 to George											
10	L2	69	0.0	0.261	18.7	LOS B	3.1	21.5	0.76	0.68	46.8
11	T1	378	0.0	0.419	13.8	LOS B	5.4	37.6	0.80	0.68	48.5
12	R2	64	0.0	0.193	21.9	LOS C	1.3	9.0	0.81	0.74	43.1
Approach		511	0.0	0.419	15.5	LOS B	5.4	37.6	0.80	0.69	47.5
All Vehicles		1284	0.0	0.419	15.1	LOS B	5.4	37.6	0.77	0.68	47.7

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	53	14.5	LOS B	0.1	0.1	0.76	0.76	
P2	East Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88	
P3	North Full Crossing	53	14.5	LOS B	0.1	0.1	0.76	0.76	
P4	West Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88	
All Pedestrians		211	16.9	LOS B			0.82	0.82	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 01pm2021fu

N2 / Egret Street
PM Peak Hour
2021
Stop (All-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Makou Street											
1	L2	51	0.0	0.537	33.9	LOS D	2.7	19.1	1.00	1.46	38.6
2	T1	53	0.0	0.537	34.4	LOS D	2.7	19.1	1.00	1.46	38.7
3	R2	40	0.0	0.537	34.0	LOS D	2.7	19.1	1.00	1.46	38.7
Approach		144	0.0	0.537	34.1	LOS D	2.7	19.1	1.00	1.46	38.7
East: N2 to Knysna											
4	L2	82	0.0	0.672	28.6	LOS D	4.2	29.3	1.00	1.61	41.1
5	T1	361	0.0	0.672	29.3	LOS D	4.2	29.3	1.00	1.61	40.6
6	R2	56	0.0	0.178	11.9	LOS B	0.6	4.5	0.94	1.27	50.0
Approach		499	0.0	0.672	27.2	LOS D	4.2	29.3	0.99	1.57	41.6
North: Egret Street											
7	L2	43	0.0	0.470	30.1	LOS D	2.2	15.5	1.00	1.41	40.3
8	T1	48	0.0	0.470	30.6	LOS D	2.2	15.5	1.00	1.41	40.4
9	R2	39	0.0	0.470	30.1	LOS D	2.2	15.5	1.00	1.41	40.3
Approach		130	0.0	0.470	30.3	LOS D	2.2	15.5	1.00	1.41	40.3
West: N2 to George											
10	L2	69	0.0	0.509	20.8	LOS C	2.5	17.5	1.00	1.44	45.1
11	T1	378	0.0	0.816	36.8	LOS E	6.8	47.3	1.00	1.78	37.5
12	R2	64	0.0	0.201	12.3	LOS B	0.7	5.1	0.94	1.28	49.8
Approach		511	0.0	0.816	31.5	LOS D	6.8	47.3	0.99	1.67	39.6
All Vehicles		1284	0.0	0.816	30.0	LOS D	6.8	47.3	0.99	1.58	40.3

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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APPENDIX C

SITE DEVELOPMENT PLANS

