

REPORT N° 19447

TRAFFIC IMPACT ASSESSMENT

CLAYVILLE EXTENSIONS 50 AND 71

NOVEMBER 2015

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CLAYVILLE EXTENSIONS 50 AND 71

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It is herewith certified that this Traffic Impact Assessment has been prepared according to requirements of the South African Traffic Impact and Site Traffic Assessment Manual.

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GDRT	Gauteng Provincial Department of Roads and Transport
EMM	Ekurhuleni Metropolitan Municipality
COTO	Committee of Transport Officials
GLA	Gross Leasable Area
LOS	Level of Service
LVO	Low Vehicle Ownership
MUD	Mixed Use Development
SDP	Site Development Plan
SEC	Seconds
SIDRA	Micro-analytical traffic evaluation
TMH	Technical Methods for Highways
V/C	Volume/Capacity ratio
VPH	Vehicles per hour
VLVO	Very Low Vehicle Ownership

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INTRODUCTION

1.1

BACKGROUND

WSP Group Africa (Pty) Ltd. (WSP) has been appointed by Valumax Midrand (Pty) Ltd to undertake a Traffic Impact Assessment for the proposed township developments known as Clayville Extensions 50 and 71. Clayville Extension 50 will be situated on the Remainder of Portion 183 and Portions 30 and 31 of the farm Olifantsfontein 410 JR. Clayville Extension 71 will be situated on Portion 207 (a Portion of Portion 183) of the farm Olifantsfontein 410 JR.

The proposed township developments are bounded by the farm Olifantsfontein 410 JR to the north, Dale Road to the south Clayville Extension 45 Township to the east and Glen Austin Agricultural Holdings to the west. The proposed township developments are within Region B of the northern planning region of the Ekurhuleni Metropolitan Municipality (EMM).

The site is currently undeveloped. The proposed township locality and the surrounding road network are indicated on **Figures 1** and **2**. The purpose of this traffic impact assessment is to illustrate the proposed developments impact on the surrounding road network and possible mitigation of the anticipated traffic impact. This report also comments on the proposed site accesses and non-motorised and public transport aspects.

Clayville Extensions 50 and 71 together with Clayville Extension 45 form the Clayville/Tembisa Mega Housing Development as announced by the Premier and MEC of Human Settlements and it will assist government to alleviate the critical housing shortage in the Tembisa area in EMM. The funding for the road network and intersection upgrades will be provided by EMM.

1.2

EXTENT OF THE DEVELOPMENT

According to the information provided by the town planner, Clayville Extensions 50 and 71 will comprise of the following land-uses and development extents as shown on **Table 1**. The trips generated and anticipated by the proposed filling station (4% to 6%) are already included in the traffic generated by the residential and business nodes. The trips generated from the proposed crèche/church and clinic/library nodes fall outside the AM and PM peak hours, therefore they have not been included in this traffic assessment. The site development plan and the schedule of rights are contained in **Appendix A-1**.

Table 1a: Development Extent for Clayville Extension 50

ZONING	EXTENT
Residential 1	595 units
Residential 2	1683 units
Residential 4	2833 units
Business 2	1.63 hectares
Business 3	2.56 hectares
Community Facility (Secondary School)	1200 students
Community Facility (Creche/Church)	3 stands
Social Services (Clinic/Library)	3 stands

Table 1b: Development Extent for Clayville Extension 71

ZONING	EXTENT
Residential 2	2220 units
Residential 4	3814 units
Business 2	4.33 hectares
Community Facility (Primary School)	1200 students
Public Garage (Filling Station)	1 stand
Community Facility (Creche/Church)	7 stands
Social Services (Clinic/Library)	2 stands

1.3 PHASING OF THE DEVELOPMENT

This report presents the traffic impact assessment for the ultimate township establishment of Clayville Extensions 50 and 71. Clayville Extension 50 will not be phased and will only be developed after the development Clayville Extension 71.

Clayville Extension 71 will be phased as follows:

- Phase 1: 749 units (434 residential 2 and 315 residential 4)
- Phase 2: 1295 units (523 residential 2 and 772 residential 4)
- Phase 3: 742 units (480 residential 2 and 262 residential 4)
- Phase 4: 1186 units (274 residential 2 and 912 residential 4) and a public primary school
- Phase 5: 1054 units (257 residential 2 and 797 residential 4)
- Phase 6: 1008 units (252 residential 2 and 756 residential 4) and shopping centre (business 2)

1.4 APPROVAL OF SUBMISSION

This traffic impact assessment report will be subject approval by the relevant roads authorities listed below:

- à Gauteng Provincial Department of Roads and Transport (GDRT)
- à Ekurhuleni Metropolitan Municipality (EMM)

2 DATA COLLECTION

2.1 SITE VISIT

During February 2015 a site visit was undertaken for this study and the following was confirmed:

- à Layouts of intersections considered in the study
- à Appropriateness of recommended site access
- à Intersection control for relevant intersections
- à Presence of existing public transport and non-motorised transport facilities

2.2 TRAFFIC COUNT DATA

Traffic counts were used to estimate the traffic demand and traffic volumes for the proposed development. A traffic count was commissioned by WSP on Thursday 5th February 2015 at the following intersections:

- à Olifantsfontein Road (R562)/Olifantsfontein Road
- à Olifantsfontein Road (R562)/Main Road (Future K111)
- à Main Road (Future K111)/Thabana Ntlenyana Drive
- à Main Road (Future K111)/Riverside Street
- à Main Road (Future K111)/Karee Street
- à Dale Road/Archerfish Drive
- à Dale Road/Modderfontein Road
- à Dale Road/Old Pretoria Road

The existing 2015 peak hour traffic volumes are presented in **Figure 3**.

2.3 LATENT DEVELOPMENTS

Several latent developments are situated within the study area (refer to **Figures 4a, 4b, 4c, 4d, 4e and 4f**). The following developments were considered as latent developments in this study:

CLAVILLE EXTENSIONS 52 & 66

A traffic study for the proposed development known as Clayville Extensions 52 & 66 was undertaken by E.D.S Transportation Engineers. The development is for the following rights:

- à 85 000m² GLA of Shopping Centre;
- à 34 000m² GLA of Offices;
- à 11 000m² GLA of Motor Dealership

The latent development is expected to fully realise by the year 2020 and the latent trips were taken into consideration in this traffic study.

TEMBISA EXTENSION 25

A traffic study for the proposed development known as Tembisa Extension 25 was undertaken by GIBB Consulting Engineers. The development is for the following rights:

- à 1 555 Residential Units with subservient land uses

The latent development is expected to fully realise by the year 2025. For this traffic study, it has been assumed that 50% of the latent trips of Tembisa Extension 25 will be on the road network by the year 2020.

REMAINDER OF PORTION 122 OF THE FARM OLIFONSTFONTEIN 402-JR

A traffic study for the proposed industrial development on Remainder of Portion 122 of the farm Olifantsfontein 402-JR was undertaken by E.D.S Transportation Engineers. The development is for the following rights:

- à 43 385m² GLA of Industrial Development

The latent development is expected to fully realise by the year 2018 and the latent trips were taken into consideration in this traffic study.

STERKFONTein EXTENSION 12

A traffic study for the proposed development known as Sterkfontein Extension 12 was undertaken by E.D.S Transportation Engineers. The development is for the following rights:

- à 349 622m² GLA of Warehousing and Distribution Centre

The latent development is expected to fully realise by the year 2024. For this traffic study, it has been assumed that 60% of the latent trips of Sterkfontein Extension 12 will be on the road network by the year 2020.

CLAYVILLE EXTENSION 45

A traffic study for the proposed development known as Clayville Extension 45 was undertaken by WSP Traffic and Transportation Engineers. The development is for the following rights:

- à 4763m² GLA of Shopping Centre
- à 389 Residential Units (single dwelling units)
- à 440 Residential Units (apartments and flats)
- à 1 Public Primary School (1200 students)
- à 1 Public Secondary School (1200 students)

The latent development is expected to fully realise by the year 2020 and the latent trips were taken into consideration in this traffic study.

3 SURROUNDING ROAD NETWORK & STUDY AREA

3.1 ROAD NETWORK & MASTER PLANNING

MUNICIPAL PLANNING

The local roads will include proposed accesses from the provincial roads through the proposed development. The road network planning is contained in **Appendix A-2**.

PROVINCIAL AND NATIONAL PLANNING

- Planned K111: Provincial dual carriageway road, K111 is planned on the existing Main Road alignment. The existing Main Road is currently operating at capacity. Therefore the planned K111 road will mitigate capacity constraints in the future.
- Planned K109: Provincial dual carriageway road, K109 is planned adjacent to the proposed development. The planned K109 will run in a north south direction and will connect Olifantsfontein Road (R562) to Dale Road/Archerfish Road. Two access points will be provided off the K109 to the proposed development.
- Planned PWV5: Provincial Class 1 freeway which is planned to run in the east west direction passing the north of the proposed Clayville Extension 50 township.

The 2010 Gauteng Major Road Network is contained in **Appendix A-2**.

3.2 SURROUNDING ROAD NETWORK

The following roads in the vicinity of the proposed development are regarded as relevant to this study and are discussed in detail below:

- à **Olifantsfontein Road (R562):** This is a Class 2 dual carriageway road located to the north of the site which provides a link between the R101 and the R21 national freeway.
- à **Olifantsfontein Road:** This is a Class 2 single carriageway road located to the north of the site which provides a link between the R101 and the R562.
- à **Main Road (Future K111):** This is a Class 3 single carriageway road which runs in a north - south direction pass the east boundary of the site.
- à **Dale Road:** This is a Class 3 road located to the west of the site; this road follows a north - south west alignment.
- à **Allan Road/Modderfontein Road:** This is a Class 3 road located to the west of the site; this road follows a north - south east alignment.

3.3 DETERMINATION OF THE STUDY AREA

In determining the site area TMH 16 volume 1 recommends the following:

- à *“Class 4 and 5 roads in the vicinity of the development up to the first Class 1 to 3 roads that can be reached by the Class 4 and 5 road network from the development, up to and including the first connection(s) on the Class 1 to 3 roads.*

- à *The elements shall be restricted to those within a maximum distance of 1.5km from the accesses to the site, measured along the shortest routes to the accesses, provided that there is at least one intersection within this distance. Where there is no such intersection, the distance will be extended to include at least one intersection.”*

TMH 16 also states that judgement should be used in selecting the intersections considered and therefore specific elements like extent of the development were also considered. A larger development will by its nature require a wider study area to be considered while for a smaller development the opposite will be true.

4 SITE ACCESS

4.1 SITE ACCESS

It is proposed that the development be served by two primary accesses off the planned future K109 route. The secondary access to the proposed development is off Main Road (planned future K111 route) and Thabana Ntlenyana Drive. Furthermore a future access is planned 500m north from the K111/Thabana Ntlenyana Drive intersection. The proposed access positions are shown on drawing **SKC001** and **SKC002** contained in **Appendix A-2**.

5

EXISTING TRAFFIC VOLUMES

5.1 GENERAL

From the traffic count a common peak hour was determined (the busiest hour) for each counted period and was found to be:

à Weekday AM peak hour	06:45 – 07:45
à Weekday PM peak hour	16:30 – 17:30

The existing 2015 peak hour traffic volumes are shown on **Figure 3**. The following subheadings provide a brief overview of the existing intersections.

5.2 OLIFANTSFONTEIN ROAD (R562)/OLIFANTSFONTEIN ROAD INTERSECTION

This intersection is currently an all-way stop control and has an overall LOS F during the AM and PM peak hours. Long queues and high levels of delay have been observed on site on the west and east approaches during both peak hours. Traffic counts have revealed that Olifantsfontein Road (R562) has in the order of 2460vph and 2800vph during the AM and PM peak hours respectively (in and outbound). Therefore Olifantsfontein Road (R562) has approximately 50% of capacity available.

5.3 OLIFANTSFONTEIN ROAD (R562)/MAIN ROAD (FUTURE K111) INTERSECTION

This intersection is signalised and has an overall LOS F and LOS B during the AM and PM peak hours respectively. Long queues and high levels of delay have been observed on site on the south and west approaches during the AM peak hour. Traffic counts have revealed that Main Road has in the order of 1560vph and 1160vph during the AM and PM peak hours respectively (in and outbound). Therefore Main Road is currently operating at capacity.

5.4 MAIN ROAD (FUTURE K111)/THABANA NTLENYANA DRIVE INTERSECTION

This intersection is currently a two-way stop control and has the worst LOS F for the west approach, right turn movement for both the AM and PM peak hours. The west approach, left turn movement has a LOS B and all other movements have LOS A during both the AM and PM peak hours. Long queues and high levels of delay have been observed on site on the west approach during both peak hours. Thabana Ntlenyana Drive provides access to Clayville Extension 45. Traffic from Kaalfontein (township south of Clayville Extension 45) has been observed using this road for access via Main Road.

5.5 MAIN ROAD (FUTURE K111)/RIVERSIDE STREET INTERSECTION

This intersection is currently a two-way stop control and has the worst LOS F for the east approach during both the AM and PM peak hours. All other approaches have LOS A, LOS B or LOS D for the AM and PM peak hours. Long queues and high levels of delay have been observed on site on the west approach during both peak hours. Traffic from Ivory Park and Tembisa Township has been observed using Riverside Street for access via Main Road.

5.6 MAIN ROAD (FUTURE K111)/KAREE STREET INTERSECTION

This intersection is signalised and has an overall LOS F during the AM and PM peak hours. Long queues and high levels of delay have been observed on site on the north, west and east approaches during both peak hours.

Traffic from Ivory Park and Tembisa Township has been observed using Riverside Street for access via Main Road.

5.7 DALE ROAD/ARCHERFISH DRIVE INTERSECTION

This intersection is currently a two-way stop control and has the worst LOS F for the east approach during the PM peak hour. Long queues and high levels of delay have been observed on site on the east approach during the PM peak hour. Traffic counts have revealed that Dale Road has in the order of 1470vph and 1195vph during the AM and PM peak hours respectively (in and outbound). Therefore Dale Road is currently operating close to capacity.

5.8 DALE ROAD/MODDERFONTEIN ROAD INTERSECTION

This intersection is signalised and has an overall LOS F and LOS C during the AM and PM peak hours respectively. Long queues and high levels of delay have been observed on site on the north and west approaches during the AM peak hour.

5.9 DALE ROAD/OLD PRETORIA ROAD INTERSECTION

This intersection is signalised and has an overall LOS B during both the AM and PM peak hours. Site observations confirm that queuing and delays related to normal traffic conditions are nominal.

6

DEVELOPMENT TRIP GENERATION AND TRAFFIC VOLUME SCENARIOS

6.1 ADJUSTMENT FACTORS

Various trip adjustment factors have been introduced into the COTO document to allow for trip reductions. These adjustment factors are discussed briefly below.

MIXED USE DEVELOPMENTS (MUD)

According to the COTO manual “mixed use developments are defined as developments in an area that consist of two or more single-use developments between which trips can be made by means of non-motorised modes of transport (such as walking). This has the net effect of reducing the vehicle trip generation in the area.”

Since this development will consist of a mixed land use, the reduction factors which have been applied are listed in **Table 2** below. Note, P_m = Reduction factor for mixed-use development.

LOW VEHICLE OWNERSHIP (LVO) & VERY LOW VEHICLE OWNERSHIP (VLVO)

According to COTO “the vehicle ownership in areas with high levels of vehicle ownership varies between one or two per household. In areas with a low level of vehicle ownership, the majority of households (more than 50%) does not own a vehicle and relies on public transport for transportation. In areas with very low level of vehicle ownership, nearly all households (more than 90%) do not own a vehicle and rely on public transportation.”

This study considered low to very low vehicle ownership and the reduction factors which have been applied are listed in **Table 2** below. Note, P_v = Reduction factor for vehicle ownership.

TRANSIT NODE OR CORRIDORS

According to COTO “the transit reduction factors are applicable to developments that are located within a reasonable walking distance from a major transit node or stops on a major transit corridor.”

This study considered transit nodes and a 15% reduction factor has been applied for all land uses as recommended in the COTO manual. See **Table 2** below. Note, P_t = Reduction factor for transit nodes or corridors.

Table 2: Adjustment Factors Applied for Trip Reductions

TRIP CODE	P_m	P_v	P_t
Shopping Centre	10%	40%	15%
Residential 1 (single dwelling units)	0%	30%	15%
Residential 2 (single dwelling units)	0%	40%	15%
Apartments & Flats	0%	50%	15%
Offices	5%	40%	15%
Public Primary School	0%	60%	15%
Public Secondary School	0%	60%	15%

6.2 TRIP SUMMARY

The detailed trip generation calculations are included in **Appendix C-1**. Using the COTO document the expected peak hour trip generation for the proposed development was calculated and indicated in **Table 3** below.

Table 3: Development Generated Trips (Clayville Extensions 50 and 71)

TMH 17 CODE	LAND USE	EXTENT	AM PEAK			PM PEAK		
			In	Out	Total	In	Out	Total
820	Shopping Centre	16300m ² GLA	60	32	93	262	262	524
820	Shopping Centre	43300m ² GLA	112	60	173	489	489	979
210	Res 1 Single Dwelling Units	595 Units	89	266	354	248	106	354
231	Res 2 Single Dwelling Units	3903 Units	423	1269	1692	1184	508	1692
220	Apartments and Flats	6647 Units	459	1377	1836	1285	551	1836
520	Public Primary School	1200 Students	173	173	347	61	61	122
530	Public Secondary School	1200 Students	153	153	306	51	51	102
TOTAL TRIPS			1691	3370	5061	3634	2237	5870

The TMH 16 Volume 1 document requires that a traffic impact assessment be done for developments which generate more than 50 peak hour trips.

6.3 GROWTH RATE

TMH 16 Volume 1 requires that a five year horizon be considered for developments that generate more than 50 trips. TMH 17 recommends growth rates for developments as shown in **Table 4**

Table 4: Typical Traffic Growth Rates

DEVELOPMENT AREA	GROWTH RATES
Low growth areas	0 – 3%
Average growth areas	3 – 4%
Above average growth areas	4 – 6%
Fast growing areas	6 – 8%
Exceptionally high growth areas	>8%

A growth rate of 3% was considered appropriate for this study

6.4 TRAFFIC VOLUME SCENARIOS

The existing 2015 peak hour traffic volumes (see **Figure 3**) were thus subjected to a 3% growth rate over five years; this is in line with an above average growth rate as given in **Table 4** above. The 2020 background peak hour traffic volumes are presented on **Figure 5**. The 2020 background plus total latent rights peak hour traffic volumes are presented on **Figure 6**.

6.5 TRIP DISTRIBUTION AND ASSIGNMENT

Assumptions with respect to the expected trip distribution were based on the location of the site access in relation to the surrounding road network; the existing traffic volumes, travel patterns as well as the land use nature of the proposed development.

The expected trip distribution and development generated traffic of the proposed development can be seen on **Figure 7** and **Figure 8** respectively. The 2020 background plus total latent rights plus development generated peak hour traffic volumes are presented on **Figure 9**.

7

TRAFFIC IMPACT AND CAPACITY ANALYSIS

7.1 SCENARIOS ANALYSED

The AM and PM peak hour trip generation of the development was analysed. The critical peak hour analysis was considered for the following scenarios:

- à Scenario 1: 2020 background plus latent rights peak hour traffic volumes
- à Scenario 2: 2020 background plus latent rights plus development generated peak hour traffic volumes
- à Scenario 3: 2020 background plus latent rights plus development generated peak hour traffic volumes (with upgrades)

This is in line with TMH16 document requirement for scenarios to be considered in a traffic impact assessment.

7.2 CAPACITY ANALYSIS

7.2.1 Olifantsfontein Road (R562)/Olifantsfontein Road Intersection

Scenario 1: 2020 Background plus Latent Rights Peak Hour Traffic Volumes

The SIDRA analysis results indicate that the existing intersection will further perform at a worse level of service with increased queuing and delays. The summary of the SIDRA intersection results are contained in **Table 5a**.

Table 5a: Summary of SIDRA Intersection Capacity Analysis Results**Olifantsfontein Road (R562) & Olifantsfontein Road Intersection, Scenario 1**

CONTROL: STOP (ALL-WAY)

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	1.202	267.5	F	2.571	1471.7	F
	THROUGH	1.202	268.1	F	2.571	1472.3	F
	RIGHT	1.202	267.7	F	2.571	1471.9	F
	APPROACH	1.202	267.7	F	2.571	1471.9	F
WEST BOUND	LEFT	1.868	822.8	F	1.420	436.0	F
	THROUGH	2.541	1421.1	F	3.357	2153.6	F
	RIGHT	2.541	1422.3	F	3.357	2154.7	F
	APPROACH	2.541	1265.3	F	3.357	1864.2	F
SOUTH BOUND	LEFT	0.001	8.1	A	0.000	8.1	A
	THROUGH	0.001	8.7	A	0.000	8.7	A
	RIGHT	0.001	8.2	A	0.000	8.2	A
	APPROACH	0.001	8.3	A	0.000	8.4	A
EAST BOUND	LEFT	2.415	1304.7	F	2.786	1638.8	F
	THROUGH	2.415	1305.2	F	2.786	1639.3	F
	RIGHT	1.021	130.3	F	1.120	196.3	F
	APPROACH	2.415	1107.7	F	2.786	1407.1	F
ALL VEHICLES		2.541	1113.1	F	3.357	1626.5	F

Scenario 2: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes

It is evident that the proposed development generated trips added onto the congested intersection will cause further queuing and delays unless upgrades are undertaken. The summary of the SIDRA intersection results are contained in **Table 5b**.

Table 5b: Summary of SIDRA Intersection Capacity Analysis Results

Olifantsfontein Road (R562) & Olifantsfontein Road Intersection, Scenario 2

CONTROL: STOP (ALL-WAY)

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	1.265	319.8	F	2.803	1683.3	F
	THROUGH	1.256	230.4	F	2.803	1683.9	F
	RIGHT	1.265	319.9	F	2.803	1683.4	F
	APPROACH	1.265	319.9	F	2.803	1683.4	F
WEST BOUND	LEFT	1.843	800.3	F	1.376	398.0	F
	THROUGH	2.852	1698.8	F	4.033	2759.5	F
	RIGHT	2.852	1700.0	F	4.033	2760.5	F
	APPROACH	2.852	1486.6	F	4.033	2427.2	F
SOUTH BOUND	LEFT	0.001	8.1	A	0.000	8.1	A
	THROUGH	0.001	8.7	A	0.000	8.7	A
	RIGHT	0.001	8.2	A	0.000	8.2	A
	APPROACH	0.001	8.3	A	0.000	8.4	A
EAST BOUND	LEFT	3.005	1833.0	F	3.221	2028.6	F
	THROUGH	3.005	1833.4	F	3.211	2029.1	F
	RIGHT	1.006	121.9	F	1.116	193.2	F
	APPROACH	3.005	1596.6	F	3.221	1768.7	F
ALL VEHICLES		3.005	3.005	F	4.033	2079.3	F

Scenario 3: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes (with upgrades)

Intersection upgrades have been conducted in this scenario and the SIDRA analysis results indicate that the intersection is expected to perform at an overall LOS B and LOS C during the AM and PM peak hours respectively.

The upgrades required at this intersection are as follows:

- The intersection is required to be signalised
- A dedicated right turn lane is required on the south approach
- A dedicated right turn lane (60m) is required on the south approach
- A shared through and left turn lane (30m) is required on the south approach
- An additional exit lane (60m) is required on the south approach
- A slip lane (60m) is required on the east approach
- A dedicated right turn lane (30m) is required on the east approach
- An additional right turn lane (60m) is required on the west approach

The summary of the SIDRA analysis results for the upgraded intersection are contained in **Table 5c**. Refer to drawing **SKC010** contained in **Appendix A-3**.

Table 5c: Summary of SIDRA Intersection Capacity Analysis Results**Olifantsfontein Road (R562) & Olifantsfontein Road Intersection, Scenario 3**

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.032	36.3	D	0.008	47.7	D
	THROUGH	0.032	30.7	C	0.008	42.2	D
	RIGHT	0.682	41.0	D	0.925	74.7	E
	APPROACH	0.682	40.8	D	0.925	74.6	E
WEST BOUND	LEFT	0.386	8.0	A	0.260	8.9	A
	THROUGH	0.695	12.6	B	0.916	32.7	C
	RIGHT	0.029	15.7	B	0.007	20.3	C
	APPROACH	0.695	11.5	B	0.916	29.3	C
SOUTH BOUND	LEFT	0.026	36.2	D	0.008	47.7	D
	THROUGH	0.026	30.7	C	0.008	42.2	D
	RIGHT	0.005	35.7	D	0.004	47.7	D
	APPROACH	0.026	34.3	C	0.008	45.9	D
EAST BOUND	LEFT	0.621	11.1	B	0.630	13.1	B
	THROUGH	0.621	5.5	A	0.630	7.2	A
	RIGHT	0.455	16.6	B	0.830	47.9	D
	APPROACH	0.621	7.0	A	0.830	13.0	B
ALL VEHICLES		0.695	11.5	B	0.925	27.0	C

7.2.2 Olifantsfontein Road (R562)/Main Road (Future K111) Intersection

Scenario 1: 2020 Background plus Latent Rights Peak Hour Traffic Volumes

The SIDRA analysis results indicate that the existing intersection will further perform at a worse level of service with increased queuing and delays. The summary of the SIDRA intersection results are contained in **Table 6a**.

Table 6a: Summary of SIDRA Intersection Capacity Analysis Results

Olifantsfontein Road (R562) & Main Road (Future K111), Scenario 1

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	2.169	1100.7	F	1.500	498.0	F
	THROUGH						
	RIGHT	2.169	1100.3	F	1.500	497.7	F
	APPROACH	2.169	1100.5	F	1.500	497.8	F
WEST BOUND	LEFT	1.095	129.4	F	0.617	22.1	C
	THROUGH	0.471	5.8	A	0.590	5.1	A
	RIGHT						
	APPROACH	1.095	47.3	D	0.617	8.2	A
EAST BOUND	LEFT						
	THROUGH	0.380	5.3	A	0.571	5.0	A
	RIGHT	2.354	1282.6	F	1.690	684.1	F
	APPROACH	2.354	469.0	F	1.690	108.0	F
ALL VEHICLES		2.354	464.8	F	1.690	113.9	F

Scenario 2: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes

It is evident that the proposed development generated trips added onto the congested intersection will cause further queuing and delays unless upgrades are undertaken. The summary of the SIDRA intersection results are contained in **Table 6b**.

Table 6b: Summary of SIDRA Intersection Capacity Analysis Results

Olifantsfontein Road (R562) & Main Road (Future K111), Scenario 2

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		PM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	2.558	1448.9	F	1.947	897.3	F
	THROUGH						
	RIGHT	2.558	1448.6	F	1.947	897.0	F
	APPROACH	2.558	1448.7	F	1.947	897.1	F
WEST BOUND	LEFT	1.107	138.3	F	0.712	17.9	B
	THROUGH	0.550	6.2	A	0.737	6.0	A
	RIGHT						
	APPROACH	1.107	50.5	D	0.737	8.6	A
EAST BOUND	LEFT						
	THROUGH	0.527	6.0	A	0.664	5.4	A
	RIGHT	2.768	1655.7	F	1.977	938.1	F
	APPROACH	2.768	492.6	F	1.977	131.0	F
ALL VEHICLES		2.768	563.8	F	1.977	171.7	F

Scenario 3: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes (with upgrades)

Intersection upgrades have been conducted in this scenario and the SIDRA analysis results indicate that the intersection is expected to perform at and overall LOS C during both the AM and PM peak hours. The Main Road is planned to become the Future K111 route and the additional through lanes were taken into account in this analysis.

The upgrades required at this intersection are as follows:

- A slip lane (70m) is required on the south approach
- An additional right turn lane on the south approach
- An additional exit lane on the south approach
- An additional right turn lane (120m) is required on the west approach

The summary of the SIDRA analysis results for the upgraded intersection are contained in **Table 6c**. Refer to drawing **SKC011** contained in **Appendix A-3**.

Table 6c: Summary of SIDRA Intersection Capacity Analysis Results

Olifantsfontein Road (R562) & Main Road (Future K111), Scenario 3

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.499	18.3	B	0.442	36.3	D
	THROUGH						
	RIGHT	0.942	59.3	E	0.870	63.1	E
	APPROACH	0.942	45.8	D	0.870	54.1	D
WEST BOUND	LEFT	0.564	9.2	A	0.475	11.3	B
	THROUGH	0.922	42.8	D	0.862	20.7	C
	RIGHT						
	APPROACH	0.922	31.6	C	0.862	18.7	B
EAST BOUND	LEFT						
	THROUGH	0.584	11.1	B	0.625	6.9	A
	RIGHT	0.890	39.8	D	0.804	47.7	D
	APPROACH	0.890	19.6	B	0.804	12.4	B
ALL VEHICLES		0.942	30.9	C	0.870	20.8	C

7.2.3 Main Road (Future K111)/Thabana Ntlenyana Drive Intersection

Scenario 1: 2020 Background plus Latent Rights Peak Hour Traffic Volumes

The SIDRA analysis results indicate that the existing intersection will further perform at a worse level of service with increased queuing and delays. The summary of the SIDRA intersection results are contained in **Table 7a**.

Table 7a: Summary of SIDRA Intersection Capacity Analysis Results

Main Road (Future K111)/Thabana Ntlenyana Drive, Scenario 1

CONTROL: STOP (TWO-WAY)

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.165	5.6	A	0.116	5.6	A
	THROUGH	0.375	0.0	A	0.337	0.0	A
	RIGHT						
	APPROACH	0.375	1.6	NA	0.337	1.3	NA
SOUTH BOUND	LEFT						
	THROUGH	0.502	0.0	A	0.419	0.0	A
	RIGHT	0.678	22.9	C	0.633	17.7	C
	APPROACH	0.678	4.9	NA	0.633	5.0	NA
EAST BOUND	LEFT	1.484	464.3	F	1.170	185.4	F
	THROUGH						
	RIGHT	8.825	7104.5	F	5.246	3891.5	F
	APPROACH	8.825	3804.3	F	5.246	1606.1	F
	ALL VEHICLES	8.825	1219.7	NA	5.246	474.1	NA

Scenario 2: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes

It is evident that the proposed development generated trips added onto the congested intersection will cause further queuing and delays unless upgrades are undertaken. The summary of the SIDRA intersection results are contained in **Table 7b**.

Table 7b: Summary of SIDRA Intersection Capacity Analysis Results

Olifantsfontein Road (R562)/Thabana Ntlenyana Drive, Scenario 2

CONTROL: STOP (TWO-WAY)

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.269	5.6	A	0.340	5.6	A
	THROUGH	0.375	0.0	A	0.337	0.0	A
	RIGHT						
	APPROACH	0.375	2.2	NA	0.340	2.7	NA
SOUTH BOUND	LEFT						
	THROUGH	0.049	43.7	E	1.143	128.3	F
	RIGHT	1.199	220.8	F	1.790	740.5	F
	APPROACH	1.199	90.6	NA	1.790	363.7	NA
EAST BOUND	LEFT	2.295	1192.5	F	1.941	874.3	F
	THROUGH						
	RIGHT	14.737	12421.1	F	9.158	7403.8	F
	APPROACH	14.737	7460.0	F	9.158	3931.2	F
ALL VEHICLES		14.737	2921.2	NA	9.158	1369.0	NA

Scenario 3: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes (with upgrades)

Intersection upgrades have been conducted in this scenario and the SIDRA analysis results indicate that the intersection is expected to perform at an overall LOS C and LOS B during the AM and PM peak hours respectively. The Main Road is planned to become the future K111 route and the additional through lanes were taken into account in this analysis.

The upgrades required at this intersection are as follows:

- The intersection is required to be signalised
- An additional through lane on the north and south approaches
- An additional exit lane on the north and south approaches
- Two dedicated right turn lanes on the west approach
- A slip lane (100m) on the west approach
- An additional exit lane is required on the west approach

The summary of the SIDRA analysis results for the upgraded intersection are contained in **Table 7c**. Refer to drawing **SKC012** contained in **Appendix A-3**.

Table 7c: Summary of SIDRA Intersection Capacity Analysis Results**Olifantsfontein Road (R562)/Thabana Ntlenyana Drive, Scenario 3**

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.427	8.7	A	0.623	11.3	B
	THROUGH	0.804	28.2	C	0.778	27.8	C
	RIGHT						
	APPROACH	0.804	20.7	C	0.778	20.0	C
SOUTH BOUND	LEFT						
	THROUGH	0.502	10.9	B	0.350	6.5	A
	RIGHT	0.837	34.7	C	0.820	29.7	C
	APPROACH	0.837	17.2	B	0.820	15.5	B
EAST BOUND	LEFT	0.679	10.6	B	0.602	9.7	A
	THROUGH						
	RIGHT	0.863	36.3	D	0.804	35.8	D
	APPROACH	0.863	24.9	C	0.804	21.9	C
ALL VEHICLES		0.863	21.2	C	0.820	19.0	B

7.2.4 Main Road (Future K111)/Riverside Street intersection

Scenario 1: 2020 Background plus Latent Rights Peak Hour Traffic Volumes

The SIDRA analysis results indicate that the existing intersection will further perform at a worse level of service with increased queuing and delays. The summary of the SIDRA intersection results are contained in **Table 8a**.

Table 8a: Summary of SIDRA Intersection Capacity Analysis Results

Main Road (Future K111) & Riverside Street, Scenario 1

CONTROL: STOP (TWO-WAY)

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT						
	THROUGH	1.431	387.7	F	0.215	0.0	A
	RIGHT	2.510	1408.4	F	0.769	23.1	C
	APPROACH	2.510	765.4	NA	0.769	10.6	NA
WEST BOUND	LEFT	9.649	7840.3	F	4.902	3539.3	F
	THROUGH						
	RIGHT	9.649	7843.9	F	4.902	3598.0	F
	APPROACH	9.649	7842.1	F	4.902	3574.7	F
SOUTH BOUND	LEFT	0.070	5.6	A	0.085	5.6	A
	THROUGH	0.665	0.0	A	0.388	0.0	A
	RIGHT						
	APPROACH	0.665	0.6	NA	0.388	0.9	NA
ALL VEHICLES		9.649	2058.7	NA	4.902	756.8	NA

Scenario 2: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes

It is evident that the proposed development generated trips added onto the congested intersection will cause further queuing and delays unless upgrades are undertaken. The summary of the SIDRA intersection results are contained in **Table 8b**.

Table 8b: Summary of SIDRA Intersection Capacity Analysis Results

Main Road (Future K111) & Riverside Street, Scenario 2

CONTROL: STOP (TWO-WAY)

APPROACH		OPERATING CONDITIONS					
		PM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT						
	THROUGH	2.918	1725.9	F	0.928	15.4	C
	RIGHT	5.246	3894.9	F	1.238	253.8	F
	APPROACH	5.246	2400.7	NA	1.238	90.5	NA
WEST BOUND	LEFT	11.754	9743.5	F	5.831	4379.5	F
	THROUGH						
	RIGHT	11.754	9730.6	F	5.831	4415.7	F
	APPROACH	11.754	9736.8	F	5.831	4402.4	F
SOUTH BOUND	LEFT	0.092	5.6	A	0.099	5.6	A
	THROUGH	0.831	0.0	A	0.498	0.0	A
	RIGHT						
	APPROACH	0.831	0.9	NA	0.498	0.9	NA
ALL VEHICLES		11.754	2677.9	NA	5.831	814.6	NA

Scenario 3: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes (with upgrades)

Intersection upgrades have been conducted in this scenario and the SIDRA analysis results indicate that the intersection is expected to perform at an overall LOS C and LOS B during the AM and PM peak hours respectively. Main Road is planned to become the future K111 route and the additional through lanes were taken into account in this analysis.

The upgrades required at this intersection are as follows:

- The intersection is required to be signalised
- An additional through lane on the north and south approaches
- An additional exit lane on the north and south approaches
- A dedicated full right turn lane is required on the east approach
- A dedicated right turn lane (60m) is required on the east approach
- A dedicated slip lane (60m) is required on the east approach
- An additional exit lane (60m) is required on the east approach

The summary of the SIDRA analysis results for the upgraded intersection are contained in **Table 8c**. Refer to drawing **SKC013** contained in **Appendix A-3**.

Table 8c: Summary of SIDRA Intersection Capacity Analysis Results**Main Road (Future K111) & Riverside Street, Scenario 3**

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT						
	THROUGH	0.251	3.7	A	0.294	4.4	A
	RIGHT	0.860	43.9	D	0.684	24.2	C
	APPROACH	0.860	16.2	B	0.684	10.7	B
WEST BOUND	LEFT	0.519	16.6	B	0.203	9.4	A
	THROUGH						
	RIGHT	0.873	47.8	D	0.623	34.4	C
	APPROACH	0.873	32.7	C	0.623	25.3	C
SOUTH BOUND	LEFT	0.188	16.6	B	0.270	20.2	C
	THROUGH	0.856	24.4	C	0.679	18.0	B
	RIGHT						
	APPROACH	0.856	23.7	C	0.679	18.3	B
ALL VEHICLES		0.873	23.3	C	0.684	16.4	B

7.2.5 Main Road/Karee Street Intersection

Scenario 1: 2020 Background plus Latent Rights Peak Hour Traffic Volumes

The SIDRA analysis results indicate that the existing intersection will further perform at a worse level of service with increased queuing and delays. The summary of the SIDRA intersection results are contained in **Table 9a**.

Table 9a: Summary of SIDRA Intersection Capacity Analysis Results

Main Road & Karee Street, Scenario 1

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.657	23.1	C	0.974	64.1	E
	THROUGH	0.657	17.5	B	1.860	58.8	E
	RIGHT	1.459	488.3	F	1.860	827.3	F
	APPROACH	1.459	107.5	F	1.860	213.5	F
WEST BOUND	LEFT	1.533	544.9	F	2.034	984.9	F
	THROUGH	1.533	539.3	F	2.034	979.4	F
	RIGHT	1.533	544.9	F	2.034	984.9	F
	APPROACH	1.533	542.8	F	2.034	983.2	F
SOUTH BOUND	LEFT	0.745	24.5	C	1.062	120.3	F
	THROUGH	1.422	246.6	F	2.028	152.5	F
	RIGHT	1.422	444.2	F	2.028	979.4	F
	APPROACH	1.422	237.5	F	2.028	287.8	F
EAST BOUND	LEFT	1.510	525.2	F	0.938	53.9	D
	THROUGH	1.510	519.7	F	0.938	48.4	D
	RIGHT	1.510	525.2	F	0.938	53.9	D
	APPROACH	1.510	523.4	F	0.938	51.4	D
ALL VEHICLES		1.533	311.7	F	2.034	345.1	F

Scenario 2: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes

It is evident that the proposed development generated trips added onto the congested intersection will cause further queuing and delays unless upgrades are undertaken. The summary of the SIDRA intersection results are contained in **Table 9b**.

Table 9b: Summary of SIDRA Intersection Capacity Analysis Results

Main Road & Karee Street, Scenario 2

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.766	21.7	C	1.254	275.0	F
	THROUGH	0.766	16.2	B	2.394	382.9	F
	RIGHT	1.686	679.3	F	2.394	1296.0	F
	APPROACH	1.686	123.0	F	2.394	502.0	F
WEST BOUND	LEFT	1.890	862.9	F	2.365	1278.0	F
	THROUGH	1.890	587.3	F	2.365	1272.4	F
	RIGHT	1.890	862.8	F	2.365	1277.9	F
	APPROACH	1.890	860.9	F	2.365	1276.3	F
SOUTH BOUND	LEFT	1.012	99.0	F	1.207	234.1	F
	THROUGH	1.933	589.8	F	2.304	373.2	F
	RIGHT	1.933	900.8	F	2.304	1222.5	F
	APPROACH	1.933	552.4	F	2.304	464.5	F
EAST BOUND	LEFT	1.562	566.1	F	0.952	54.7	D
	THROUGH	1.562	560.6	F	0.952	49.1	D
	RIGHT	1.562	566.1	F	0.952	54.7	D
	APPROACH	1.562	564.3	F	0.952	52.2	D
ALL VEHICLES		1.933	503.5	F	2.394	544.3	F

Scenario 3: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes (with upgrades)

Intersection upgrades have been conducted in this scenario and the SIDRA analysis results indicate that the intersection is expected to perform at an overall LOS B during both the AM and PM peak hours.

The upgrades required at this intersection are as follows:

- A dedicated right turn lane (100m) on the north and south approach
- An additional through lane (120m) on the north approach
- A slip lane (100m) on the north approach
- A slip lane (60m) on the west approach
- A slip lane (60m) on the east approach
- An additional exit lane (30m) on the east approach
- A dedicated right turn lane (30m) on the west and east approach

The summary of the SIDRA analysis results for the upgraded intersection are contained in **Table 9c**. Refer to drawing **SKC014** contained in **Appendix A-3**.

Table 9c: Summary of SIDRA Intersection Capacity Analysis Results**Main Road & Karee Street, Scenario 3**

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.279	12.8	B	0.431	15.4	B
	THROUGH	0.488	8.2	A	0.754	13.4	B
	RIGHT	0.823	39.5	D	0.626	23.2	C
	APPROACH	0.823	13.8	B	0.754	15.2	B
WEST BOUND	LEFT	0.393	12.2	B	0.216	8.1	A
	THROUGH	0.512	21.7	C	0.334	18.1	B
	RIGHT	0.822	38.5	D	0.908	46.4	D
	APPROACH	0.822	24.2	C	0.908	26.8	C
SOUTH BOUND	LEFT	0.265	11.2	B	0.321	10.7	B
	THROUGH	0.634	9.5	A	0.395	9.5	A
	RIGHT	0.501	20.4	C	0.891	47.1	D
	APPROACH	0.634	10.7	B	0.891	15.2	B
EAST BOUND	LEFT	0.303	9.8	A	0.418	14.5	B
	THROUGH	0.434	21.2	C	0.490	19.1	B
	RIGHT	0.800	38.1	D	0.304	27.0	C
	APPROACH	0.800	22.5	C	0.490	18.7	B
ALL VEHICLES		0.823	15.4	B	0.908	17.7	B

7.2.6 Dale Road (Future K109)/Archerfish Drive Intersection

Scenario 1: 2020 Background plus Latent Rights Peak Hour Traffic Volumes

The SIDRA analysis results indicate that the existing intersection will further perform at a worse level of service with increased queuing and delays. The summary of the SIDRA intersection results are contained in **Table 10a**.

Table 10a: Summary of SIDRA Intersection Capacity Analysis Results

Dale Road (Future K109) & Archerfish Drive, Scenario 1

CONTROL: STOP (TWO-WAY)

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT						
	THROUGH	0.906	15.8	C	0.923	18.5	C
	RIGHT	0.906	21.5	C	0.923	24.0	C
	APPROACH	0.906	20.1	NA	0.923	23.1	NA
WEST BOUND	LEFT	1.954	880.4	F	0.864	37.4	E
	THROUGH						
	RIGHT	1.954	1042.3	F	0.864	144.4	F
	APPROACH	1.954	892.1	F	0.864	44.8	E
SOUTH BOUND	LEFT	0.250	5.6	A	0.263	5.6	A
	THROUGH	0.250	0.0	A	0.263	0.0	A
	RIGHT						
	APPROACH	0.250	0.4	NA	0.263	0.7	NA
ALL VEHICLES		1.954	323.6	NA	0.923	20.7	NA

Scenario 2: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes

It is evident that the proposed development generated trips added onto the congested intersection will cause further queuing and delays unless upgrades are undertaken. The summary of the SIDRA intersection results are contained in **Table 10b**.

Table 10b: Summary of SIDRA Intersection Capacity Analysis Results

Dale Road (Future K109) & Archerfish Drive, Scenario 2

CONTROL: STOP (TWO-WAY)

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT						
	THROUGH	11.748	9695.2	F	10.836	8870.3	F
	RIGHT	11.748	9701.5	F	10.836	8877.1	F
	APPROACH	11.748	9697.9	NA	10.836	8872.3	NA
WEST BOUND	LEFT	12.491	10400.5	F	4.882	3560.3	F
	THROUGH						
	RIGHT	12.491	10387.2	F	4.882	3543.1	F
	APPROACH	12.491	10399.3	F	4.882	3557.3	F
SOUTH BOUND	LEFT	1.041	2.8	A	0.788	5.5	A
	THROUGH	1.041	0.0	A	0.788	0.0	A
	RIGHT						
	APPROACH	1.041	21.2	NA	0.788	0.6	NA
ALL VEHICLES		12.491	5516.9	NA	10.836	5368.9	NA

Scenario 3: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes **(with upgrades)**

Intersection upgrades have been conducted in this scenario and the SIDRA analysis results indicate that the intersection is expected to perform at an overall LOS C and LOS B during the AM and PM peak hours respectively. The future K109 alignment is planned to run in a north to south direction passing the site. The K109 alignment will provide a link to Olifantsfontein Road (R562) in the north to K109/Dale road/Archerfish Intersection in the south. Therefore the additional through lanes were taken into account in this analysis.

The upgrades required at this intersection are as follows:

- The intersection is required to be signalised
- An additional through lane on the north and south approach
- An additional exit lane on the north and south approaches
- An additional exit lane (60m) on the north approach
- A dedicated left turn lane (30m) on the north approach
- Two dedicated right turn lanes (60m) on the south approach
- An additional exit lane (60m) on the south approach
- A continuous slip lane (60m) on the east approach
- An additional exit lane (120m) on the east approach

The summary of the SIDRA analysis results for the upgraded intersection are contained in **Table 10c**. Refer to drawing **SKC015** contained in **Appendix A-3**.

Table 10c: Summary of SIDRA Intersection Capacity Analysis Results**Dale Road (Future K109) & Archerfish Drive, Scenario 3**

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT						
	THROUGH	0.409	2.2	A	0.843	3.4	A
	RIGHT	0.848	47.1	D	0.643	28.0	C
	APPROACH	0.848	21.3	C	0.843	10.8	B
WEST BOUND	LEFT	0.398	5.7	A	0.167	5.6	A
	THROUGH						
	RIGHT	0.757	67.8	E	0.644	65.9	E
	APPROACH	0.757	11.5	B	0.644	16.1	B
SOUTH BOUND	LEFT	0.070	17.5	B	0.097	23.1	C
	THROUGH	0.863	27.1	C	0.775	26.1	C
	RIGHT						
	APPROACH	0.863	26.7	C	0.775	25.9	C
ALL VEHICLES		0.863	22.0	C	0.843	16.4	B

7.2.7 Dale Road/Modderfontein Road Intersection

Scenario 1: 2020 Background plus Latent Rights Peak Hour Traffic Volumes

The SIDRA analysis results indicate that the existing intersection will further perform at a worse level of service with increased queuing and delays. The summary of the SIDRA intersection results are contained in **Table 11a**.

Table 11a: Summary of SIDRA Intersection Capacity Analysis Results

Dale Road & Modderfontein Road, Scenario 1

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.419	14.7	B	0.141	10.8	B
	THROUGH	0.593	13.0	B	0.912	34.3	C
	RIGHT	1.205	229.6	F	1.500	496.4	F
	APPROACH	1.205	58.8	E	1.500	171.9	F
WEST BOUND	LEFT	1.145	179.5	F	0.868	33.2	C
	THROUGH	1.145	174.0	F	0.868	27.6	C
	RIGHT	1.253	272.5	F	1.253	273.2	F
	APPROACH	1.253	193.9	F	1.253	84.7	F
SOUTH BOUND	LEFT	0.350	10.2	B	0.336	10.9	B
	THROUGH	1.394	394.0	F	0.771	19.6	B
	RIGHT	0.940	54.4	D	1.461	462.1	F
	APPROACH	1.394	253.0	F	1.461	138.3	F
EAST BOUND	LEFT	1.179	208.8	F	0.895	37.0	D
	THROUGH	1.179	203.3	F	0.895	31.5	C
	RIGHT	2.048	987.0	F	1.310	324.7	F
	APPROACH	2.048	410.2	F	1.310	103.3	F
ALL VEHICLES		2.048	244.3	F	1.500	127.4	F

Scenario 2: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes

It is evident that the proposed development generated trips added onto the congested intersection will cause further queuing and delays unless upgrades are undertaken. The summary of the SIDRA intersection results are contained in **Table 11b**.

Table 11b: Summary of SIDRA Intersection Capacity Analysis Results

Dale Road & Modderfontein Drive, Scenario 2

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.459	19.4	B	0.239	19.2	B
	THROUGH	0.986	61.4	E	1.666	641.9	F
	RIGHT	1.341	351.4	F	2.393	1298.1	F
	APPROACH	1.341	114.9	F	2.393	788.5	F
WEST BOUND	LEFT	2.160	1088.2	F	1.400	401.4	F
	THROUGH	2.160	1082.7	F	1.400	395.9	F
	RIGHT	1.791	755.6	F	1.703	676.1	F
	APPROACH	2.160	1049.9	F	1.703	433.6	F
SOUTH BOUND	LEFT	0.626	21.3	C	0.805	32.0	C
	THROUGH	2.058	990.9	F	1.683	652.7	F
	RIGHT	1.967	915.0	F	2.514	1406.6	F
	APPROACH	2.058	771.1	F	2.514	674.7	F
EAST BOUND	LEFT	1.529	518.6	F	1.824	783.2	F
	THROUGH	1.529	513.1	F	1.824	777.6	F
	RIGHT	2.048	987.0	F	1.502	495.5	F
	APPROACH	2.048	590.6	F	1.824	753.1	F
ALL VEHICLES		2.160	744.7	F	2.514	653.4	F

Scenario 3: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes (with upgrades)

Intersection upgrades have been conducted in this scenario and the SIDRA analysis results indicate that the intersection is expected to perform at LOS C and LOS D during the AM and PM peak hours respectively.

The upgrades required at this intersection are as follows:

- An additional dedicated right turn lane (90m) on the north approach
- An additional through lane (160m) on the north approach
- An additional exit lane (200m) on the north approach
- An additional through lane (120m) on the south approach
- An additional dedicated right turn lane (60m) on the south approach
- An additional exit lane (200m) on the south approach
- An additional exit lane (60m) on the south approach
- A slip lane (60m) on the east approach
- An additional through lane on the east approach
- An extension of the right turn lane on the east approach (80m to 120m)
- An additional exit lane on the east approach
- An additional dedicated right turn lane (100m) on the west approach
- An additional through lane on the west approach
- A slip lane (160m) on the west approach
- An additional exit lane on the west approach

The summary of the SIDRA analysis results for the upgraded intersection are contained in **Table 11c**. Refer to drawing **SKC016** contained in **Appendix A-3**.

Table 11c: Summary of SIDRA Intersection Capacity Analysis Results**Dale Road & Modderfontein Drive, Scenario 3**

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.401	20.0	C	0.116	10.5	B
	THROUGH	0.950	47.0	D	0.536	28.6	C
	RIGHT	0.708	40.1	D	0.957	70.2	E
	APPROACH	0.950	37.4	D	0.957	40.3	D
WEST BOUND	LEFT	0.196	5.7	A	0.170	5.6	A
	THROUGH	0.942	38.5	D	0.499	9.8	A
	RIGHT	0.901	48.6	D	0.927	43.2	D
	APPROACH	0.942	34.3	C	0.927	13.4	B
SOUTH BOUND	LEFT	0.484	11.7	B	0.577	25.1	C
	THROUGH	0.915	36.9	D	0.602	29.1	C
	RIGHT	0.535	25.6	C	0.892	56.4	E
	APPROACH	0.915	29.4	C	0.892	35.0	D
EAST BOUND	LEFT	0.406	12.6	B	0.237	9.6	A
	THROUGH	0.535	11.1	B	1.004	76.1	E
	RIGHT	1.019	79.1	E	0.383	23.0	C
	APPROACH	1.019	22.4	C	1.004	62.9	E
ALL VEHICLES		1.019	30.3	C	1.004	39.9	D

7.2.8 Old Pretoria Road/Dale Road/Kerk Street Intersection

Scenario 1: 2020 Background plus Latent Rights Peak Hour Traffic Volumes

The SIDRA analysis results indicate that the existing intersection will operate at an overall LOS B during both the AM and PM peak hours. The summary of the SIDRA intersection results are contained in **Table 12a**.

Table 12a: Summary of SIDRA Intersection Capacity Analysis Results

Old Pretoria Road/Dale Road/Kerk Street, Scenario 1

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.136	9.4	A	0.122	7.7	A
	THROUGH	0.190	15.5	B	0.247	18.2	B
	RIGHT	0.651	28.0	C	0.707	32.5	C
	APPROACH	0.651	19.7	B	0.707	21.5	C
WEST BOUND	LEFT	0.260	9.7	A	0.214	11.7	B
	THROUGH	0.369	11.2	B	0.231	8.6	A
	RIGHT	0.588	22.5	C	0.251	15.7	B
	APPROACH	0.588	13.2	B	0.251	10.5	B
SOUTH BOUND	LEFT	0.298	9.5	A	0.274	8.5	A
	THROUGH	0.233	15.8	B	0.308	18.6	B
	RIGHT	0.604	26.2	C	0.464	28.1	C
	APPROACH	0.604	17.3	B	0.464	17.3	B
EAST BOUND	LEFT	0.056	8.7	A	0.084	7.4	A
	THROUGH	0.293	10.7	B	0.164	8.2	A
	RIGHT	0.643	24.9	C	0.730	23.4	C
	APPROACH	0.643	14.3	B	0.730	15.0	B
ALL VEHICLES		0.651	15.6	B	0.730	15.7	B

Scenario 2: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes

The SIDRA analysis results indicate that the existing intersection will operate at an overall LOS F during both the AM and PM peak hours with the addition of development generated traffic. Therefore upgrades are required at this intersection for it to perform at a satisfactory LOS.

The summary of the SIDRA intersection results are contained in **Table 12b**.

Table 12b: Summary of SIDRA Intersection Capacity Analysis Results

Old Pretoria Road/Dale Road/Kerk Street, Scenario 2

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.151	9.4	A	0.114	8.1	A
	THROUGH	0.237	19.0	B	0.140	8.7	A
	RIGHT	1.863	822.7	F	1.637	619.8	F
	APPROACH	1.863	514.0	F	1.637	434.4	F
WEST BOUND	LEFT	0.993	62.5	E	0.701	11.7	B
	THROUGH	0.357	8.7	A	0.437	18.7	B
	RIGHT	1.960	913.5	F	1.908	864.2	F
	APPROACH	1.960	341.4	F	1.908	301.7	F
SOUTH BOUND	LEFT	0.870	27.9	C	1.964	899.4	F
	THROUGH	0.291	19.3	B	0.174	8.9	A
	RIGHT	0.754	33.2	C	0.262	16.4	B
	APPROACH	0.870	26.6	C	1.964	582.8	F
EAST BOUND	LEFT	0.095	17.6	B	0.109	10.3	B
	THROUGH	0.274	8.3	A	0.349	18.1	B
	RIGHT	0.606	21.2	C	1.390	398.4	F
	APPROACH	0.606	12.1	B	1.390	172.7	F
ALL VEHICLES		1.960	253.4	F	1.964	389.5	F

Scenario 3: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes (with upgrades)

Intersection upgrades have been conducted in this scenario and the SIDRA analysis results indicate that the intersection is expected to perform at an overall LOS C during both the AM and PM peak hours respectively.

The upgrades required at this intersection are as follows:

- An additional dedicated right turn lane (100m) on the south and east approach

The summary of the SIDRA intersection results are contained in **Table 12c**. Refer to drawing **SKC017** contained in **Appendix A-3**.

Table 12c: Summary of SIDRA Intersection Capacity Analysis Results

Old Pretoria Road/Dale Road/Kerk Street, Scenario 3

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.108	10.4	B	0.100	8.3	A
	THROUGH	0.343	18.5	B	0.258	12.2	B
	RIGHT	0.876	41.7	D	0.924	47.7	D
	APPROACH	0.876	32.0	C	0.924	36.6	D
WEST BOUND	LEFT	0.778	12.6	B	0.585	10.7	B
	THROUGH	0.815	28.8	C	0.875	35.8	D
	RIGHT	0.860	27.7	C	0.747	25.1	C
	APPROACH	1.960	22.7	C	0.875	23.6	C
SOUTH BOUND	LEFT	0.300	5.7	A	0.515	5.7	A
	THROUGH	0.274	18.4	B	0.209	12.1	B
	RIGHT	0.785	35.1	D	0.336	21.7	C
	APPROACH	0.785	15.9	B	0.515	9.0	A
EAST BOUND	LEFT	0.058	10.2	B	0.085	8.9	A
	THROUGH	0.626	23.3	C	0.698	28.9	C
	RIGHT	0.465	17.6	B	0.945	43.4	D
	APPROACH	0.626	21.1	C	0.945	32.8	C
ALL VEHICLES		0.876	22.6	C	0.945	24.3	C

7.2.9 Olifantsfontein Road (R562)/ K109 (Intersection A)

Scenario 3: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes

This intersection will materialise when the future K109 is constructed. Therefore only scenario 3 is analysed. The SIDRA analysis results indicate that the intersection will perform at an overall LOS B and LOS C during the AM and PM peak hours respectively. The summary of the SIDRA intersection results are contained in **Table 13**. Refer to drawing **SKC018** contained in **Appendix A-3**.

Table 13: Summary of SIDRA Intersection Capacity Analysis Results

Olifantsfontein Road (R562) & K109 (Intersection A), Scenario 3

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.659	14.6	B	0.754	19.3	B
	THROUGH						
	RIGHT	0.839	45.5	D	0.929	67.4	E
	APPROACH	0.839	21.0	C	0.929	29.9	C
WEST BOUND	LEFT	0.185	8.8	A	0.414	19.2	B
	THROUGH	0.653	21.2	C	0.925	49.4	D
	RIGHT						
	APPROACH	0.653	19.7	B	0.925	43.6	D
EAST BOUND	LEFT						
	THROUGH	0.835	9.1	A	0.742	6.8	A
	RIGHT	0.519	14.4	B	0.935	54.2	D
	APPROACH	0.835	10.7	B	0.935	29.8	C
ALL VEHICLES		0.839	16.3	B	0.935	33.8	C

7.2.10 Access Road/K109 (Intersection B)

Scenario 3: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes

This intersection will materialise when the future K109 is constructed and will provide access to the proposed township development. The SIDRA analysis results indicate that the intersection will perform at an overall LOS B and LOS C during the AM and PM peak hours respectively. The summary of the SIDRA intersection results are contained in **Table 14**. Refer to drawing **SKC019** contained in **Appendix A-3**.

Table 14: Summary of SIDRA Intersection Capacity Analysis Results

Access Road & K109 (Intersection B), Scenario 3

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT	0.069	16.9	B	0.098	10.6	B
	THROUGH	0.452	13.7	B	0.198	5.4	A
	RIGHT	0.615	20.8	C	0.890	33.8	C
	APPROACH	0.615	15.8	B	0.890	20.2	C
WEST BOUND	LEFT	0.514	8.1	A	0.374	9.8	A
	THROUGH	0.001	12.0	B	0.001	23.1	C
	RIGHT	0.730	25.1	C	0.919	49.6	D
	APPROACH	0.730	18.3	B	0.919	33.8	C
SOUTH BOUND	LEFT	0.248	5.6	A	0.493	5.7	A
	THROUGH	0.731	30.4	C	0.881	36.1	D
	RIGHT	0.287	32.9	C	0.421	30.0	C
	APPROACH	0.731	17.8	B	0.881	20.5	C
EAST BOUND	LEFT	0.201	11.9	B	0.089	8.4	A
	THROUGH	0.001	12.0	B	0.001	23.1	C
	RIGHT	0.175	19.0	B	0.221	30.9	C
	APPROACH	0.201	15.4	B	0.221	19.7	B
ALL VEHICLES		0.731	17.3	B	0.919	23.4	C

7.2.11 Access Road/K109 (Intersection C)

Scenario 3: 2020 Background plus Latent Rights plus Development Generated Peak Hour Traffic Volumes

This intersection will materialise when the future K109 is constructed and will provide access to the proposed township development. The SIDRA analysis results indicate that the intersection will perform at an overall LOS C during both the AM and PM peak hours. The summary of the SIDRA intersection results are contained in **Table 15**. Refer to drawing **SKC020** contained in **Appendix A-3**.

Table 15: Summary of SIDRA Intersection Capacity Analysis Results

Access Road & K109 (Intersection C), Scenario 3

CONTROL: TRAFFIC SIGNAL

APPROACH		OPERATING CONDITIONS					
		AM PEAK HOUR			PM PEAK HOUR		
		V/C	DELAYS (SEC)	LOS	V/C	DELAYS (SEC)	LOS
NORTH BOUND	LEFT						
	THROUGH	0.157	7.1	A	0.268	4.6	A
	RIGHT	0.814	31.3	C	0.895	35.1	D
	APPROACH	0.814	21.1	C	0.895	21.4	C
WEST BOUND	LEFT	0.786	13.6	B	0.477	8.2	A
	THROUGH						
	RIGHT	0.791	32.7	C	0.894	51.1	D
	APPROACH	0.791	22.5	C	0.894	28.1	C
SOUTH BOUND	LEFT	0.205	5.6	A	0.427	5.7	A
	THROUGH	0.802	28.8	C	0.866	43.0	D
	RIGHT						
	APPROACH	0.802	20.5	C	0.866	19.2	B
ALL VEHICLES		0.814	21.5	C	0.895	22.5	C

8

ROAD AND INTERSECTION UPGRADES

8.1

GENERAL

The upgrades to the major road network and intersections are discussed in this chapter. **Table 16** illustrates the upgrades required to mitigate congestion on the surrounding road network within the vicinity of the proposed development sites. The upgrades are differentiated for EMM and GDRT.

Table 16: Major Road and Intersection Upgrades Required Within the Vicinity of the Proposed Township Development

Extension	Phases	UPGRADES SPLIT BETWEEN EMM AND GDRT AUTHORITIES	
		EMM UPGRADES	GDRT UPGRADES
71	1	<ul style="list-style-type: none"> Intersection 1 upgrades as discussed in Section 7.2.1. 	<ul style="list-style-type: none"> The future K111: Construction of the additional through lane (south bound) from intersection 2 to intersection 3.
	2	<ul style="list-style-type: none"> Intersection 2 upgrades for the west and east approach as discussed in Section 7.2.2. A 70m slip lane and the first 100m additional right turn lane is required on south approach. 	<ul style="list-style-type: none"> Construction of the additional through lane (south bound) from intersection 3 (100m).
	3	<ul style="list-style-type: none"> Intersection 3 upgrades for the west approach as discussed in Section 7.2.3. A 90m slip lane is required on the south approach. 	<ul style="list-style-type: none"> The future K109: Construction of a single carriageway of the K109 from intersection 6 to the site access at intersection C.
	4	<ul style="list-style-type: none"> The access road (single carriageway) between intersection C and intersection 3. 	<ul style="list-style-type: none"> Intersection C to connect to the K109 construction discussed above so that access to the site will be gained from the south approach.
	5	<ul style="list-style-type: none"> Intersection 7 upgrades as discussed in Section 7.2.7. 	<ul style="list-style-type: none"> The future K111: Construction of the additional through lane (north bound) from intersection 4 to intersection 3.
	6	<ul style="list-style-type: none"> Intersection 8 upgrades as discussed in Section 7.2.8. 	<ul style="list-style-type: none"> The future K109: Construction of the remaining carriageway (dual carriageway) of the K109 from intersection 6 to the site access at intersection C.
50	1	<ul style="list-style-type: none"> The future K111: Construction of the additional through lane (north bound) from intersection 5 to intersection 4. 	<ul style="list-style-type: none"> The future K111: Construction of the additional through lane (north bound) from intersection 3 to intersection 2 and the additional through lane (south bound) from intersection 3 to intersection 5. This will complete the construction of the dual carriageway.
	2	<ul style="list-style-type: none"> Intersection 6 upgrades as discussed in Section 7.2.6. 	<ul style="list-style-type: none"> The construction of the additional lanes between intersection C and intersection 3 and creating a dual carriageway.
	3	<ul style="list-style-type: none"> The construction of intersection B as discussed in Section 7.2.10. 	<ul style="list-style-type: none"> The construction of intersection A as discussed in Section 7.2.9.
	4		<ul style="list-style-type: none"> The future K109: Construction of the single carriageway between intersection A and intersection C.
	5		<ul style="list-style-type: none"> The future K109: Construction of the remaining carriageway between intersection C and intersection A creating a dual carriageway.
	6		
50	TBA		

9 NON-MOTORISED AND PUBLIC TRANSPORT

9.1 BACKGROUND

In terms of the National Land Transport Act 5 of 2009, section 38, it is a requirement that an assessment of the public transport be included in a traffic impact assessment.

9.2 EXISTING PUBLIC TRANSPORT SERVICES AND FACILITIES

The area surrounding the proposed development site is currently served by the following public transport services:

MINIBUS TAXIS

Minibus taxis were observed operating on Main Road, Archerfish Drive and Dale Road.

PUBLIC TRANSPORT LAY-BYS

Taxi/Bus lay-bys are provided near the following intersections:

- § A pair of lay-bys along Main Road near the Main Road/Riverside Street Intersection
- § A pair of lay-bys along Main Road near the Main Road/Thabana Ntlenyana Drive Intersection.

9.3 PROPOSED / NEW FACILITIES

PUBLIC TRANSPORT LAY-BYS

It is recommended that K109 be provided with a pair of public transport lay-bys in the form of bus and taxi stops at each access point where access to the township is gained. It is further recommended that the proposed lay-bys be constructed to the appropriate design standards of the relevant roads authority.

PAVED SIDEWALKS

In order to ease and formalise the movement of pedestrians between site accesses and the recommended lay-bys, it is proposed to construct at least 1.5m wide paved (or dust free) sidewalk along at least one side of all roads within the development.

10 CONCLUSIONS AND RECOMMENDATIONS

Based on the assessment of the existing and planned future road network, traffic counts, a traffic analysis and capacity analysis of road links in the study area, the following concluding remarks are relevant:

- à This Traffic Impact Assessment pertains to the proposed township known as Clayville Extensions 50 and 71. Clayville Extension 50 will be situated on the Remainder of Portion 183 and Portions 30 and 31 of the farm Olifantsfontein 410 JR. Clayville Extension 71 will be situated on Portion 207 of Portion 183 of the farm Olifantsfontein 410 JR.
- à The site is currently undeveloped. The township locality and the surrounding road network are indicated on **Figures 1 and 2**.
- à This proposed township will comprise of residential, business, community facilities, public garage and social services as indicated in the schedule of rights attached in **Appendix A-1**.
- à Detailed traffic surveys were carried at the following intersections:
 - § Olifantsfontein Road (R562)/Olifantsfontein Road
 - § Olifantsfontein Road (R562)/Main Road (Future K111)
 - § Main Road (Future K111)/Thabana Ntlenyana Drive
 - § Main Road (Future K111)/Riverside Street
 - § Main Road (Future K111)/Karee Street
 - § Dale Road/Archerfish Drive
 - § Dale Road/Modderfontein Road
 - § Dale Road/Old Pretoria Road
- à The proposed development is expected to generate approximately 5061 trips and 5870 trips (in and outbound) during the Weekday AM and PM peak hours respectively on the external road network. See **Appendix A4**.
- à It is proposed that the development be served by two primary accesses off the planned future K109 route. The secondary access to the proposed development is off Main Road (planned future K111 route) and Thabana Ntlenyana Drive. Furthermore a future access is planned 500m north from K111/Thabana Ntlenyana Drive intersection. The proposed access positions are shown on drawing **SKC001** and **SKC002** contained in **Appendix A-2**.
- à From the analysis performed, it was found that the impact of the proposed developments can be mitigated by means of a number of road and intersection improvements as shown in **Appendix A-3**.
- à The 2020 background traffic plus latent rights traffic show that there is an existing capacity constraint. Therefore the developers of the latent rights developments are required to contribute towards roads and intersection upgrades. The upgrading will be as per the requirements of EMM and GDRT.
- à The 2010 Gauteng Major Road Network shows the planned K109 and K111 provincial roads which are relevant to this development. See **Appendix A-2**.
- à The following existing intersections will require improvements:
 - § Olifantsfontein Road (R562)/Olifantsfontein Road

- § Olifantsfontein Road (R562)/Main Road (Future K111)
- § Main Road (Future K111)/Thabana Ntlenyana Drive
- § Main Road (Future K111)/Riverside Street
- § Main Road (Future K111)/Karee Street
- § Dale Road/Archerfish Drive
- § Dale Road/Modderfontein Road
- à The following new intersections external to the development are required:
 - < Olifantsfontein Road (R562)/K109 (Intersection A)
 - < Access Road (R562)/K109 (Intersection B)
 - < Access Road (R562)/K109 (Intersection C)
- à The road and intersection upgrades will be in accordance with the phasing of the project. The upgrades are listed in **Table 16** contained in Chapter 8.
- à The following are required in terms of Non-Motorised & Public Transport
 - § It is recommended that K109 be provided with a pair of public transport lay-bys in the form of bus and taxi stops at each access point where access to the township is gained. It is further recommended that the proposed lay-bys be constructed to the appropriate design standards of the relevant roads authority.
 - § In order to ease and formalise the movement of pedestrians between site accesses and the recommended lay-bys, it is proposed to construct at least 1.5m wide paved (or dust free) sidewalk along at least one side of all roads within the development.

From a traffic engineering perspective, the proposed development is thus regarded as feasible and sustainable and is therefore supported.

11 REFERENCES

- à TMH 16 Volume 2, South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual, Version 1.0, Committee of Transport Officials (COTO) August 2012
- à TMH 17 Volume 1, South African Trip Data Manual, Version 1.0, Committee of Transport Officials (COTO) September 2012
- à Highway Capacity Manual, Transportation Research Board, National Research Council Washington D.C., 2010
- à Manual for Traffic Impact Studies, Department of Transport (DOT), October 1995
- à Clayville Extensions 52 & 66 Retail Development, Traffic Impact Study, EDS Engineering Design Services, May 2015
- à Tembisa Extension 25 Residential Development, Traffic Impact Study, GIBB Engineering & Architecture, May 2015
- à Remainder of Portion 122 of The Farm Olifantsfontein 402-JR Industrial Development, Traffic Impact Study, EDS Engineering Design Services, March 2013
- à Sterkfontein Extension 12 Warehousing & Distribution Centre Development, Traffic Impact Study, EDS Engineering Design Services, February 2015

FIGURES

Figure 1: Locality Plan

Figure 2: Site Aerial View & Key Plan

Figure 3: Existing 2015 Peak Hour Traffic Volumes

Figure 4a: Latent Development Peak Hour Traffic Volumes – Clayville Extensions 52 & 66

Figure 4b: Latent Development Peak Hour Traffic Volumes – Tembisa Extension 25

Figure 4c: Latent Development Peak Hour Traffic Volumes – Remainder of Portion 122
Olifantsfontein

Figure 4d: Latent Development Peak Hour Traffic Volumes – Sterkfontein X12

Figure 4e: Latent Development Peak Hour Traffic Volumes – Clayville Extension 45

Figure 4f: Total Latent Development Peak Hour Traffic Volumes

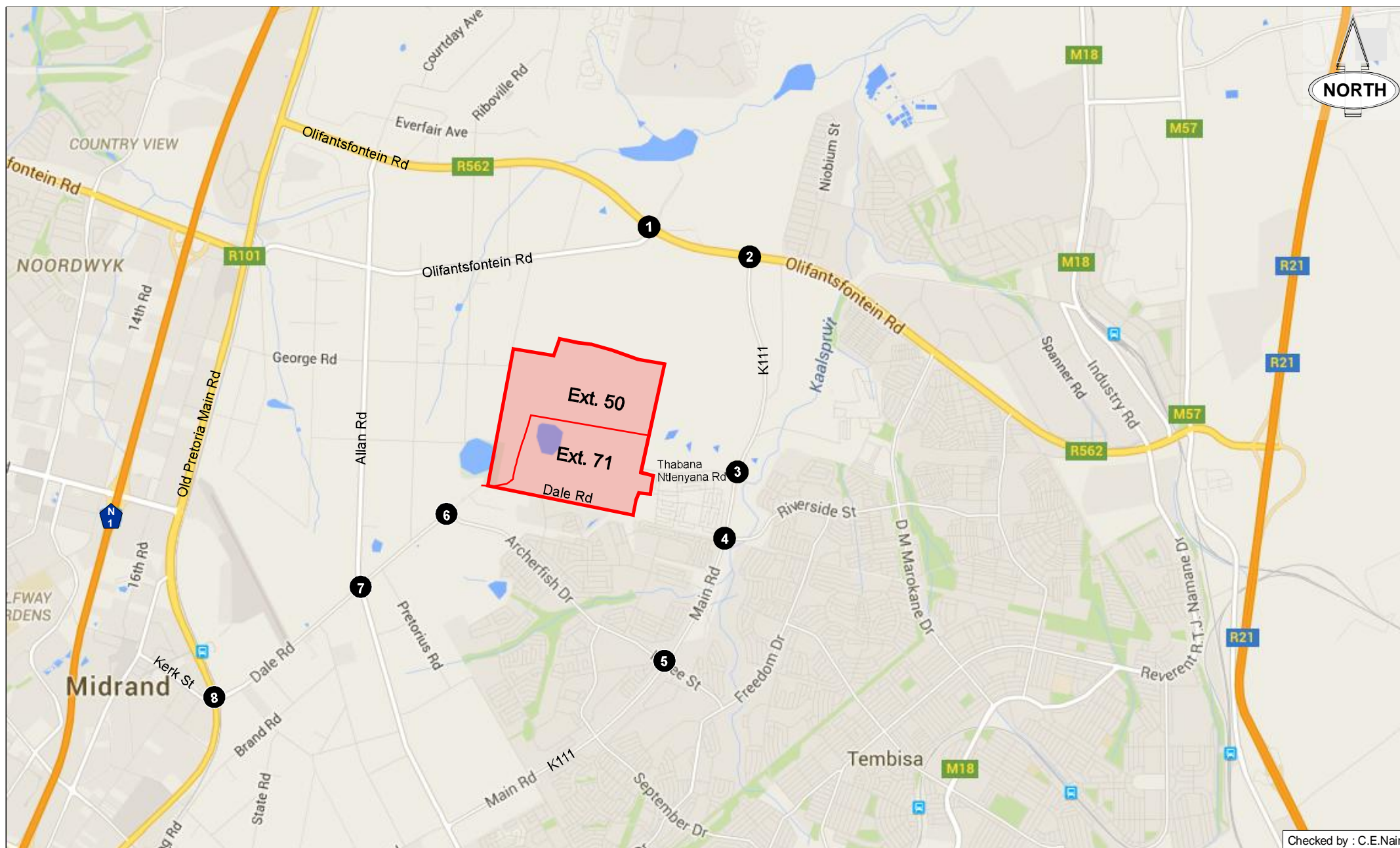
Figure 5: 2020 Background Peak Hour Traffic Volumes

Figure 6: 2020 Background Plus Total Latent Development Peak Hour Traffic Volumes

Figure 7: Expected Trip Distribution for the Proposed Development

Figure 8: Development Generated Peak Hour Traffic Volumes

Figure 9: 2020 Background Plus Total Latent Development Plus Development Generated Peak Hour
Traffic Volumes



Checked by : C.E.Nair

19447_Clayville Ext. 50 & 71_1.cdr



Project:

CLAYVILLE EXTENSION 50 & 71

Figure Description:

LOCALITY PLAN

No.

1



Checked by : C.E.Nair

19447_Clayville Ext. 50 & 71_2.cdr



Project:

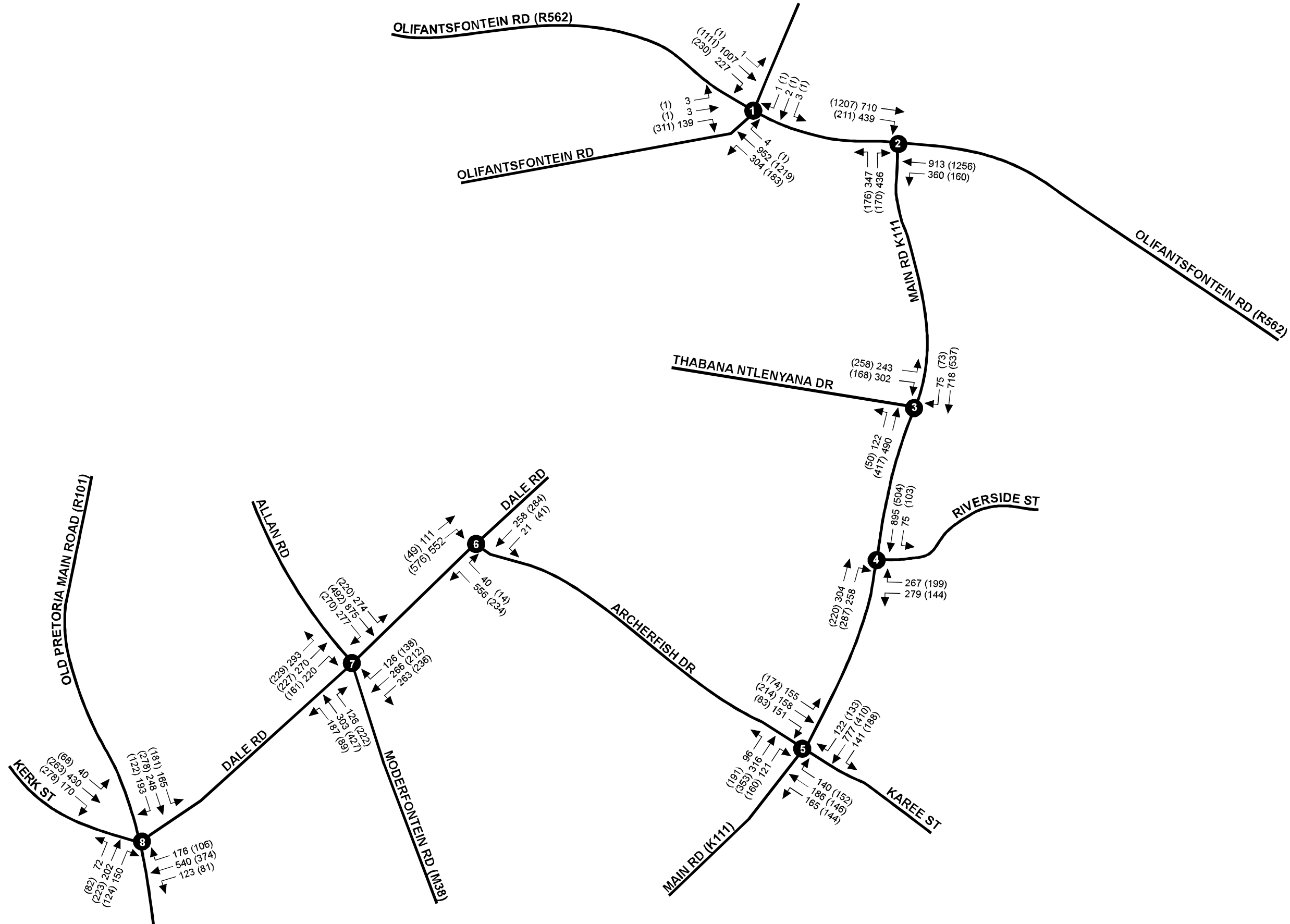
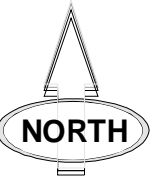
CLAYVILLE EXTENSION 50 & 71

Figure Description:

SITE AERIAL VIEW AND KEY PLAN

No.

2

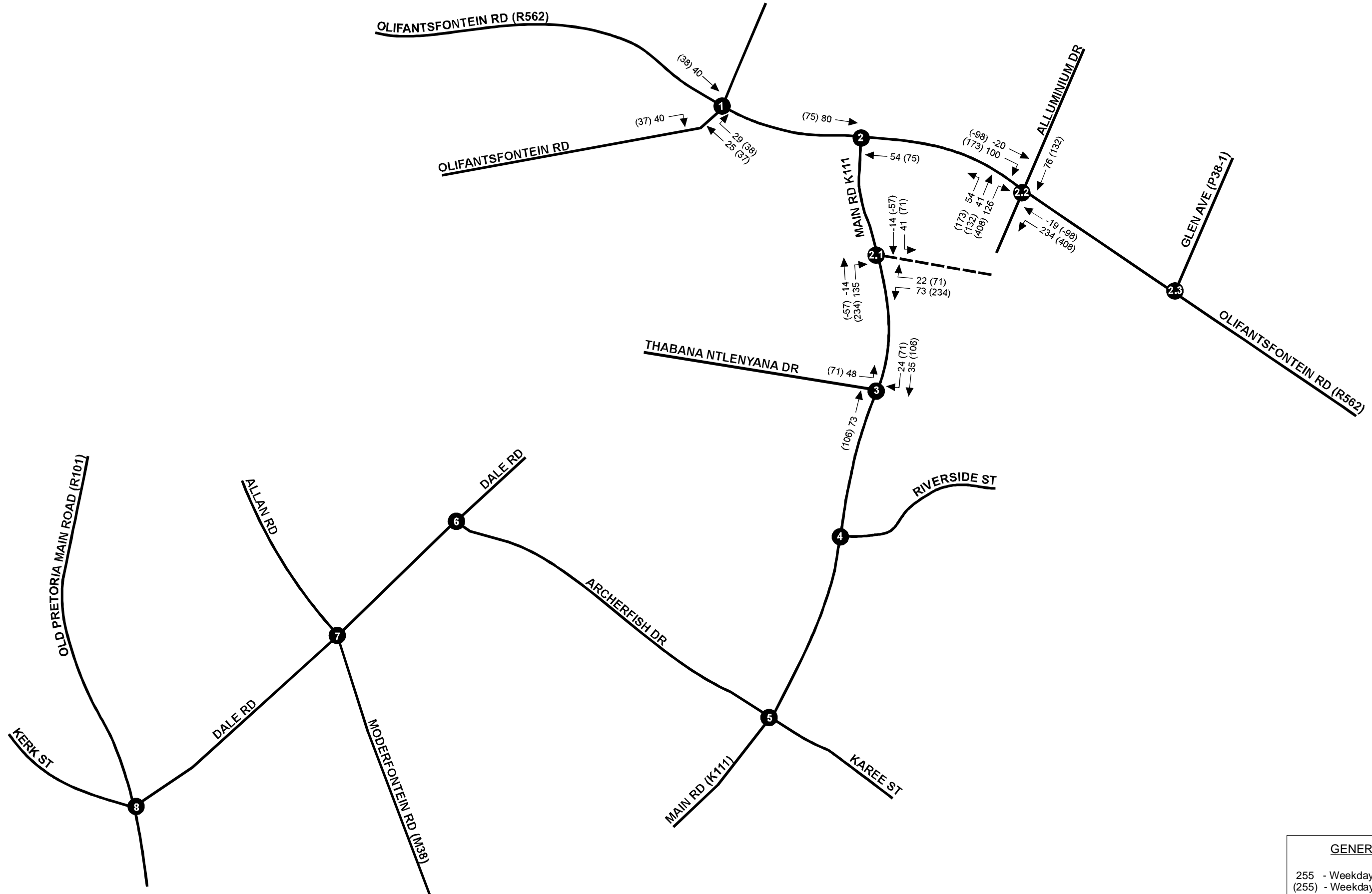
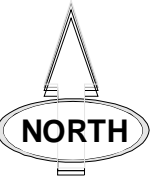


GENERAL LEGEND:

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(255) - Weekday PM Peak hour Volumes

Checked by : C.E.Nair

19447_Clayville Ext. 50 & 71_3.cdr

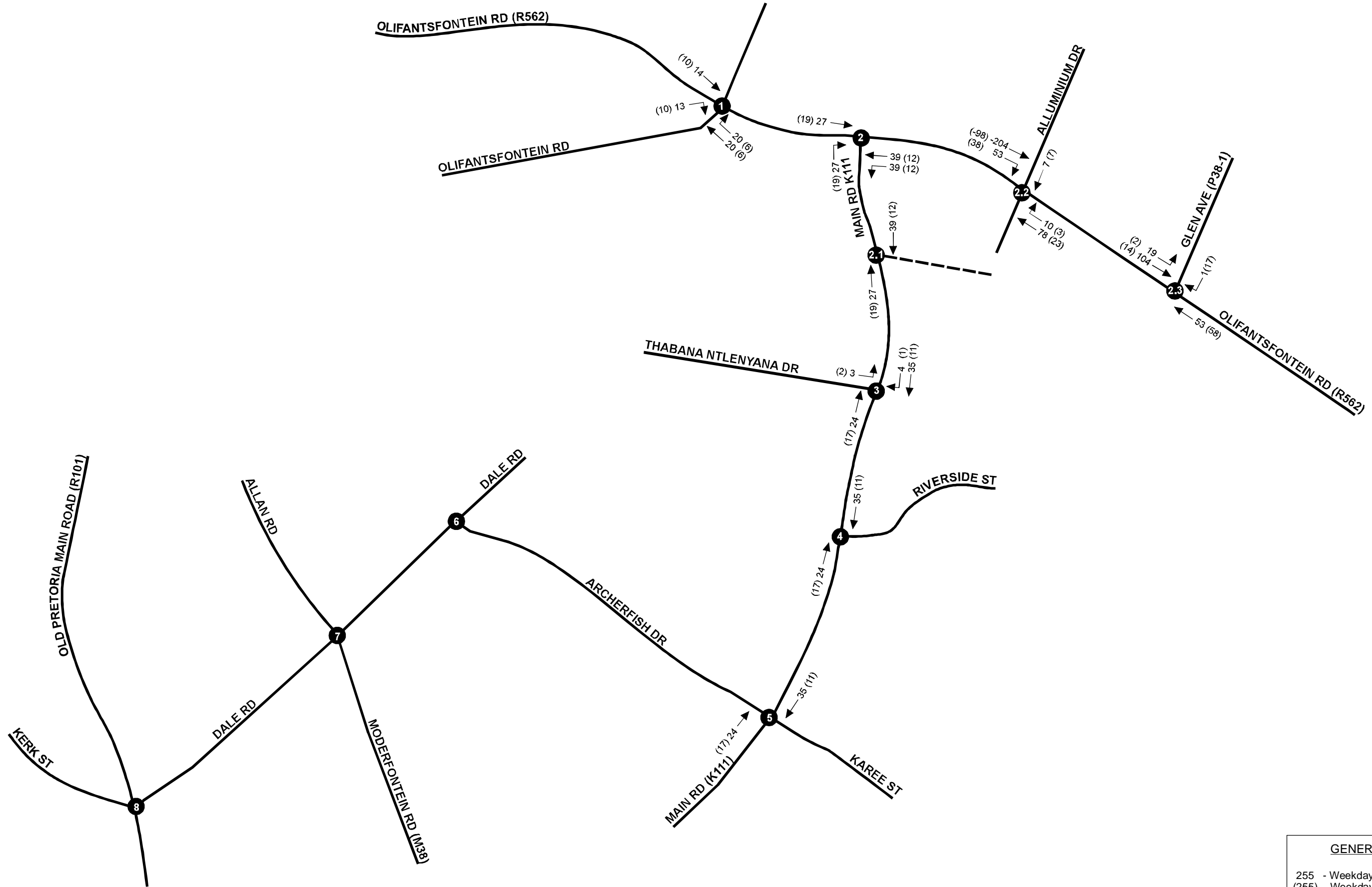
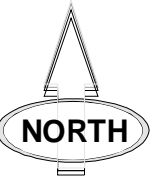


GENERAL LEGEND:

255 - Weekday AM Peak hour Volumes
(255) - Weekday PM Peak hour Volumes

Checked by : C.E.Nair

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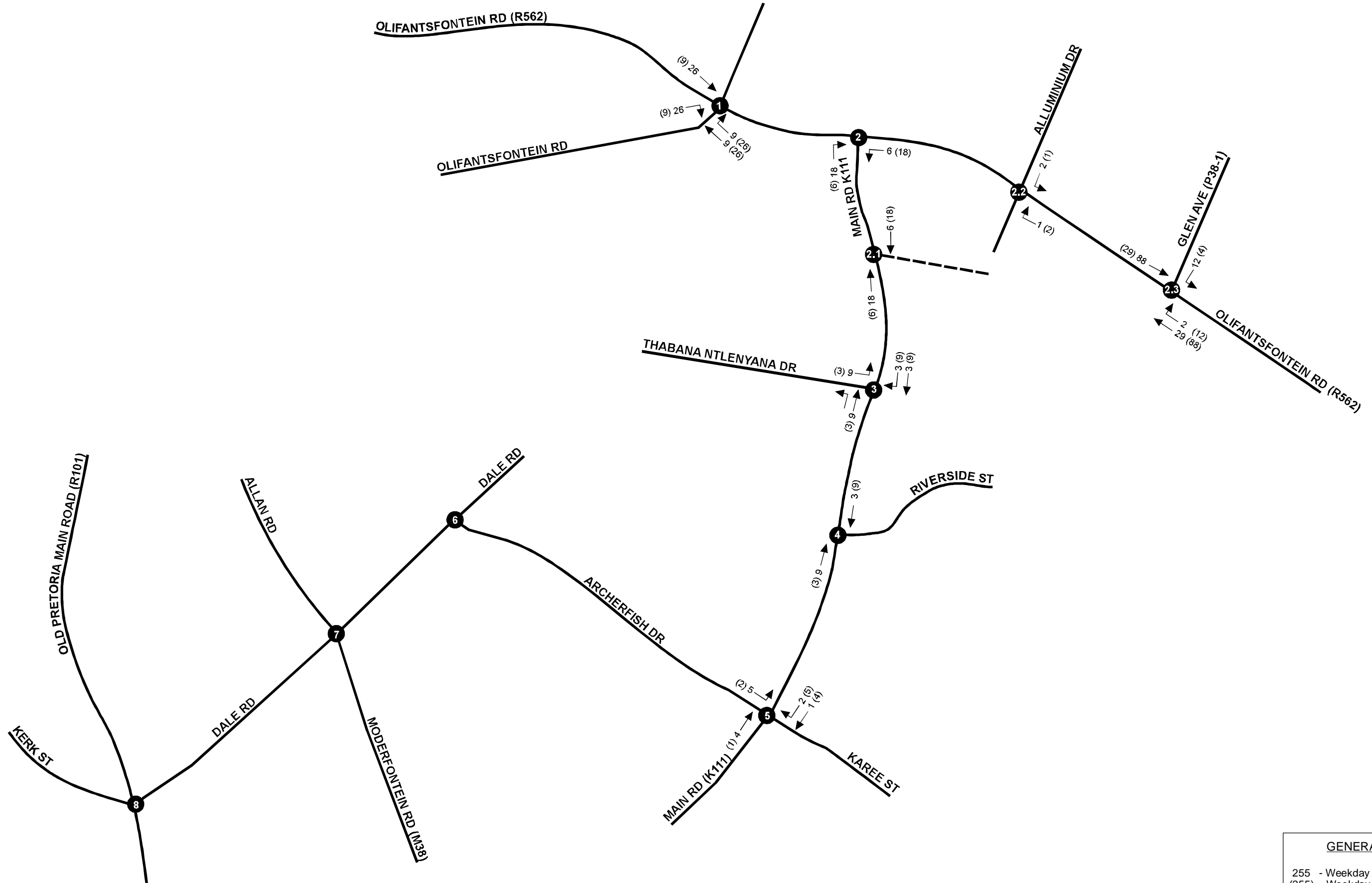
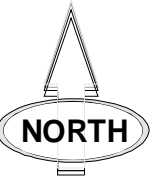


GENERAL LEGEND:

255 - Weekday AM Peak hour Volumes
(255) - Weekday PM Peak hour Volumes

Checked by : C.E.Nair

19447_Clayville Ext. 50 & 71_4a.cdr



GENERAL LEGEND:

255 - Weekday AM Peak hour Volumes
(255) - Weekday PM Peak hour Volumes

Checked by : C.E.Nair

19447_Clayville Ext. 50 & 71_4c.cdr

Project:

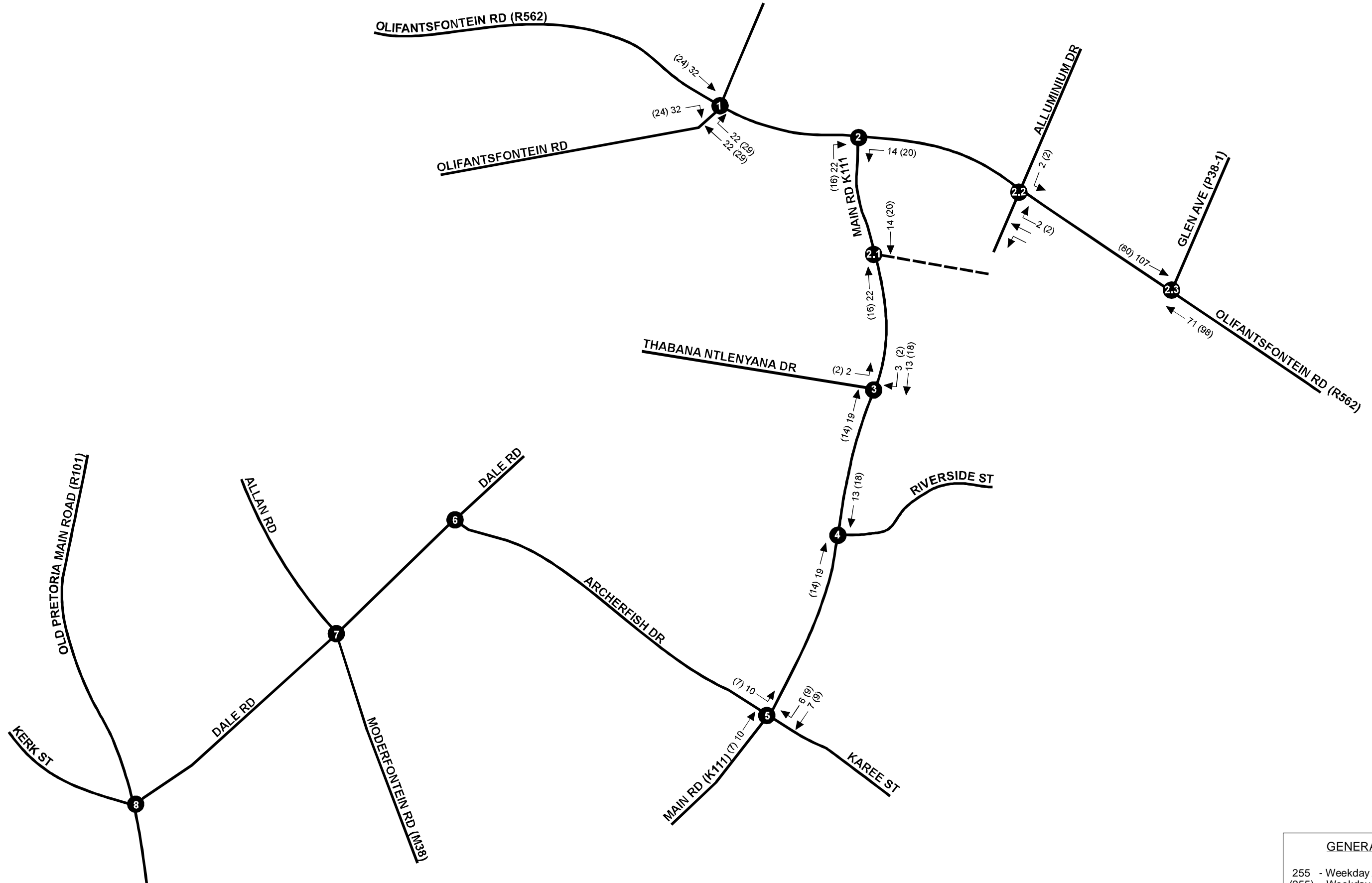
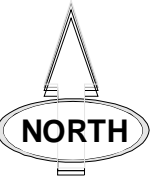
CLAYVILLE EXTENSION 50 & 71

Figure Description:

REM. PTN122 OLIFANTSFONTEIN LATENT RIGHTS PEAK HOUR TRAFFIC VOLUMES

No.

4c

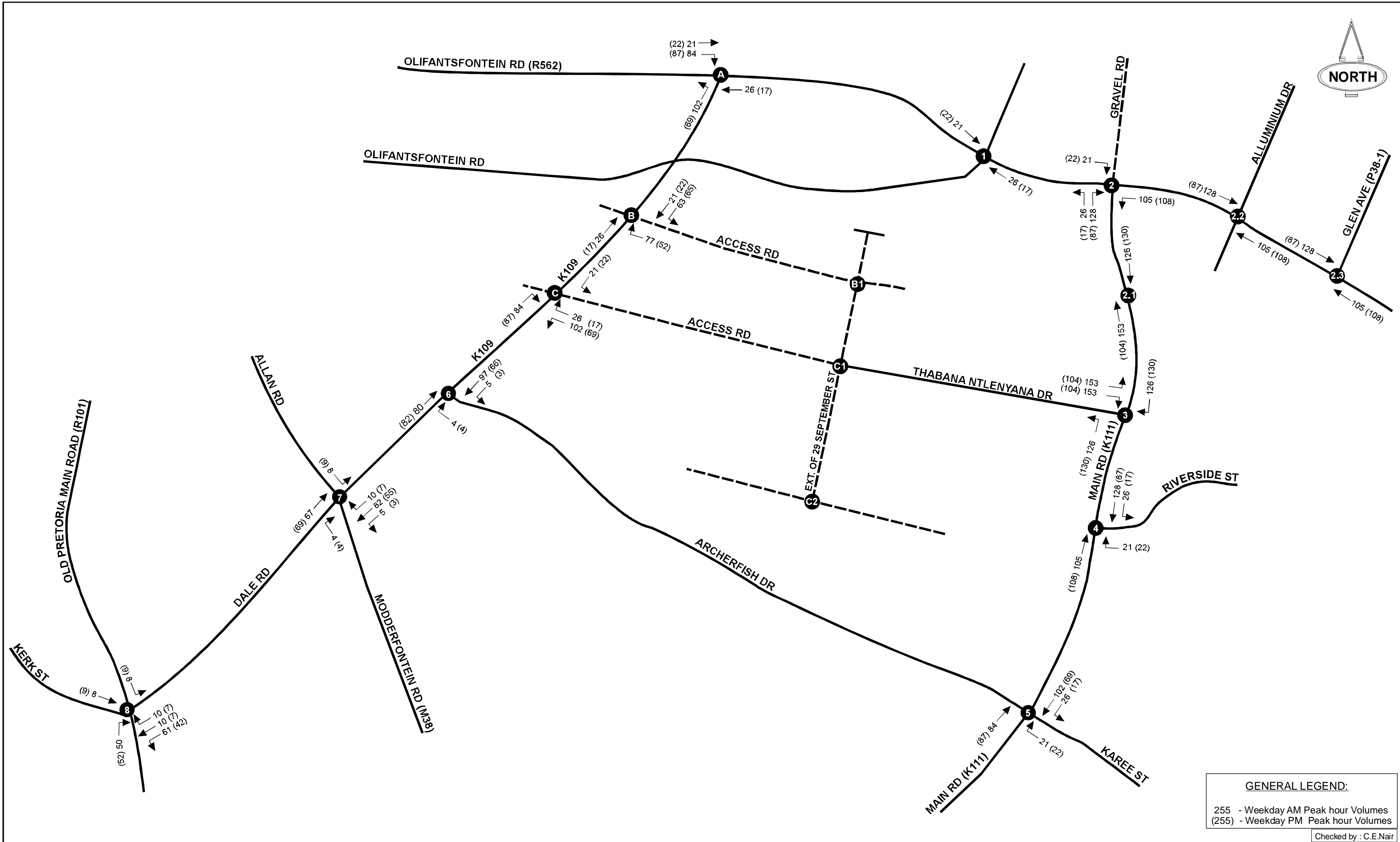


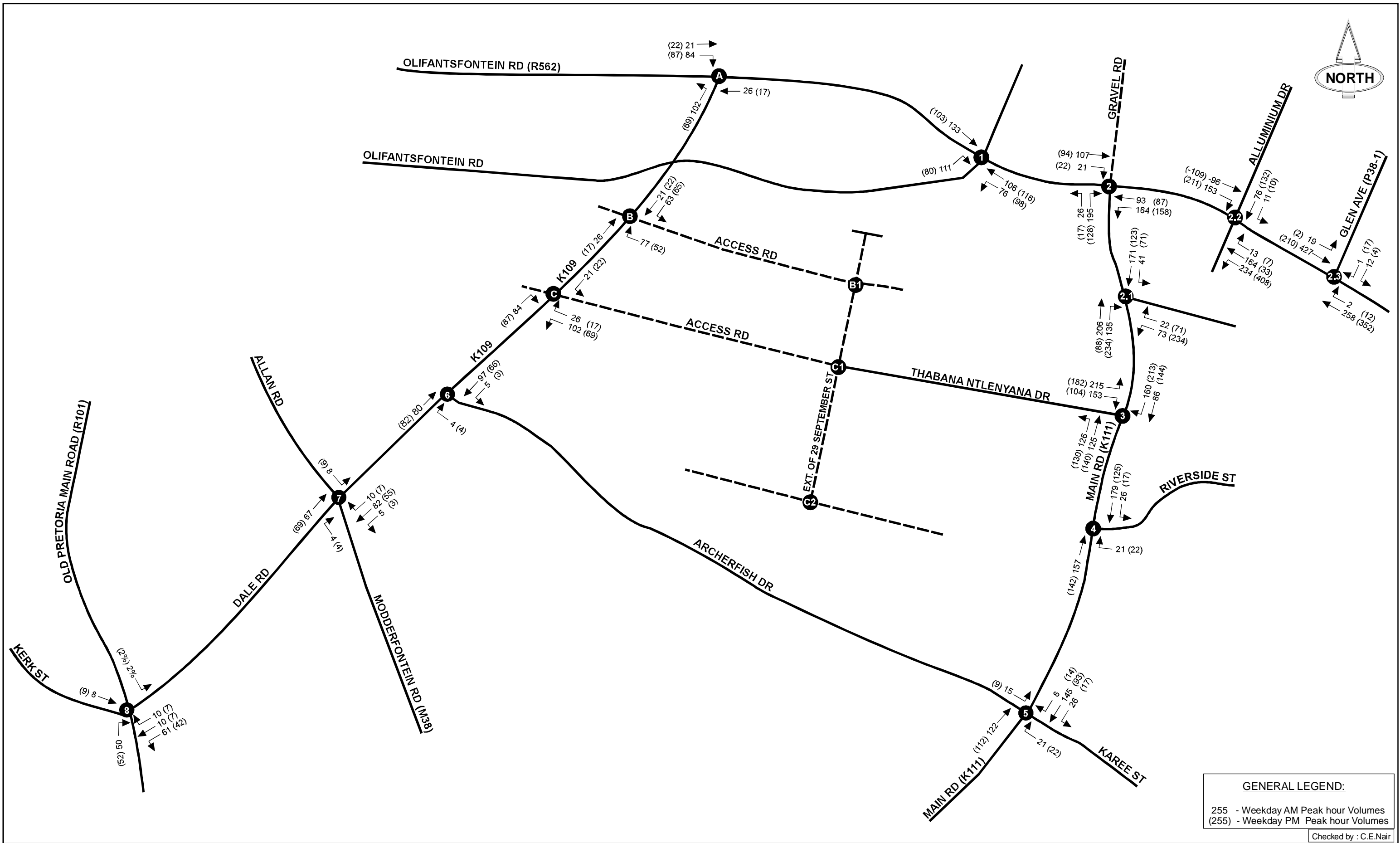
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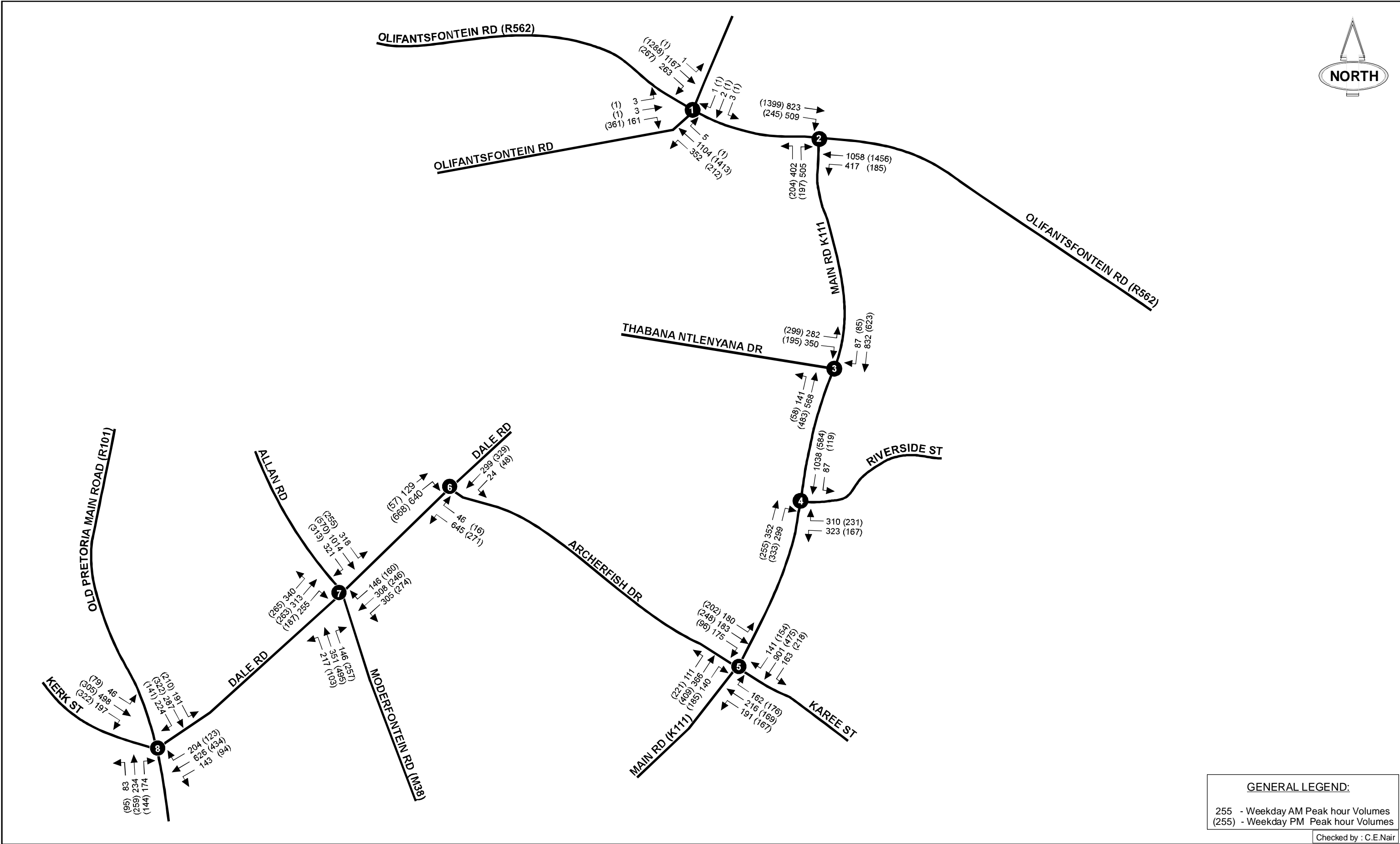
255 - Weekday AM Peak hour Volumes
(255) - Weekday PM Peak hour Volumes

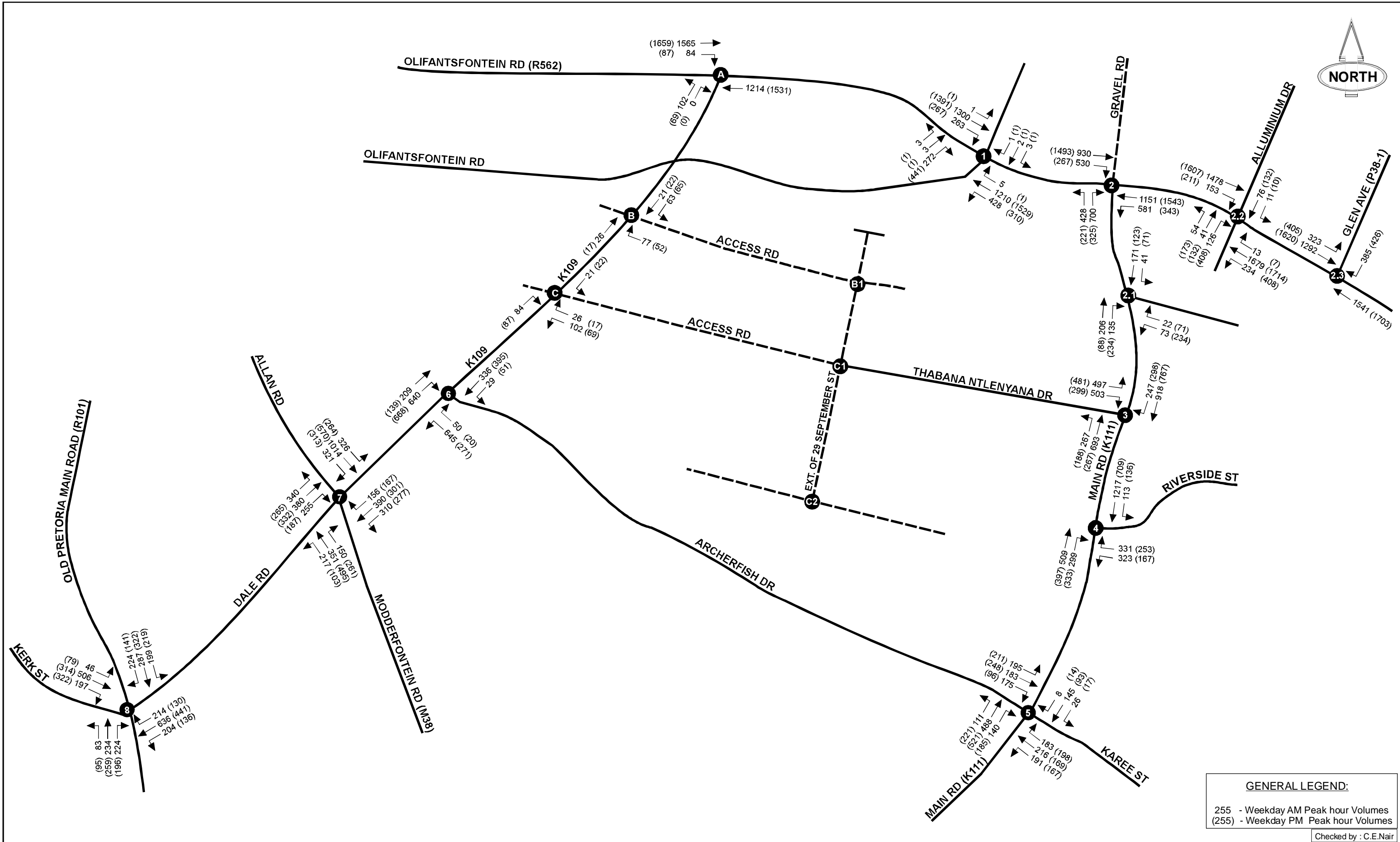
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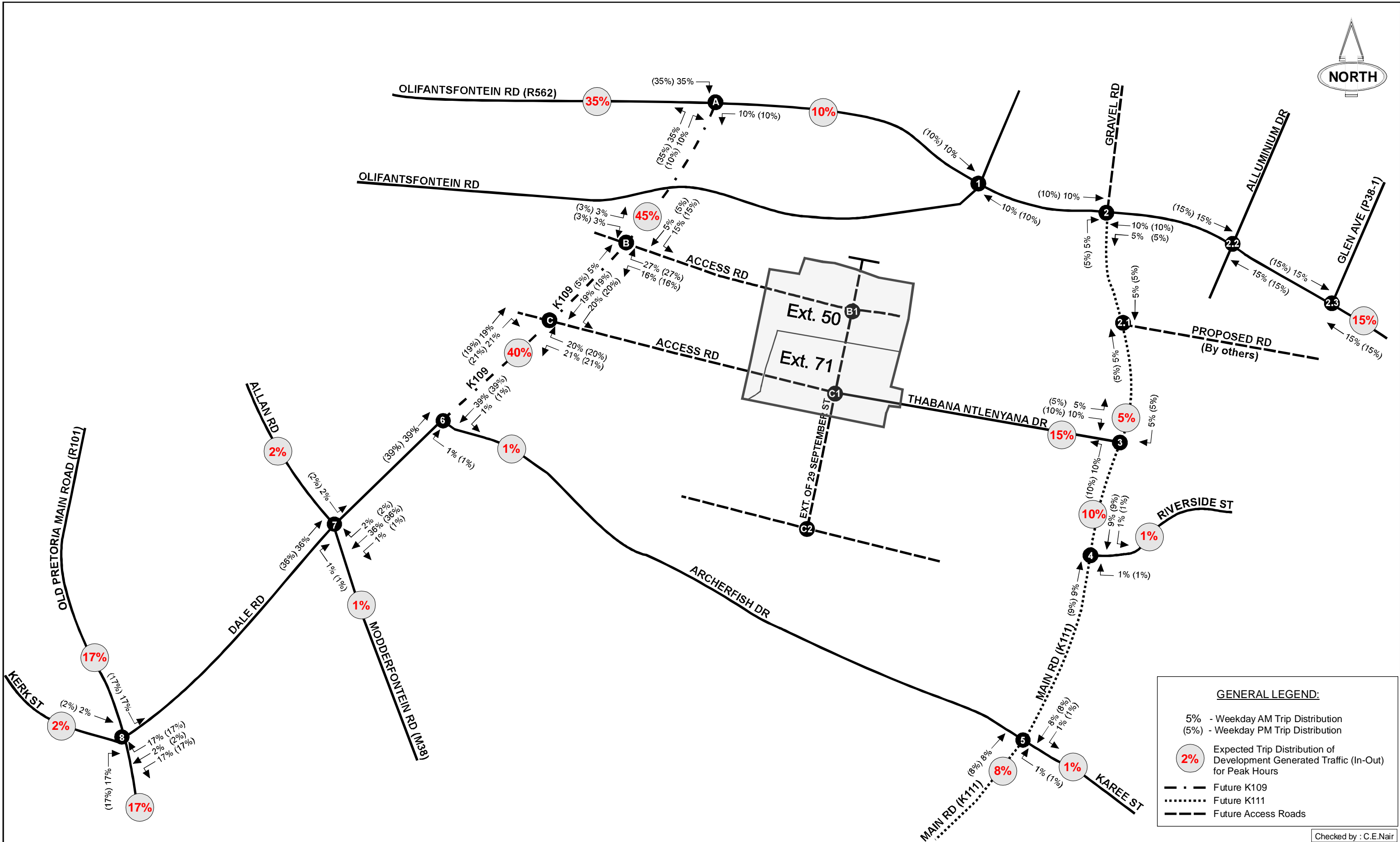
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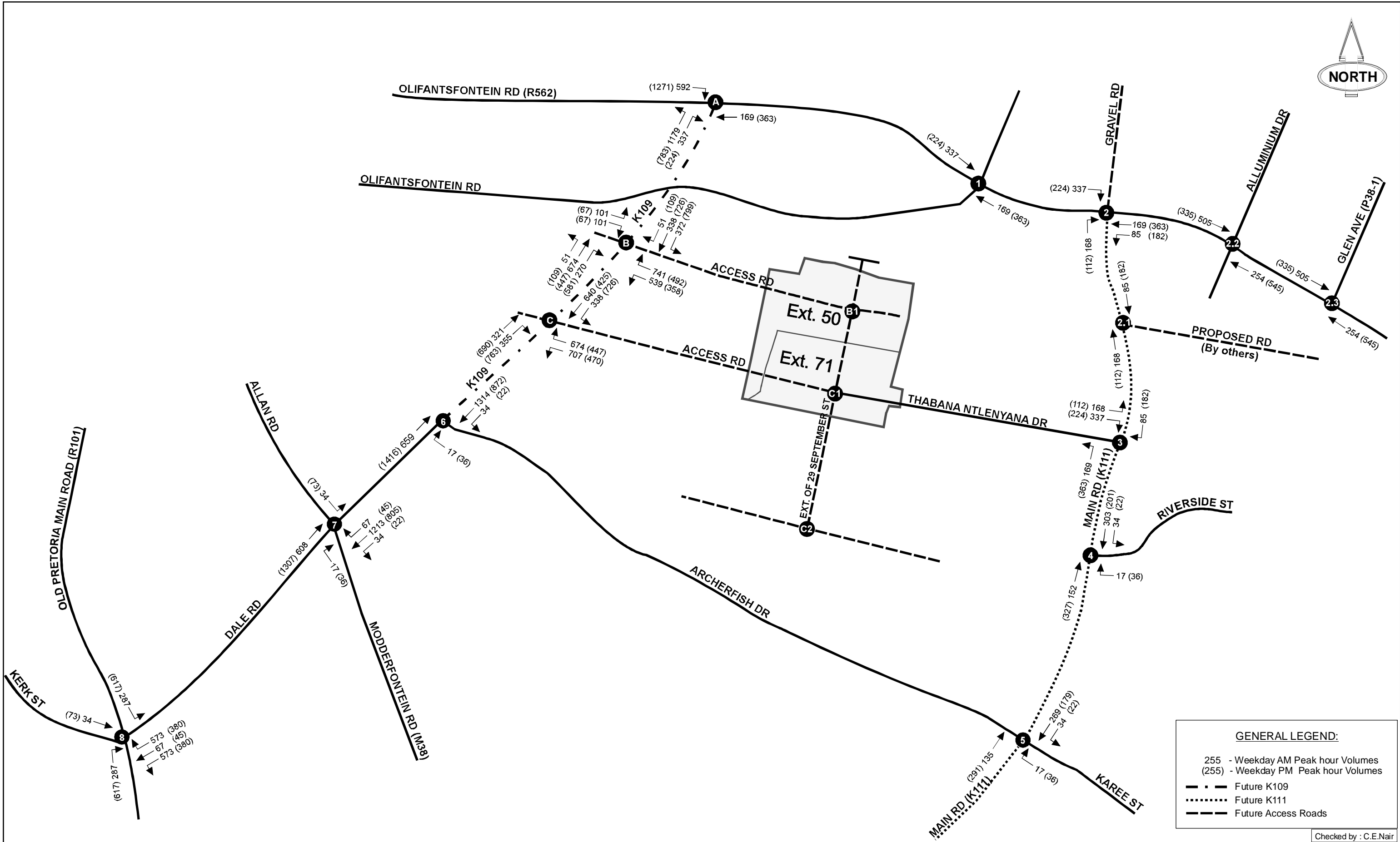


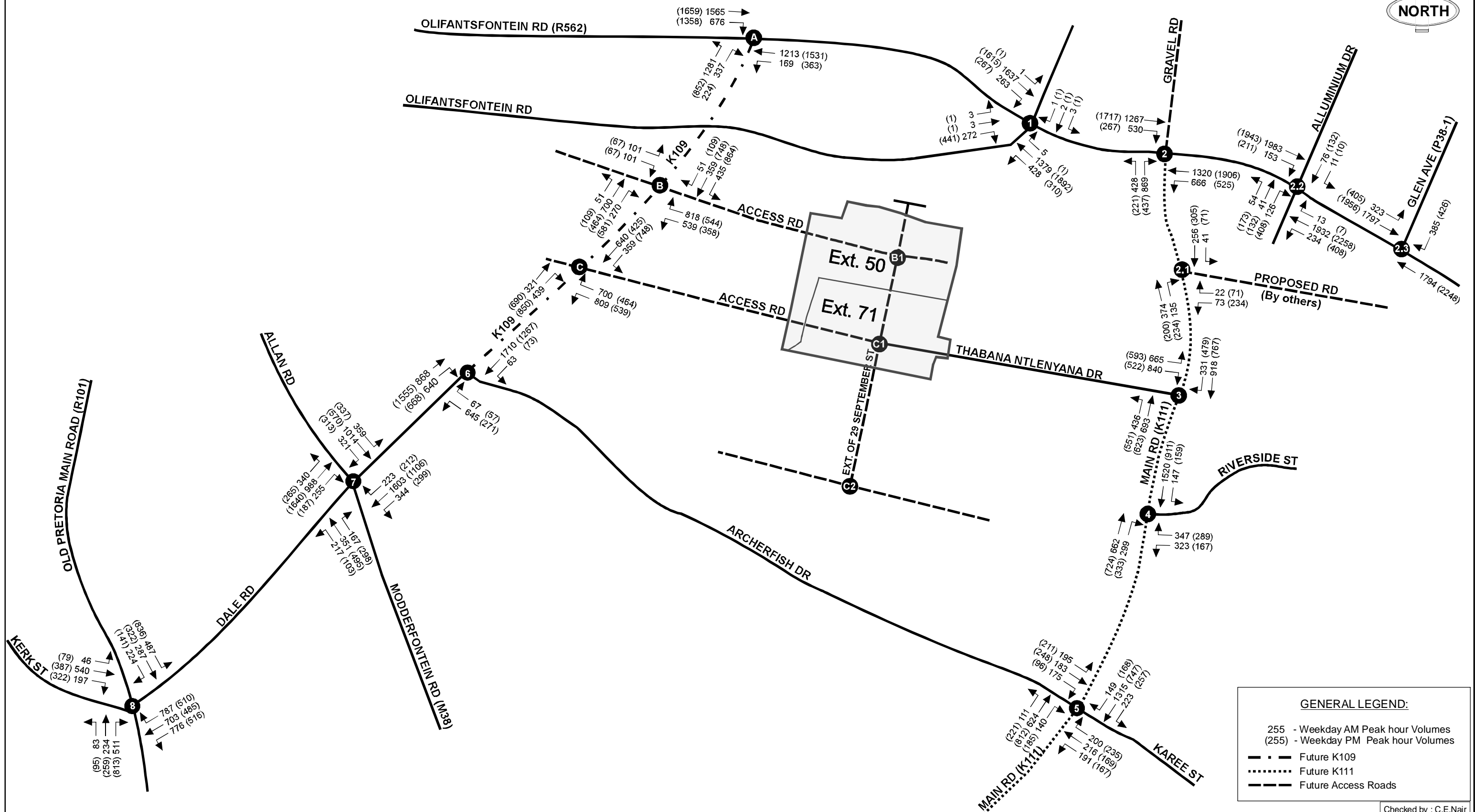
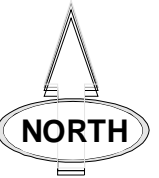












APPENDIX A-1
**SITE DEVELOPMENT PLAN & SCHEDULE OF
RIGHTS TABLES**

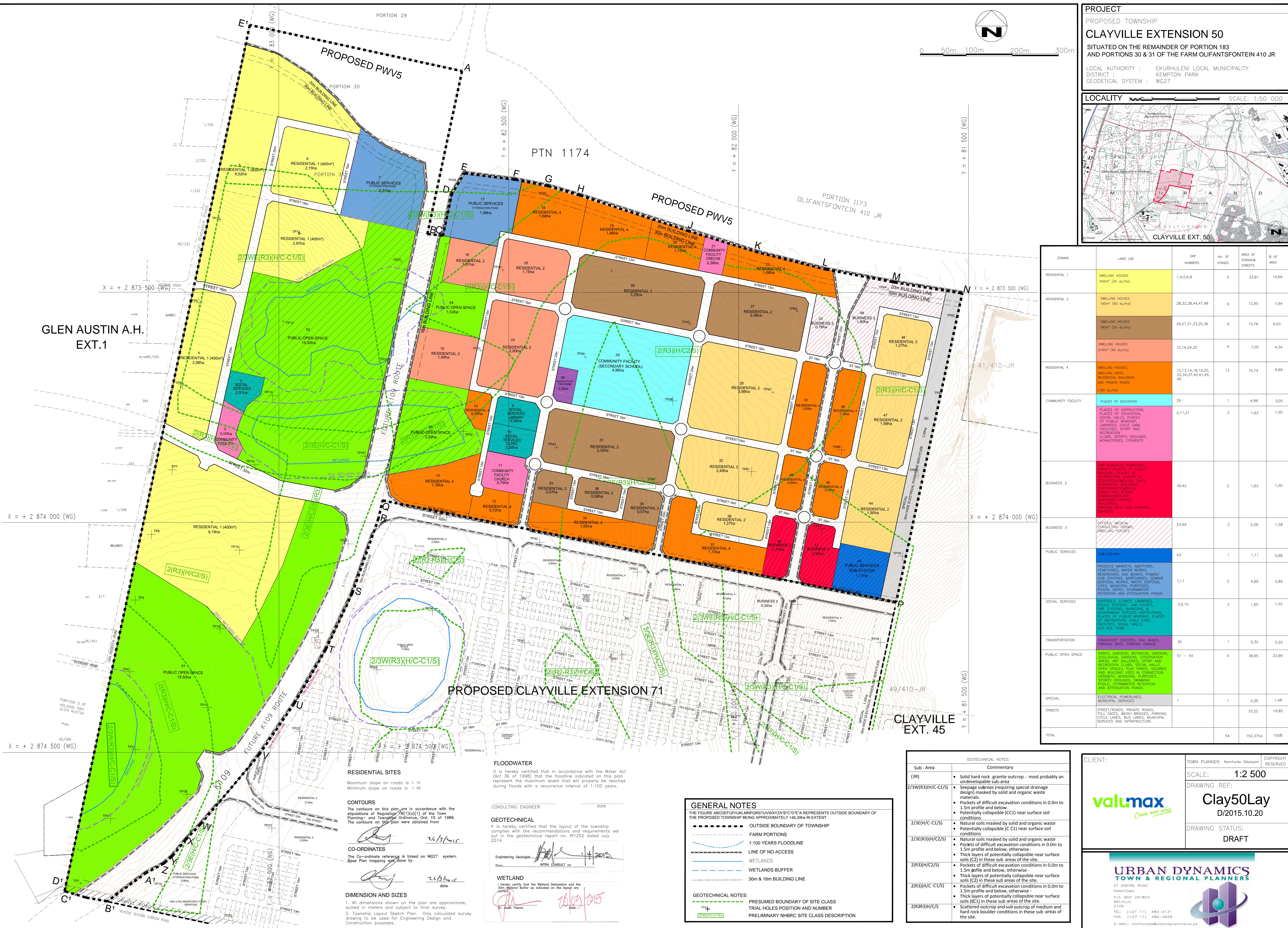
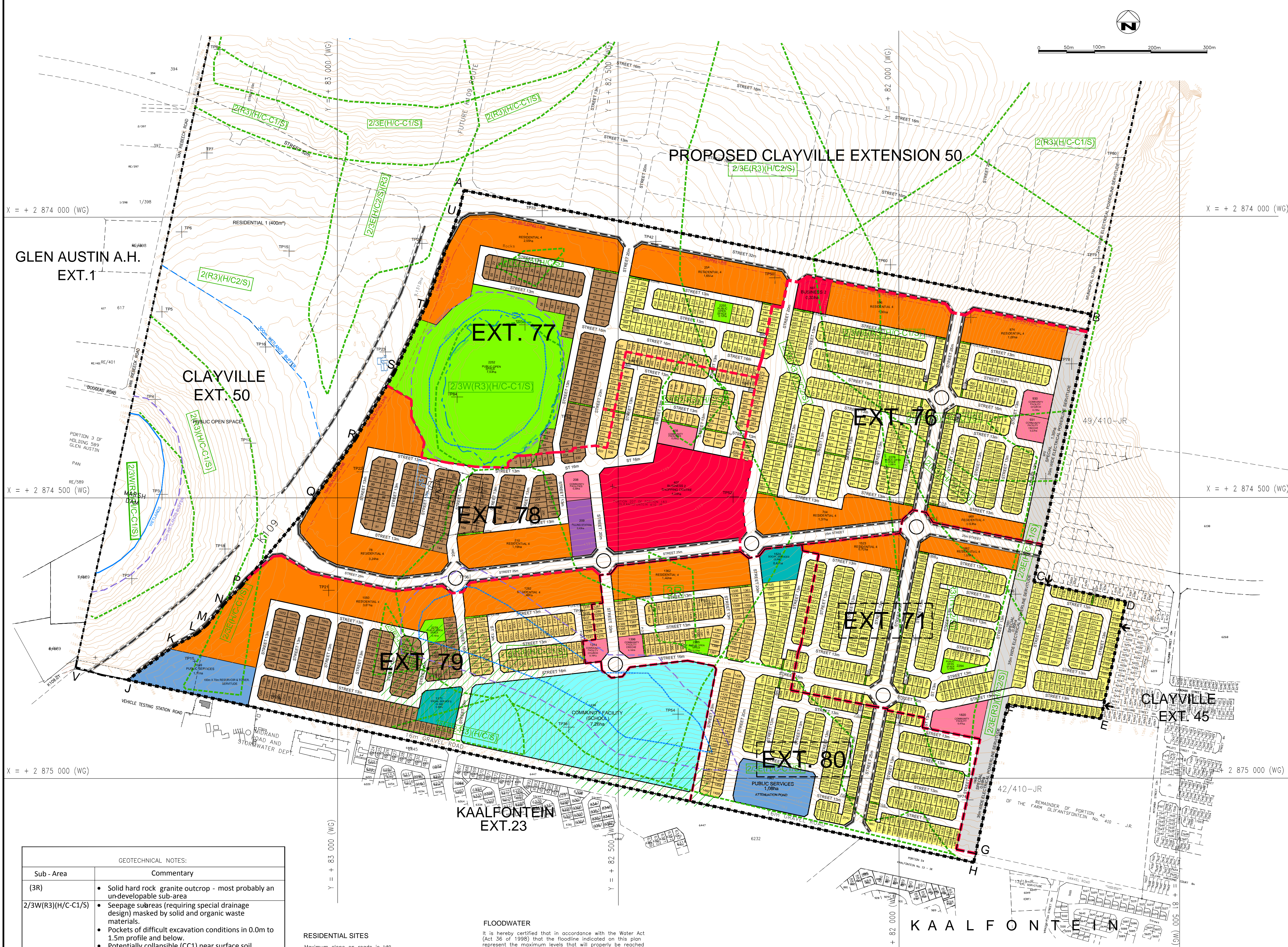


Table 1: Proposed zoning & development controls for the proposed Clayville Extension 50 Township.

ZONING	LAND USE	NO OF ERVEN / UNITS	DEVELOPMENT CONTROLS
Residential 1	Dwelling Houses 400m ² (25 du/ha)	5	Density: 25 du/ha; Height: As Per Scheme (2 Storeys); Coverage: As Per Scheme (60%) ; Parking: As Per Scheme (One Parking Bay Per Erf); Building Lines: 1m on All Sides
Residential 2	Dwelling Houses 160m ² (60 du/ha)	6	Density: 60 du/ha; Height: As Per Scheme (2 Storeys); Coverage: As Per Scheme (60%) ; Parking: As Per Scheme (One Parking Bay Per Erf); Building Lines: 1m on All Sides
	Dwelling Houses 180m ² (55 du/ha)	6	Density: 55 du/ha; Height: As Per Scheme (2 Storeys); Coverage: As Per Scheme (60%) ; Parking: As Per Scheme (One Parking Bay Per Erf); Building Lines: 1m on All Sides
	Dwelling Houses 216m ² (45 du/ha)	4	Density: 45 du/ha; Height: As Per Scheme (2 Storeys); Coverage: As Per Scheme (60%) ; Parking: As Per Scheme (One Parking Bay Per Erf); Building Lines: 1m on All Sides
Residential 4	Dwelling Houses, Dwelling Units, Residential Buildings And Private Roads (180 du/ha)	13 (2833 Units)	Density: 180 du/ha; Height: 4 Storeys; Coverage: 60% Parking: 0.5 Parking Bays Per Unit; Building Lines: 2m on all sides
Community Facility	Places of Education	1	Height: As Per Scheme (3 Storeys); Coverage: As Per Scheme (50%); Parking: As Per Scheme; Building Lines: As Per Scheme (5m On All Street Boundaries & 3m On All Other Boundaries)
	Places Of Instruction, Places Of Education, Social Halls, Places Of Public Worship, Libraries, Child Care Facilities, Sport And Recreation Clubs, Sports Grounds, Monasteries, Convents	3	Height: As Per Scheme (3 Storeys); Coverage: As Per Scheme (50%); Parking: As Per Scheme; Building Lines: As Per Scheme (5m On All Street Boundaries & 3m On All Other Boundaries)
Business 2	For Business Purposes, Shops, Places Of Public Worship, Places Of Instruction, Places Of Education, Dwelling Units, Residential Buildings, Restaurants, Medical Consulting Rooms, Gymnasium, Plant Nurseries, Service Industries, Parking Bays, Parking Garages	2	Height: As Per Scheme (2 Storeys) ; Coverage: As Per Scheme (70%); Parking: As Per Scheme; Building Lines: As Per Scheme (3m On Street Boundaries)
Business 3	Offices, Medical Consulting Rooms, Dwelling	2	Height: As Per Scheme (2

	Houses		Storeys) ; Coverage: As Per Scheme (70%); Parking: As Per Scheme; Building Lines: As Per Scheme (3m On Street Boundaries)
Public Services	Produce Markets, Abattoirs, Cemeteries, Water Works, Reservoirs, Gas Works, Power/Sub Stations, Mortuaries, Sewage Disposal Works, Waste Disposal Sites, Municipal Purposes, Postal Depots, Telecommunications, Parking, Swimming Pools, Stormwater Retention And Attenuation Ponds	3	As per Scheme
Social Services	Hospitals, Clinics, Libraries, Police Stations, Law Courts, Fire Stations, Municipal & Government Offices, Institutions, Places Of Public Worship, Places Of Instruction, Child Care Facilities, Social Halls, Old Age Home	3	As per Scheme
Transportation	Transport Centers, Taxi Ranks, Parking Bays, Parking Garages	1	As per Scheme
Public Open Space	Parks, Gardens, Botanical Gardens, Zoological Gardens, Conservation Areas, Art Galleries, Sport & Recreation Clubs, Social Halls, Open Spaces, Play Parks, Squares And Buildings Used In Connection Herewith, Municipal Purposes, Sports Grounds, Swimming Pools, Stormwater Retention & Attenuation Ponds.	4	As per Scheme
Special	Electrical Powerlines & Municipal Services	3	As per Scheme
Roads	Streets/Roads, Private Roads, Toll Gates, Weigh Bridges, Parking, Cycle Lanes, Bus Lanes, Municipal Services And Infrastructure		As Per Scheme

* Proposed Zonings are in terms of the Ekurhuleni Town Planning Scheme, 2014.



GEOTECHNICAL NOTES:	
Sub - Area	Commentary
(3R)	• Solid hard rock granite outcrop - most probably an undevelopable sub-area
2/3W(R3)(H/C-C1/S)	• Seepage subareas (requiring special drainage design) masked by solid and organic waste materials. • Pockets of difficult excavation conditions in 0.0m to 1.5m profile and below. • Potentially collapsible (CC1) near surface soil conditions
2/3E(H/C-C1/S)	• Natural soils masked by solid and organic waste • Potentially collapsible (C C1) near surface soil conditions
2/3E(R3)(H/C2/S)	• Natural soils masked by solid and organic waste • Pockets of difficult excavation conditions in 0.0m to 1.5m profile and below, otherwise - • Thick layers of potentially collapsible near surface soils (C2) in these sub areas of the site.
2(R3)(H/C2/S)	• Pockets of difficult excavation conditions in 0.0m to 1.5m profile and below, otherwise - • Thick layers of potentially collapsible near surface soils (C2) in these sub areas of the site.
2(R3)(H/C -C1/S)	• Pockets of difficult excavation conditions in 0.0m to 1.5m profile and below, otherwise - • Thick layers of potentially collapsible near surface soils (CC1) in these sub-areas of the site.
2(R2R3)H/C/S	• Scattered outcrop and sub outcrop of medium and hard rock boulder conditions in these sub -areas of the site.

RESIDENTIAL SITES

Maximum slope on roads is 1:50
Minimum slope on roads is 1:18

CONTOURS

The contours on this plan are in accordance with the stipulations of Regulation 7(1)(c) of the Town Planning - and Townships Ordinance, Ord. 15 of 1986. The contours on this plan were obtained from

CO-ORDINATES

The Co-ordinate reference is based on WG27 system. Base Plan mapping was done by

DIMENSION AND SIZES

- All dimensions shown on the plan are approximate, scaled in meters and subject to final survey.
- Township Layout Sketch Plan. Only calculated survey drawing to be used for Engineering Design and Construction purposes.

FLOODWATER

It is hereby certified that in accordance with the Water Act (Act 36 of 1998) that the floodline indicated on this plan represent the maximum levels that will properly be reached during floods with a recurrence interval of 1:100 years.

CONSULTING ENGINEER

GEOTECHNICAL

It is hereby certified that the layout of the township complies with the recommendations and requirements set out in the geotechnical report no. IR1252 dated July 2014.

WETLAND

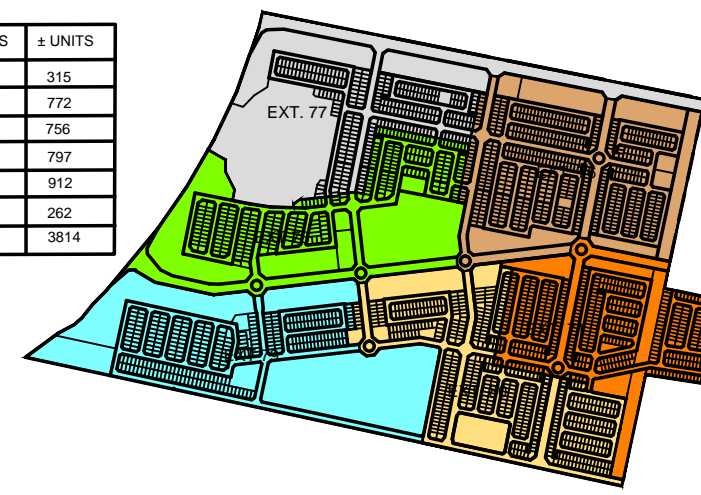
I hereby certify that the Wetland Delineation and the 30m Wetland Buffer as indicated on the layout are correct.

Dr. Elna Theron

20/09/2015

CLAYVILLE COMPILATION PROPOSED EXTENSIONS

PHASES	STANDS	UNITS
EXT. 71	434	315
EXT. 76	623	772
EXT. 77	252	756
EXT. 78	287	787
EXT. 79	274	812
EXT. 80	480	382
TOTAL	2250	3814



PROJECT

PROPOSED TOWNSHIP

CLAYVILLE COMPILATION

SITUATED ON PORTION 207 OF PORTION 183
OF THE FARM OLIFANTSFONTEIN 410 JR

LOCAL AUTHORITY : EKURHULENI LOCAL MUNICIPALITY

DISTRICT : KEMPTON PARK

GEODETICAL SYSTEM : WG27

LOCALITY

SCALE: 1:50 000

LAND USE TABLE

ZONING	LAND USE	ERF NUMBERS	No. OF STANDS	AREA OF STANDS & STREETS	% OF AREA
RESIDENTIAL 2	DWELLING HOUSES 8m x 15m = 180m²	255-363,543-595, 598-703,705-873, 875-929,932-968, 971-1048,1483-1522, 1525-1560,1663-1819, 1821-1867,1869-1962, 1964-2251	1369	24,42	19,08
	DWELLING HOUSES 8m x 20m = 160m²	364-406,409-542, 1235-1273,1275-1281, 1283-1361,1363-1365, 1397-1433,1435-1482	420	8,05	6,29
	DWELLING HOUSES 9,8m x 22m = 216m²	543-577,79-207,211-253, 255-277,279-301,303-305, 307-309,311-313,315-317, 319-321,323-325,327-329, 331-333,335-337,339-341, 343-345,347-349,351-353, 355-357,359-361,363-365, 367-369,371-373,375-377, 379-381,383-385,387-389, 391-393,395-397,399-401, 403-405,407-409,411-413, 415-417,419-421,423-425, 427-429,431-433,435-437, 439-441,443-445,447-449, 451-453,455-457,459-461, 463-465,467-469,471-473, 475-477,479-481,483-485, 487-489,491-493,495-497, 499-501,503-505,507-509, 511-513,515-517,519-521, 523-525,527-529,531-533, 535-537,539-541,543-545, 547-549,551-553,555-557, 559-561,563-565,567-569, 571-573,575-577,579-581, 583-585,587-589,591-593, 595-597,599-601,603-605, 607-609,611-613,615-617, 619-621,623-625,627-629, 631-633,635-637,639-641, 643-645,647-649,651-653, 655-657,659-661,663-665, 667-669,671-673,675-677, 679-681,683-685,687-689, 691-693,695-697,699-701, 703-705,707-709,711-713, 715-717,719-721,723-725, 727-729,731-733,735-737, 739-741,743-745,747-749, 751-753,755-757,759-761, 763-765,767-769,771-773, 775-777,779-781,783-785, 787-789,791-793,795-797, 799-801,803-805,807-809, 811-813,815-817,819-821, 823-825,827-829,831-833, 835-837,839-841,843-845, 847-849,851-853,855-857, 859-861,863-865,867-869, 871-873,875-877,879-881, 883-885,887-889,891-893, 895-897,899-901,903-905, 907-909,911-913,915-917, 919-921,923-925,927-929, 931-933,935-937,939-941, 943-945,947-949,951-953, 955-957,959-961,963-965, 967-969,971-973,975-977, 979-981,983-985,987-989, 991-993,995-997,999-1001, 1003-1005,1007-1009, 1011-1013,1015-1017, 1019-1021,1023-1025, 1027-1029,1031-1033, 1035-1037,1039-1041, 1043-1045,1047-1049, 1051-1053,1055-1057, 1059-1061,1063-1065, 1067-1069,1071-1073, 1075-1077,1079-1081, 1083-1085,1087-1089, 1091-1093,1095-1097, 1099-1101,1103-1105, 1107-1109,1111-1113, 1115-1117,1119-1121, 1123-1125,1127-1129, 1131-1133,1135-1137, 1139-1141,1143-1145, 1147-1149,1151-1153, 1155-1157,1159-1161, 1163-1165,1167-1169, 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Table 1: Proposed zoning & development controls for the proposed Clayville Extension 71, 76-80 Township.

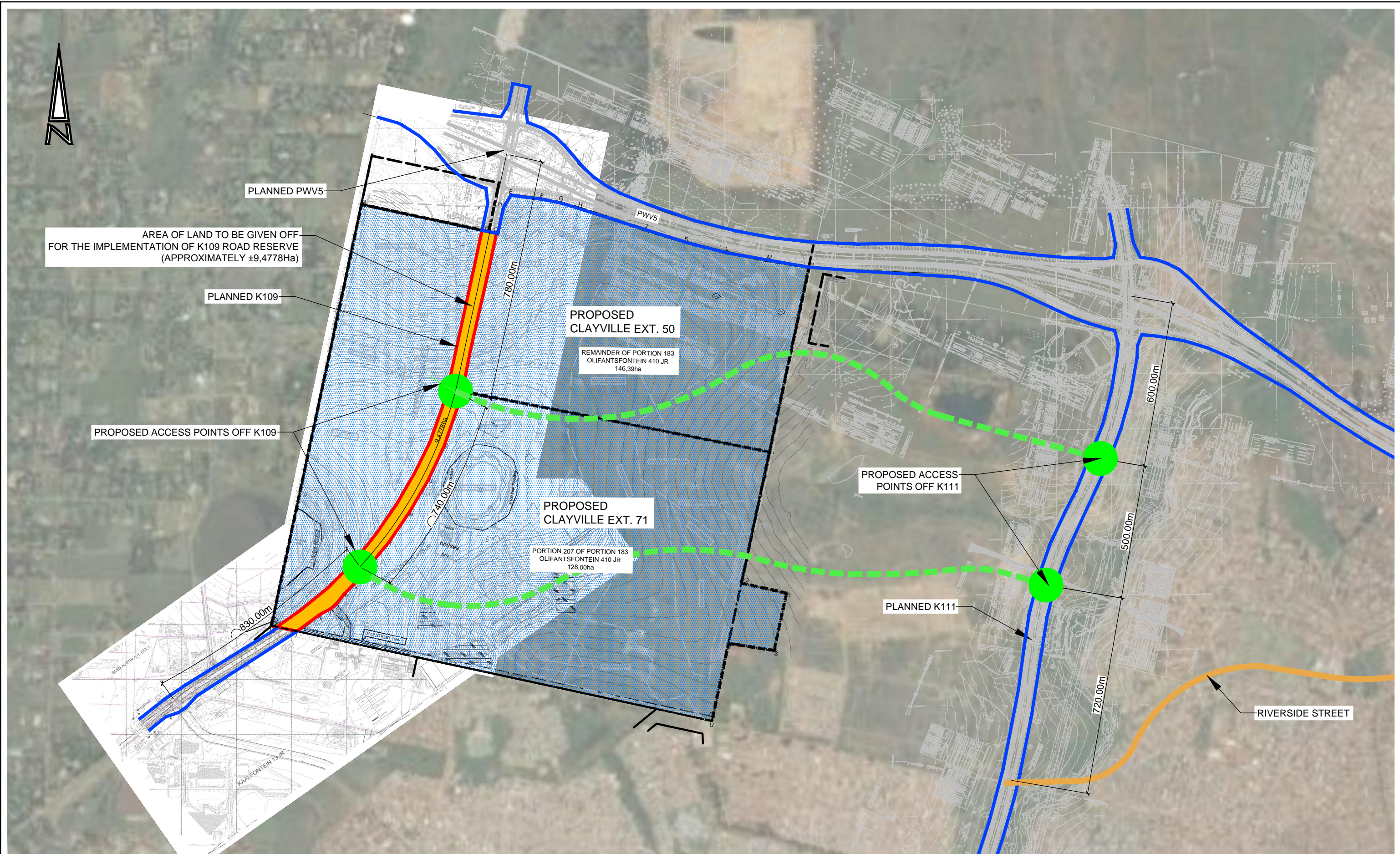
ZONING	LAND USE	NO OF ERVEN / UNITS	DEVELOPMENT CONTROLS
Residential 2	Dwelling Houses 9m X 18m = 160m ²	1369	Density: As Per Scheme (One Dwelling Per Erf); Height: As Per Scheme (2 Storeys); Coverage: As Per Scheme (60%) ; Parking: As Per Scheme (One Parking Bay Per Erf); Building Lines: 1m on All Sides
	Dwelling Houses 9m X 20m = 180m ²	420	Density: As Per Scheme (One Dwelling Per Erf); Height: As Per Scheme (2 Storeys); Coverage: As Per Scheme (60%) ; Parking: As Per Scheme (One Parking Bay Per Erf); Building Lines: 1m on All Sides
	Dwelling Houses 9,8m X 22m = 216m ²	431	Density: As Per Scheme (One Dwelling Per Erf); Height: As Per Scheme (2 Storeys); Coverage: As Per Scheme (60%) ; Parking: As Per Scheme (One Parking Bay Per Erf); Building Lines: 1m on All Sides
Residential 4	Dwelling Houses, Dwelling Units, Residential Buildings And Private Roads	13 (3814 Units)	Density: 180 du/ha; Height: 4 Storeys; Coverage: 60% Parking: 0.5 Parking Bays Per Unit; Building Lines: 2m on all sides
Business 2	For Business Purposes, Shops, Places Of Public Worship, Places Of Instruction, Places Of Education, Dwelling Units, Residential Buildings, Restaurants, Medical Consulting Rooms, Gymnasium, Plant Nurseries, Service Industries, Parking Bays, Parking Garages	2	Height: As Per Scheme (2 Storeys) ; Coverage: As Per Scheme (70%); Parking: As Per Scheme; Building Lines: As Per Scheme (3m On Street Boundaries)
Public Garage	Filling Station, Car Wash, Motor Dealers, Motor Workshops	1	Height: As Per Scheme (2 Storeys); Coverage: As Per Scheme (60%); Parking: As Per Scheme; Building Lines: As Per Scheme (3m On Street Boundaries & 5m On All Other Boundaries)
Public Open Space	Parks, Gardens, Botanical Gardens, Zoological Gardens, Conservation Areas, Art Galleries, Sport & Recreation Clubs, Social Halls, Open Spaces, Play Parks, Squares And Buildings Used In Connection Herewith, Municipal Purposes, Sports Grounds, Swimming Pools, Stormwater Retention & Attenuation Ponds.	48	As per Scheme
Community Facility	Places of Education	1	Height: As Per Scheme (3 Storeys); Coverage: As Per Scheme (50%); Parking: As Per Scheme; Building Lines: As Per Scheme (5m On All Street

			Boundaries & 3m On All Other Boundaries)
	Places Of Instruction, Places Of Education, Social Halls, Places Of Public Worship, Libraries, Child Care Facilities, Sport And Recreation Clubs, Sports Grounds, Monasteries, Convents	7	Height: As Per Scheme (3 Storeys); Coverage: As Per Scheme (50%); Parking: As Per Scheme; Building Lines: As Per Scheme (5m On All Street Boundaries & 3m On All Other Boundaries)
Social Service	Hospitals, Clinics, Libraries, Police Stations, Law Courts, Fire Stations, Municipal & Government Offices, Institutions, Places Of Public Worship, Places Of Instruction, Child Care Facilities, Social Halls, Old Age Home	2	As per Scheme
Public Services	Produce Markets, Abattoirs, Cemeteries, Water Works, Reservoirs, Gas Works, Power/Sub Stations, Mortuaries, Sewage Disposal Works, Waste Disposal Sites, Municipal Purposes, Postal Depots, Telecommunications, Parking, Swimming Pools, Stormwater Retention And Attenuation Ponds	2	As per Scheme
Special	Electrical Powerlines & Municipal Services	3	As per Scheme
Roads	Streets/Roads, Private Roads, Toll Gates, Weigh Bridges, Parking, Cycle Lanes, Bus Lanes, Municipal Services And Infrastructure		As Per Scheme

* Proposed Zonings are in terms of the Ekurhuleni Town Planning Scheme, 2014.

APPENDIX A-2

ROAD NETWORK PLANNING & GAUTENG STRATEGIC NETWORK PLAN



						CLIENT: VALUMAX MIDRAND (PTY) LTD
B	2015/11/06	MSM	JRA ROAD NETWORK ADDED	C N	A K	
A	2015/04/21	MSM	FOR INFORMATION ONLY	A K	A K	
REV	DATE	BY	DESCRIPTION	CHK	APD	
DRAWING STATUS: <div>PRELIMINARY</div> <div>If drawing status = construction, a signed copy of this drawing (either in hardcopy or electronic format) is available at the office of origin and at the office of issue.</div>						




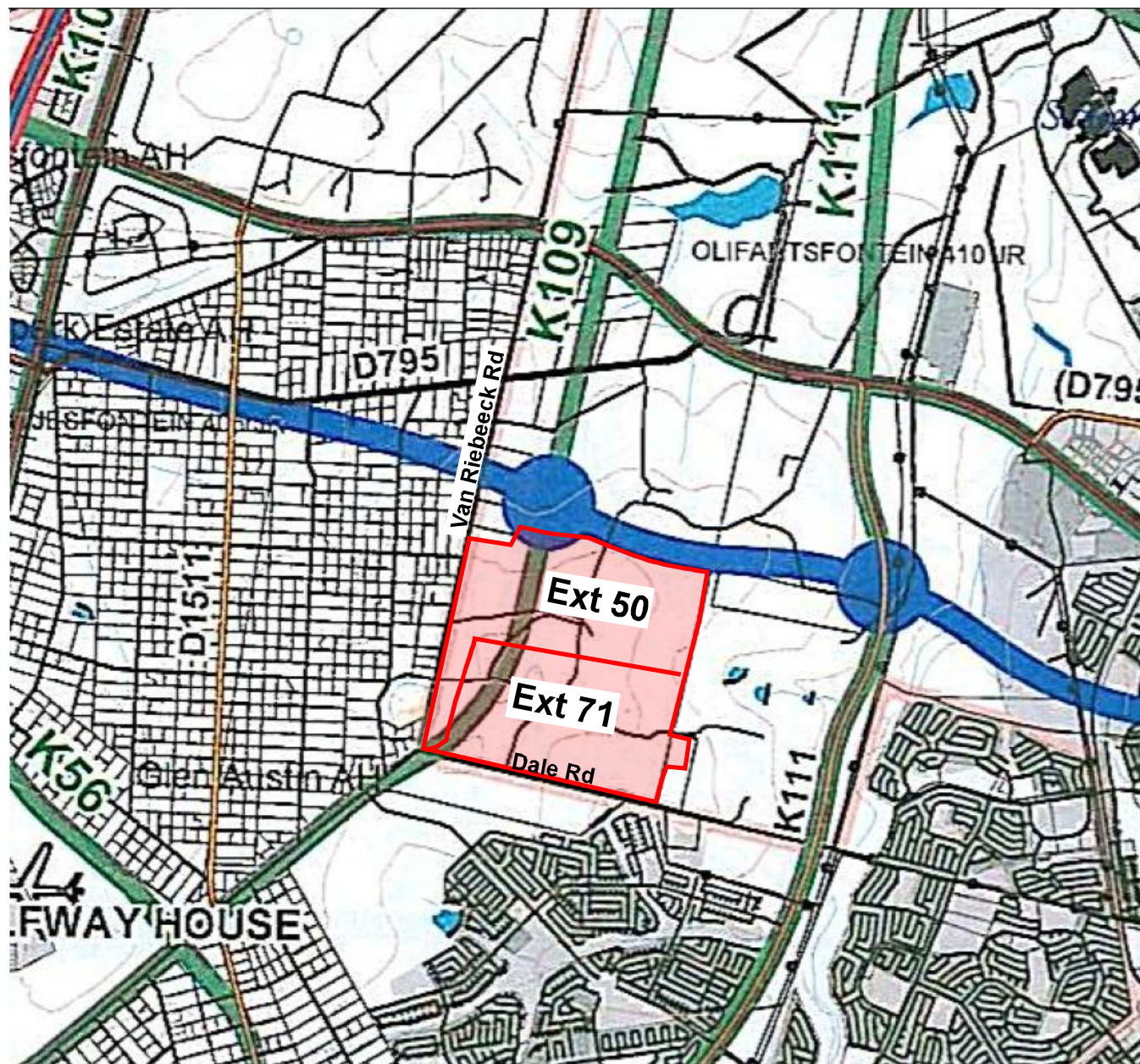
WSP Group Africa (Pty) Ltd
Civil and Coastal Division
314 Glenwood Road, Lynnwood Park, Pretoria, 0081
PostNet Suite 287, Private Bag X025, Lynnwood Ridge, 0040
Tel: +27(0)12-762-1200 Fax: +27(0)12-762-1301 www.wspgroup.co.za

PROJECT:
PORTION 183 OF THE FARM OLIFANTSFONTEIN 410-JR
[GLEN AUSTIN]

TITLE:
SITE AERIAL VIEW, PLANNED ROUTES AND PROPOSED
ACCESS LAYOUT

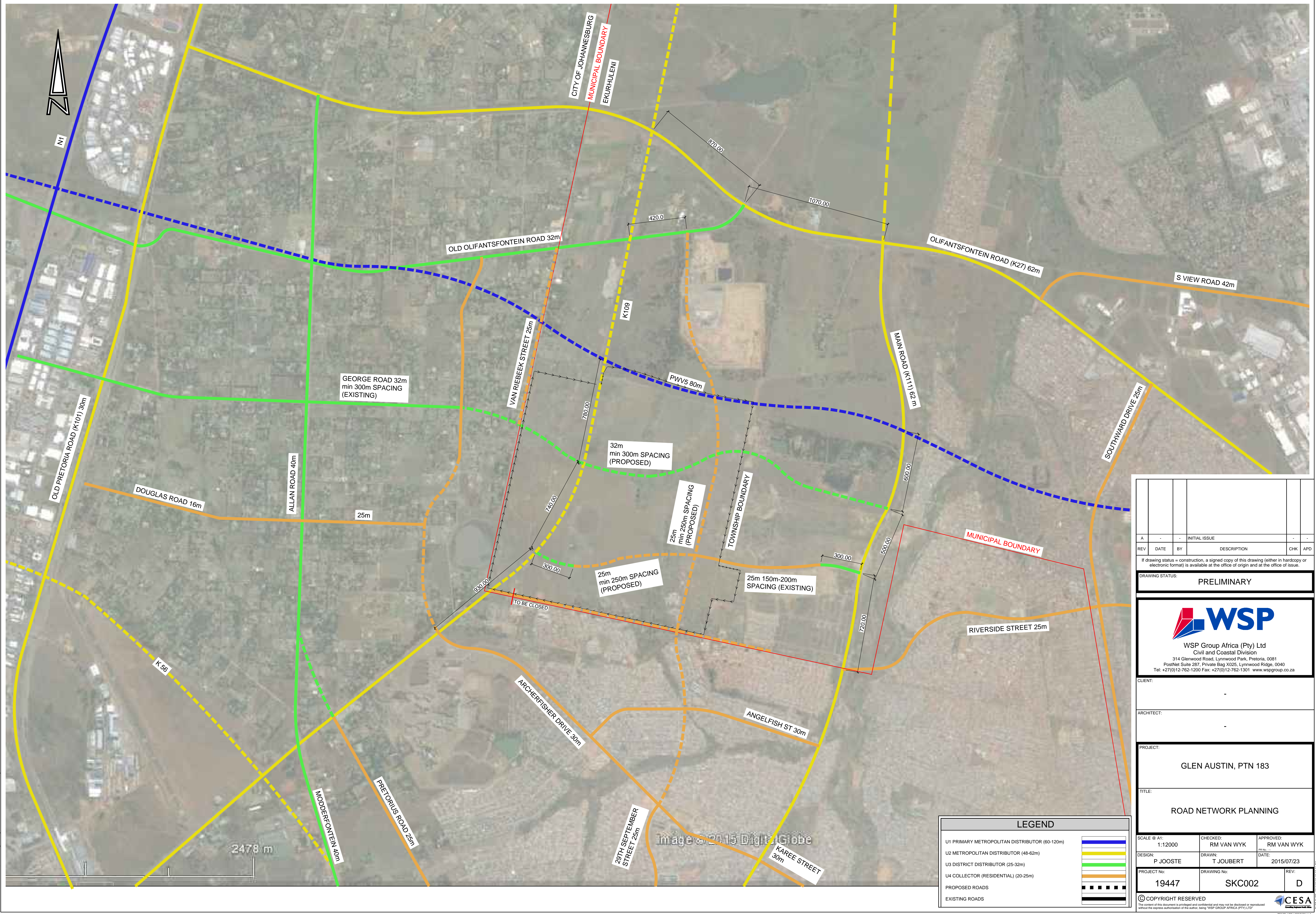
SCALE @ A3: 1:12500	CHECKED: A K KOEKEMOER	APPROVED: A K KOEKEMOER PR No.: 200570085
DESIGN: MS MASHAMBA	DRAWN: MS MASHAMBA	DATE: 2015/11/06
PROJECT No: 19447	DRAWING No: SKC001	REV: B
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Checked by : C.E.Nair

19447 Clayville Ext 50 & 71_Gauteng Major Road Network_1.cdr



A	-	-	INITIAL ISSUE	-	-
REV	DATE	BY	DESCRIPTION	CHK	APD
If drawing status = construction, a signed copy of this drawing (either in hardcopy or electronic format) is available at the office of origin and at the office of issue.					
DRAWING STATUS: PRELIMINARY					
 WSP Group Africa (Pty) Ltd Civil and Coastal Division 314 Glenwood Road, Lynnwood Park, Pretoria, 0081 PostNet Suite 287, Private Bag X025, Lynnwood Ridge, 0040 Tel: +27(0)12-762-1200 Fax: +27(0)12-762-1301 www.wspgroup.co.za					
CLIENT: -					
ARCHITECT: -					
PROJECT: GLEN AUSTIN, PTN 183					
TITLE: ROAD NETWORK PLANNING					
SCALE @ A1: 1:12000		CHECKED: RM VAN WYK		APPROVED: RM VAN WYK	
DESIGN: P JOOSTE		DRAWN: T JOUBERT		DATE: 2015/07/23	
PROJECT No: 19447		DRAWING No: SKC002		REV: D	
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2478 m

TEMPLATE VERSION 1.0

APPENDIX A-3
DRAWINGS: INTERSECTION LAYOUTS

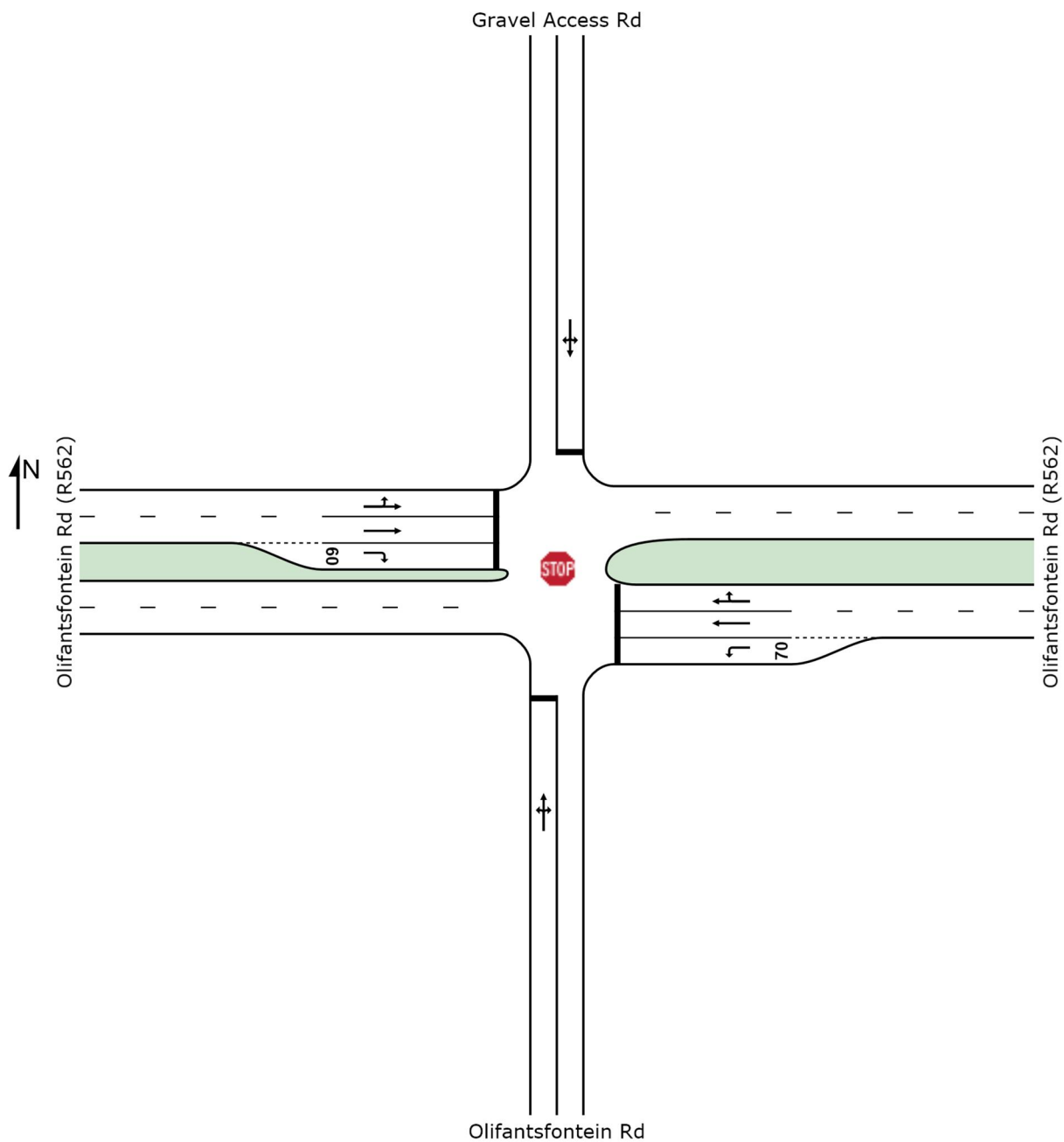
EXISTING INTERSECTION LAYOUTS

1. SITE LAYOUT



Site: 2015 AM

Olifantsfontein Rd (R562) & Olifantsfontein Rd Intersection - 2015 AM Peak Hour Traffic Volumes
Stop (All-Way)

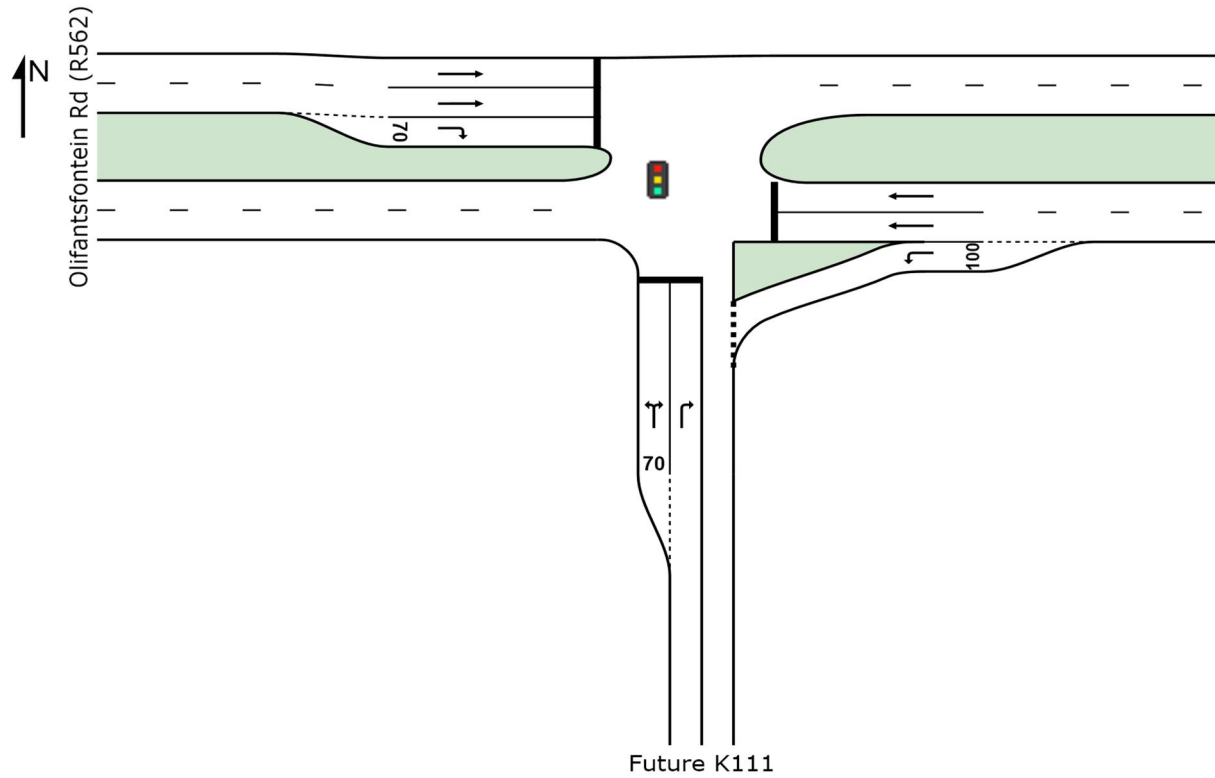


2. SITE LAYOUT



Site: 2015 AM

Olifantsfontein Rd (R562) & Future K111 - 2015 AM Peak Hour Traffic Volumes
Signals - Fixed Time Isolated

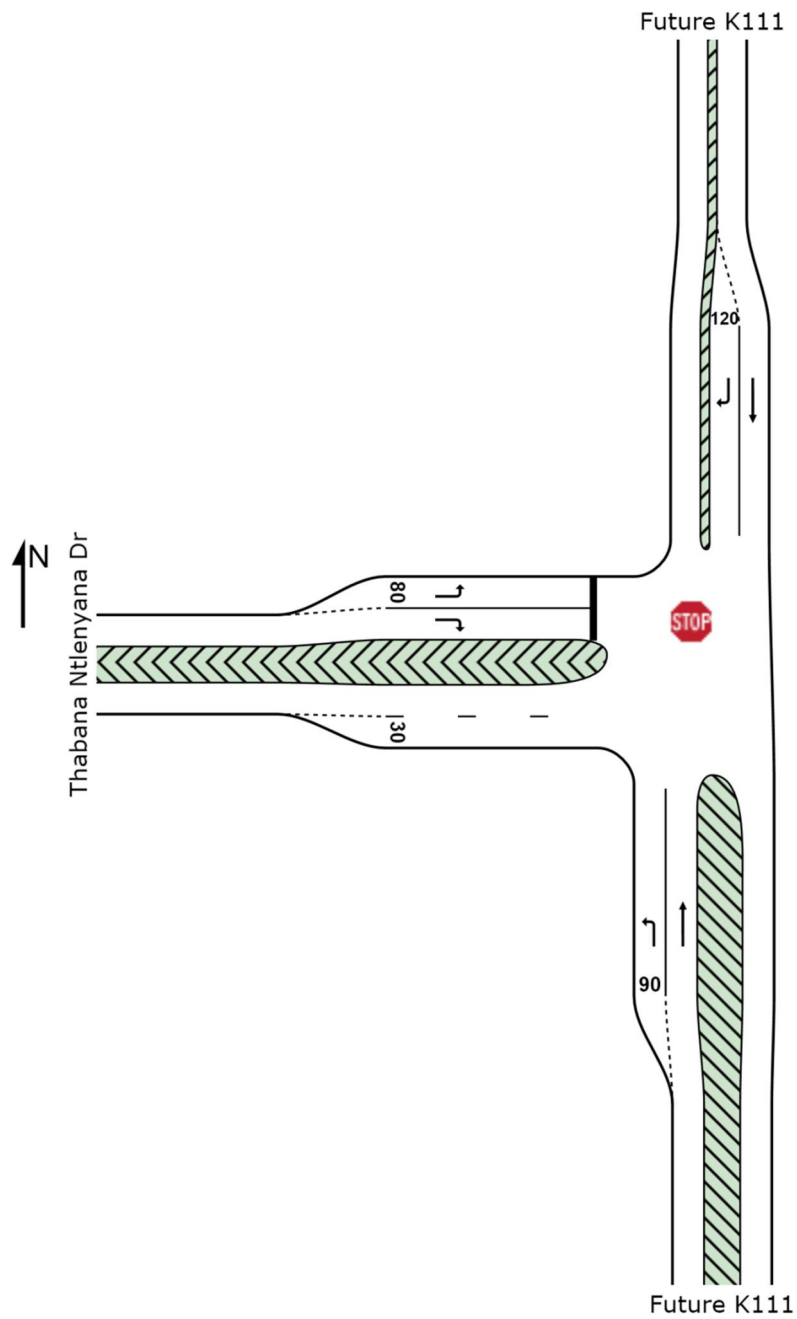


3. SITE LAYOUT



Site: 2015 AM

Future K111 & Thabana Ntlenyana Drive - 2015 AM Peak Hour Traffic Volumes
Stop (Two-Way)

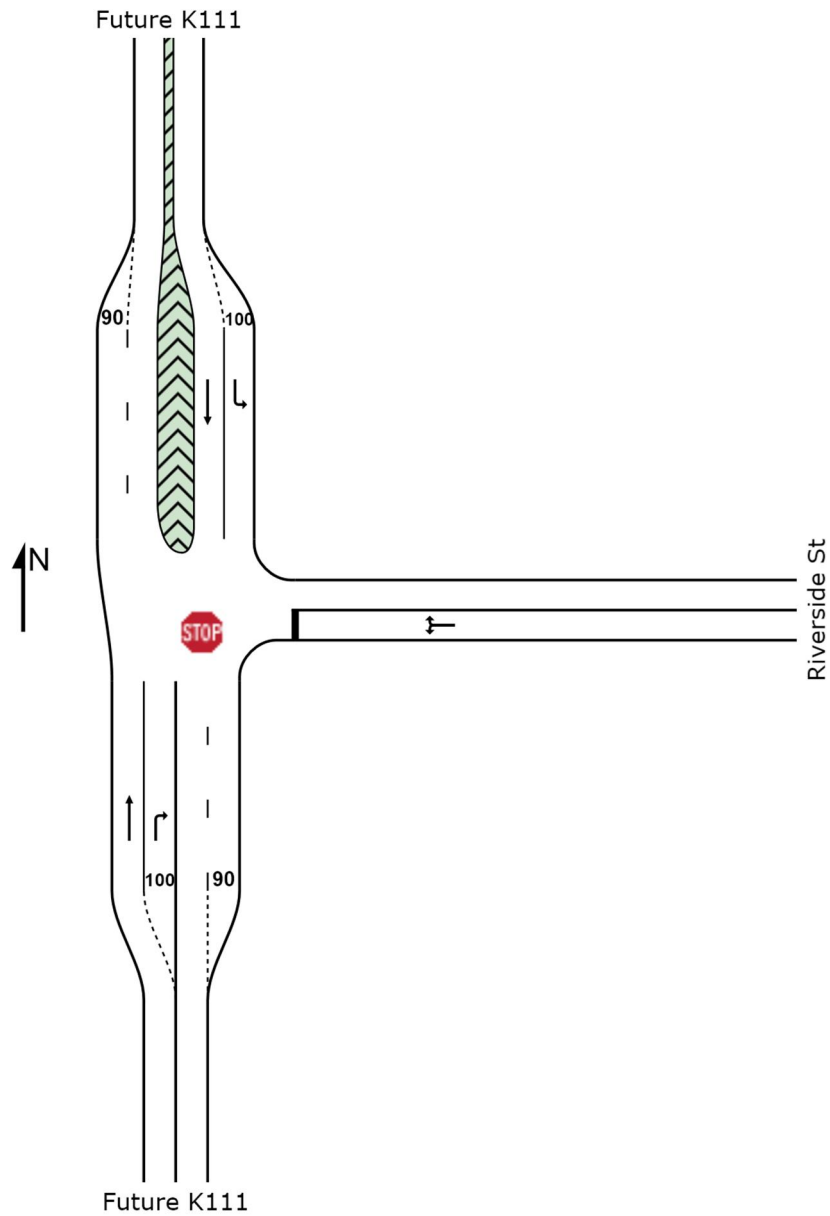


4. SITE LAYOUT



Site: 2015 AM

Future K111 & Riverside St - 2015 AM Peak Hour Traffic Volumes
Stop (Two-Way)

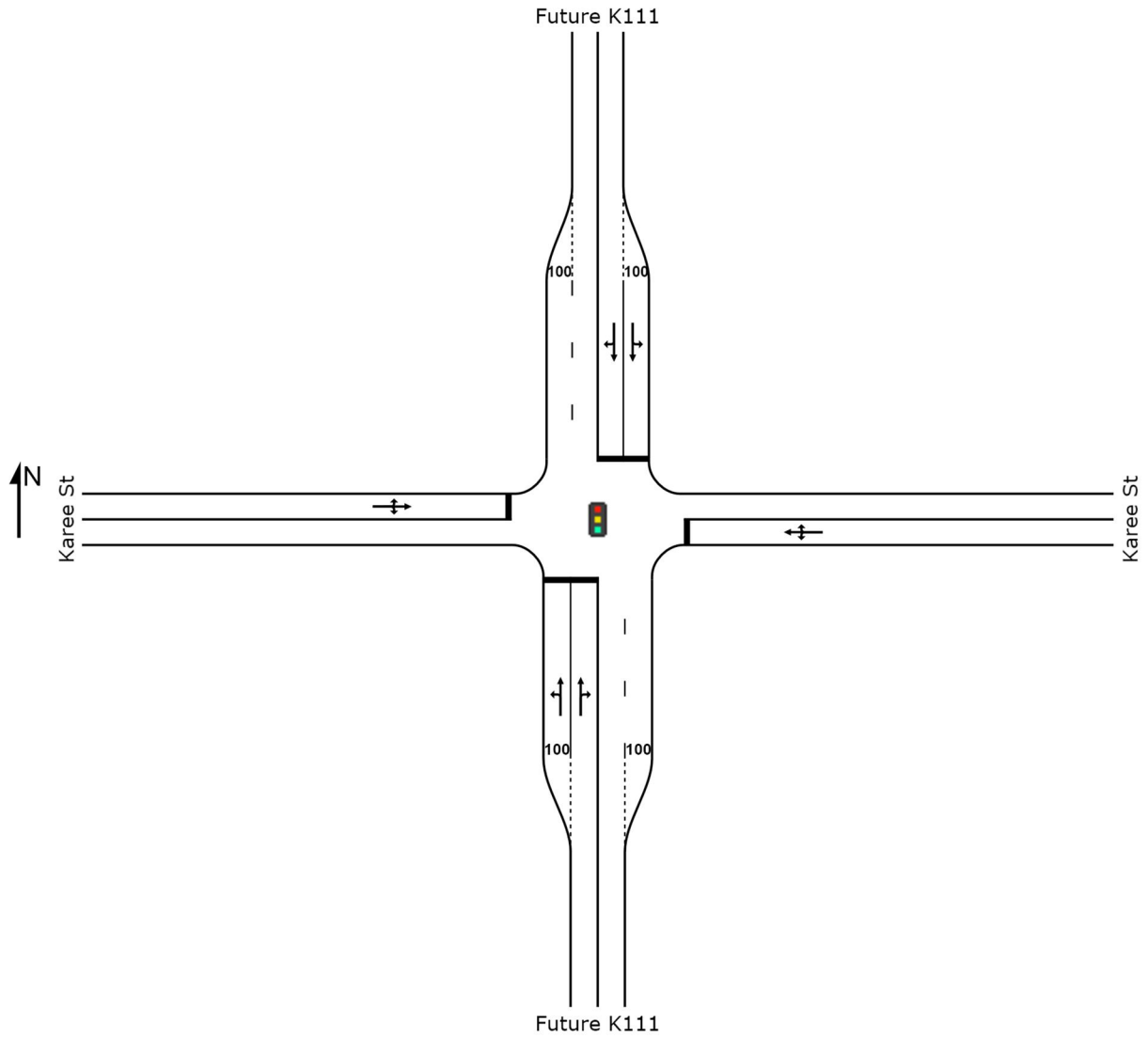


5. SITE LAYOUT



Site: 2015 AM

Future K111 & Karee St - 2015 AM Peak Hour Traffic Volumes
Signals - Fixed Time Isolated

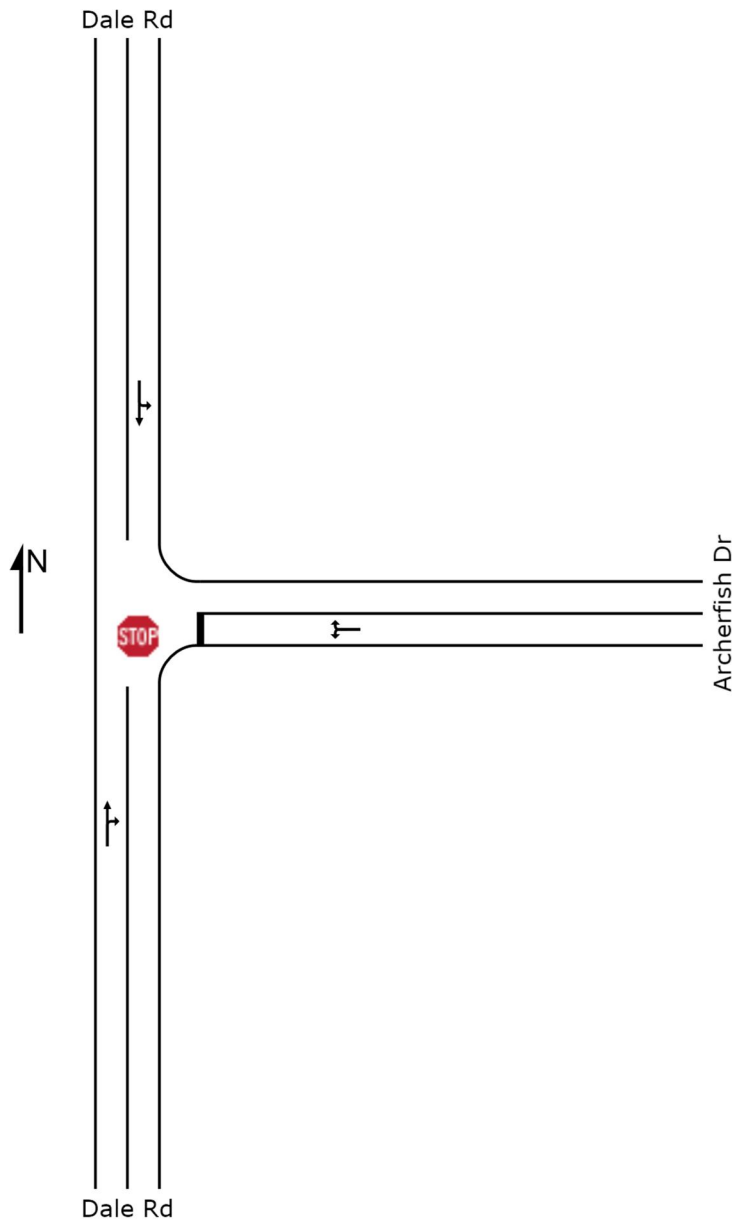


6. SITE LAYOUT



Site: 2015 AM

Dale Rd & Archerfish Dr - 2015 AM Peak Hour Traffic Volumes
Stop (Two-Way)

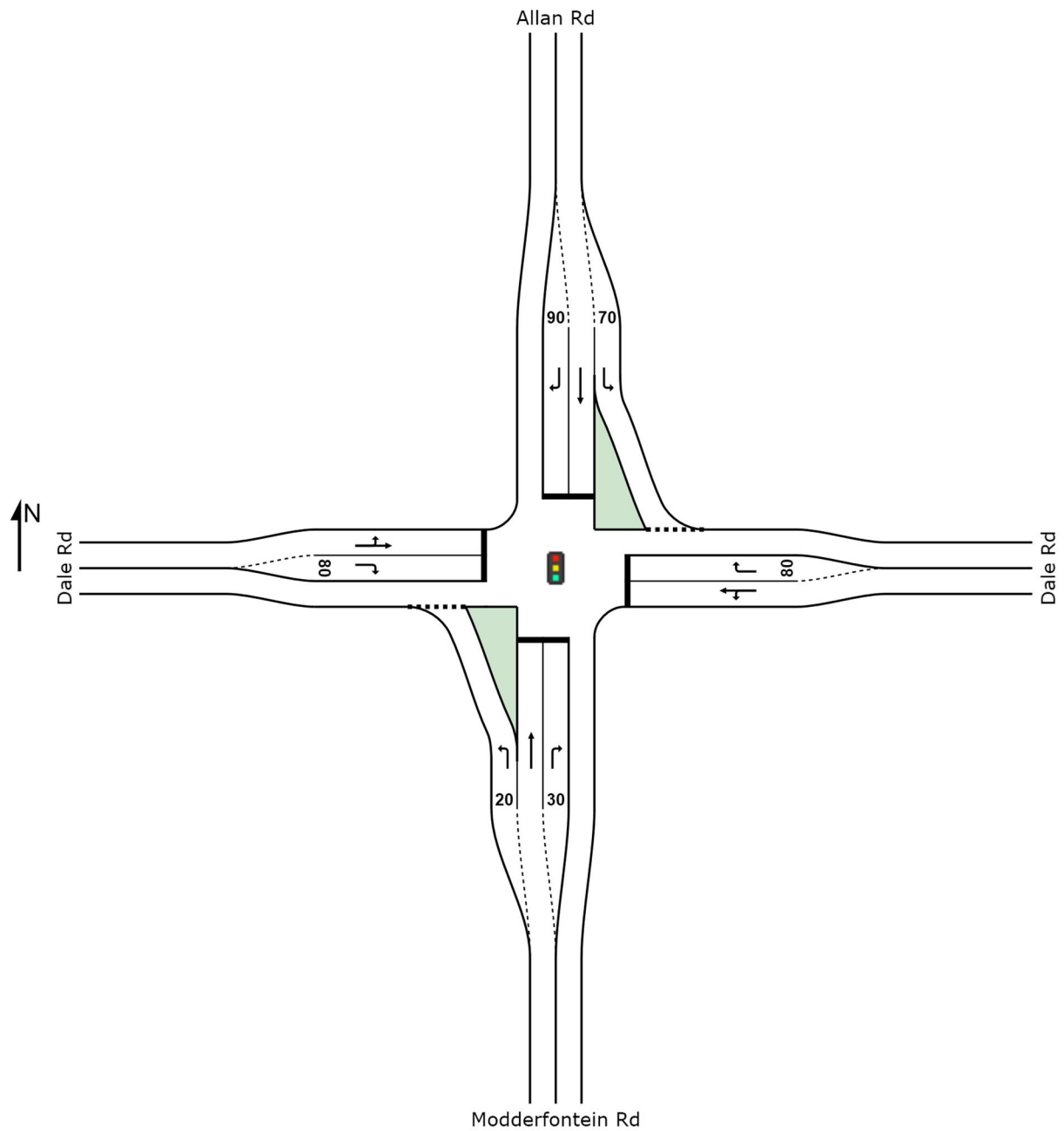


7. SITE LAYOUT



Site: 2015 AM

Dale Rd & Modderfontein Rd - 2015 AM Peak Hour Traffic Volumes
Signals - Fixed Time Isolated

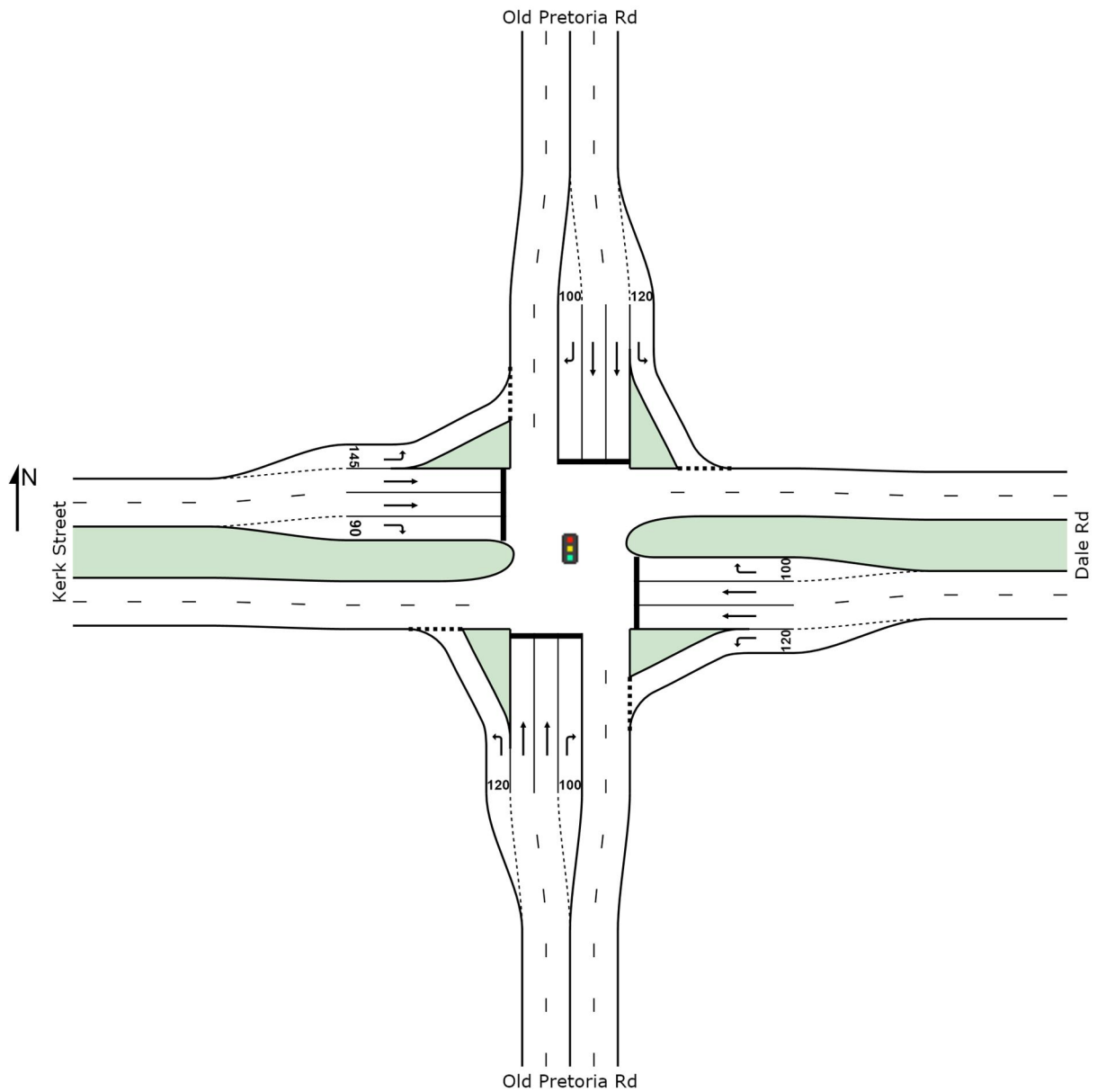


8. SITE LAYOUT



Site: 2015 AM

Dale Rd & Old Pretoria Rd - 2015 AM Peak Hour Traffic Volumes
Signals - Fixed Time Isolated



UPGRADED / NEW INTERSECTION LAYOUTS

Please note: All upgrades mentioned in this appendix which are due to the developer or others are a guide and are required to be agreed and confirmed with EMM and GDRT. The phasing of upgrades are discussed in Chapter 8.

1. SITE LAYOUT

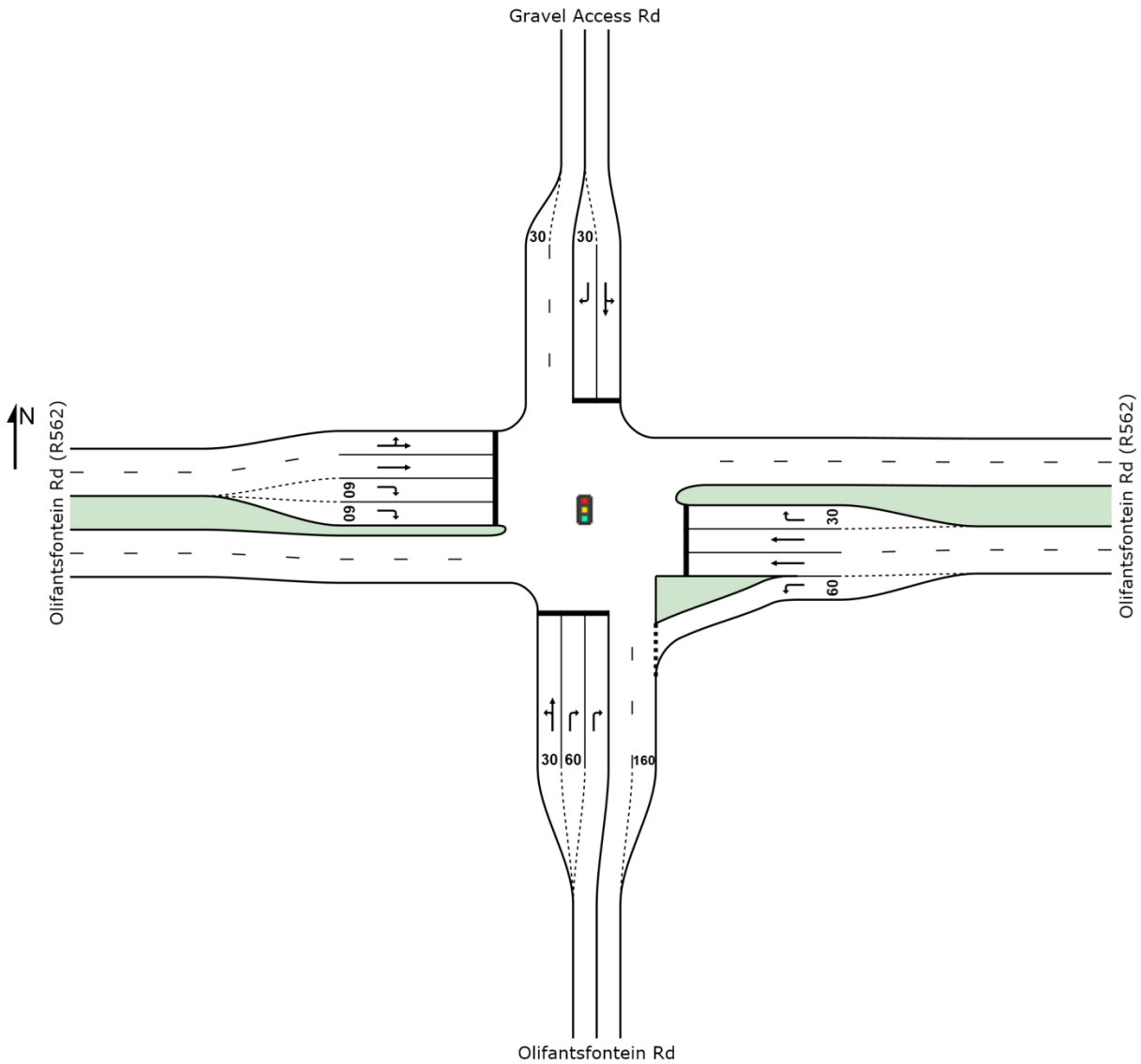


Site: Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Olifantsfontein Rd (R562) & Olifantsfontein Rd Intersection

Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Signals - Fixed Time Isolated



Upgrades due to developer:

- No upgrades are due to developer since this intersection is currently congested and the background traffic volumes affect capacity in the horizon year.

2. SITE LAYOUT

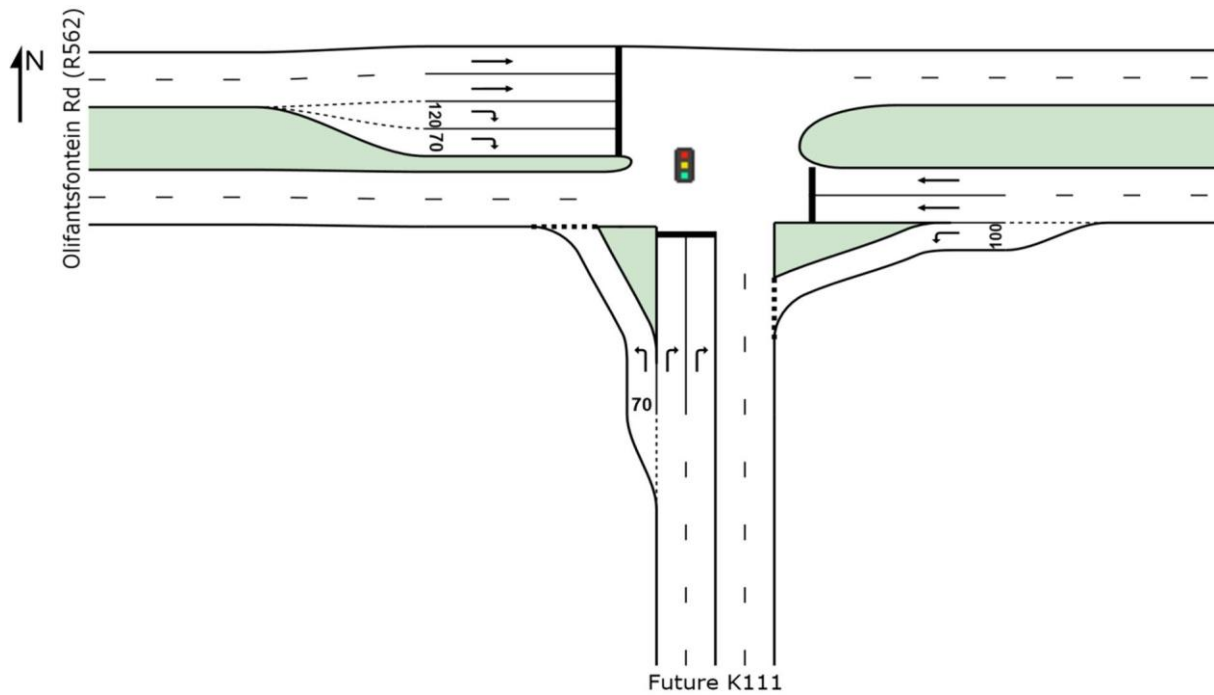


Site: Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Olifantsfontein Rd (R562) & Future K111

Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Signals - Fixed Time Isolated



Upgrades due to developer:

- The intersection is currently congested. However the developer will be responsible for the upgrade of the right turn lane on the west approach. The developer will contribute to the upgrade of the future K111. Note that the existing Main Road (future K111 route) is currently operating at capacity.

3. SITE LAYOUT

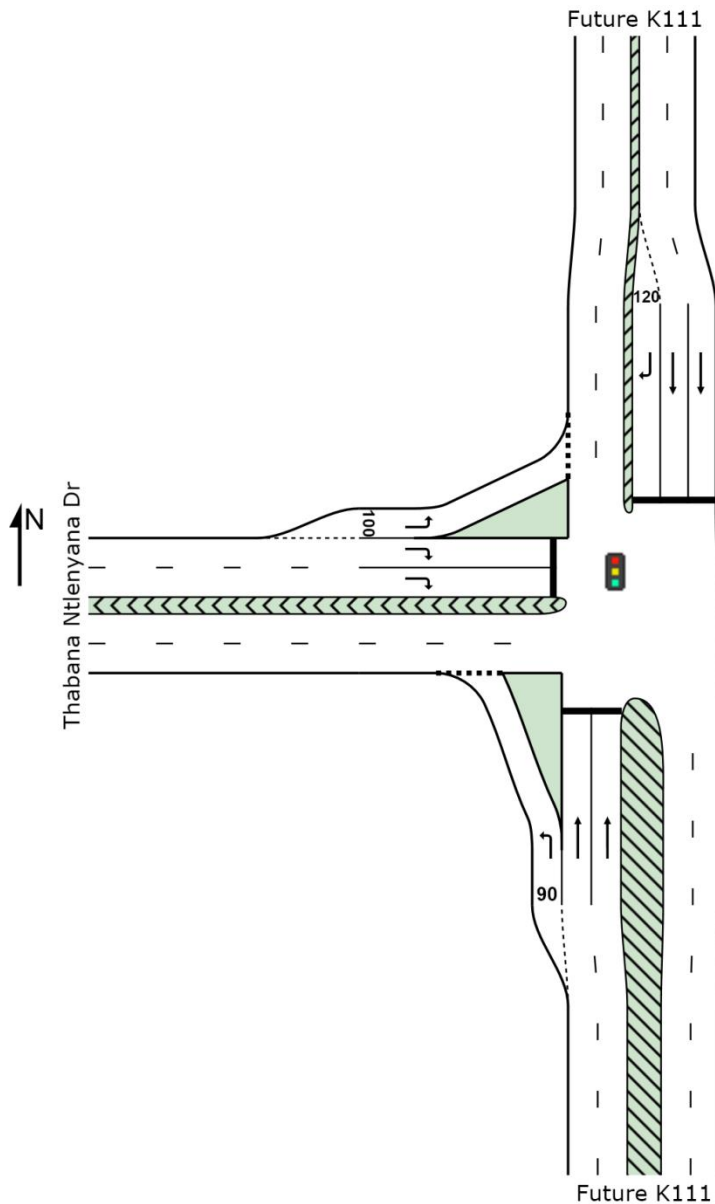


Site: Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Future K111 & Thabana Ntlenyana Drive

Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Signals - Fixed Time Isolated



Upgrades due to developer:

- Upgrade of the west approach leg of this intersection.
- Upgrade of a slip lane and the right turn lane on the south and north approach respectively.

4. SITE LAYOUT

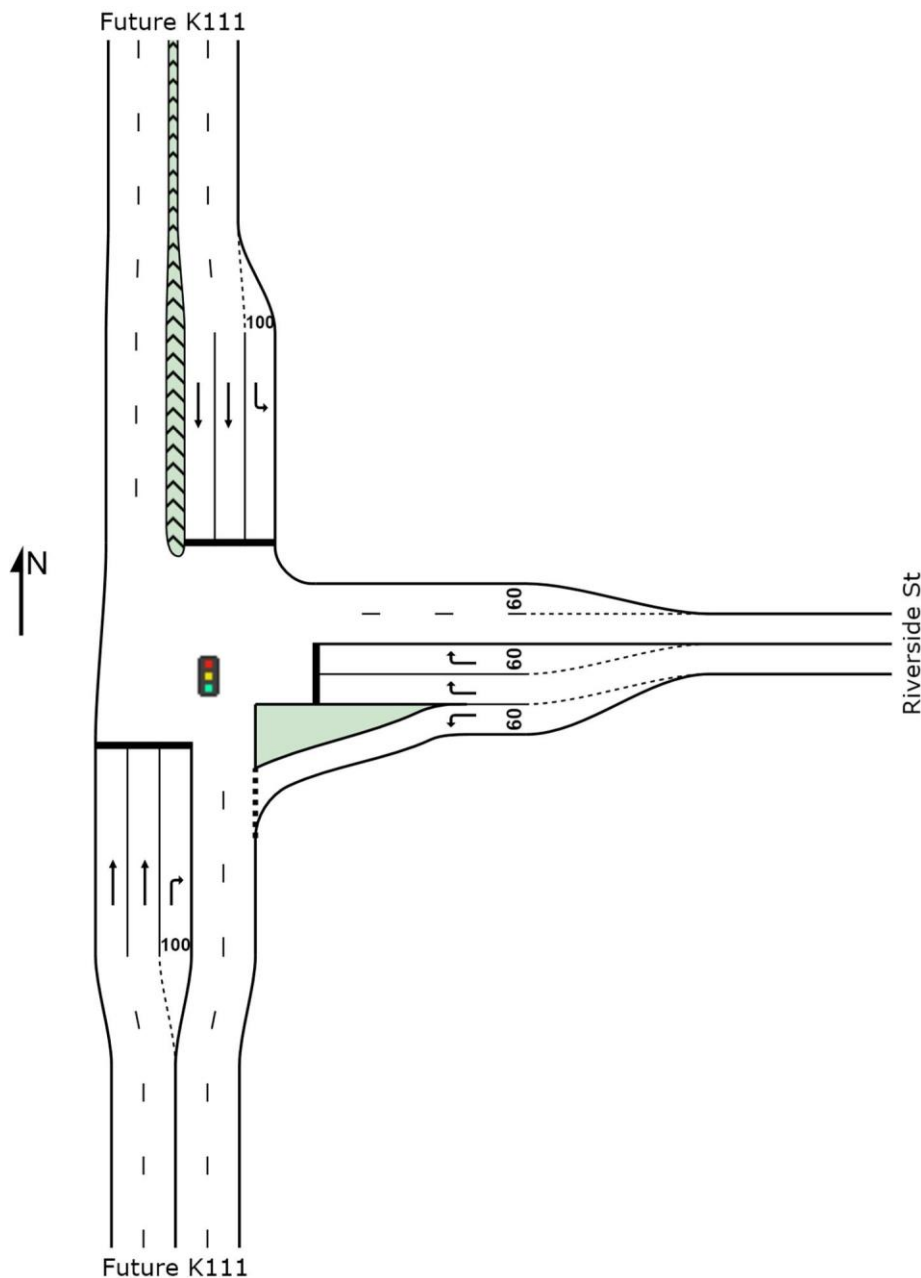


Site: Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Future K111 & Riverside St

Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Signals - Fixed Time Isolated



Upgrades due to developer:

- No upgrades are due to the developer as this intersection is a background problem.

5. SITE LAYOUT

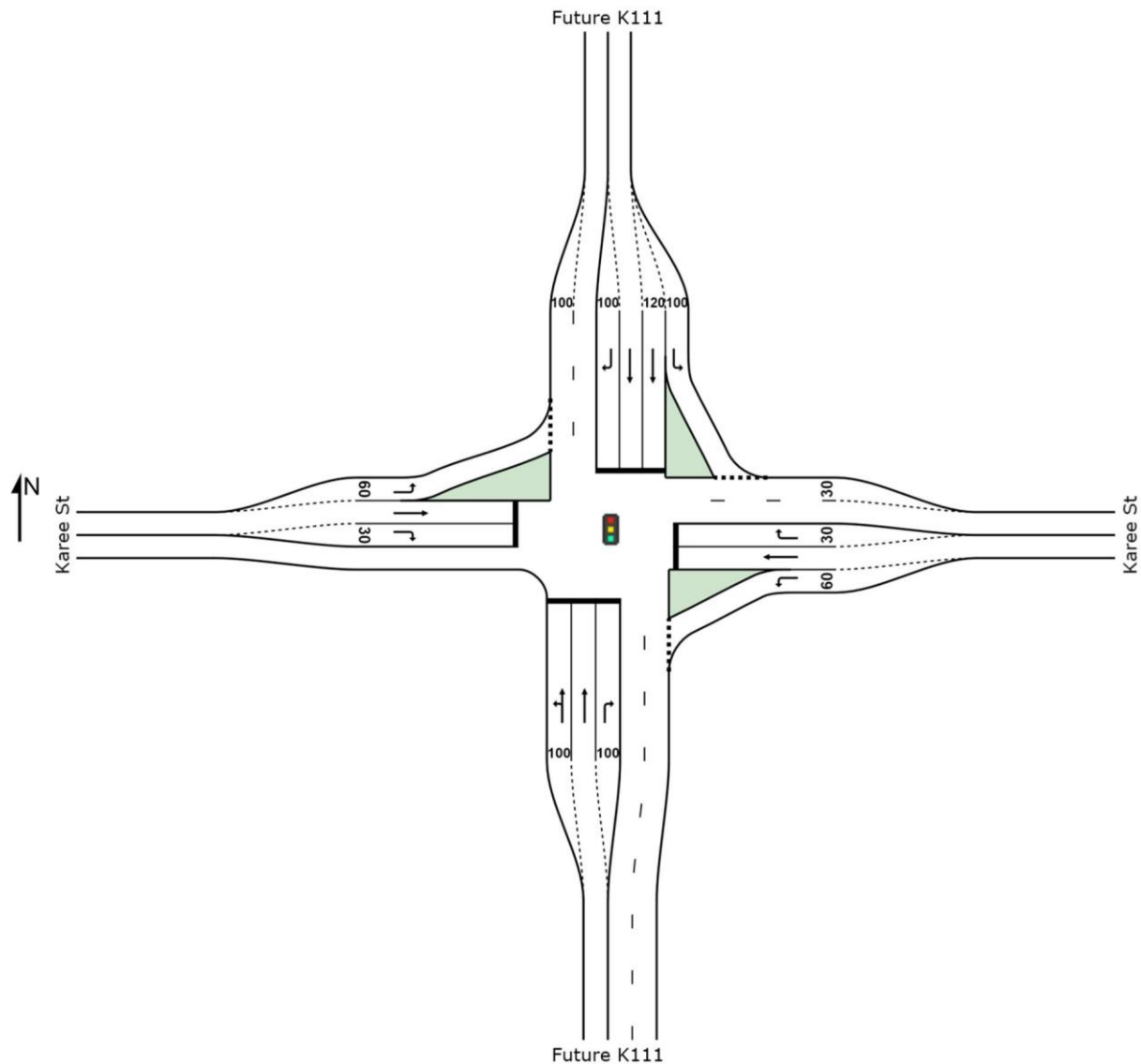


Site: Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Future K111 & Karee St

Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Signals - Fixed Time Isolated



Upgrades due to developer:

- No upgrades are due to the developer as this intersection is a background problem.

6. SITE LAYOUT

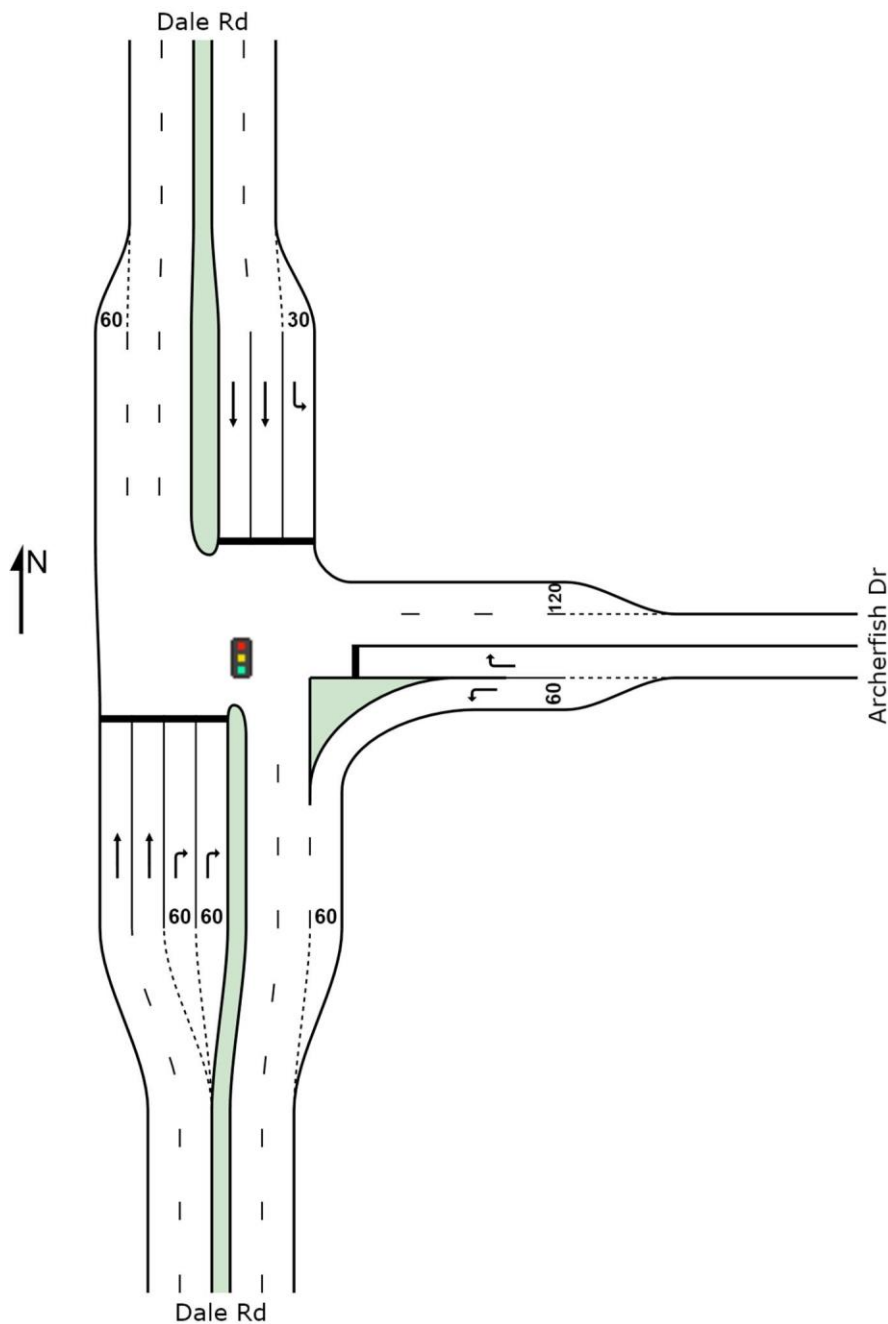


Site: Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Dale Rd & Archerfish Dr

Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Signals - Fixed Time Isolated



Upgrades due to developer:

- The developer will be required to contribute to the upgrade of the link (Dale Road)

7. SITE LAYOUT

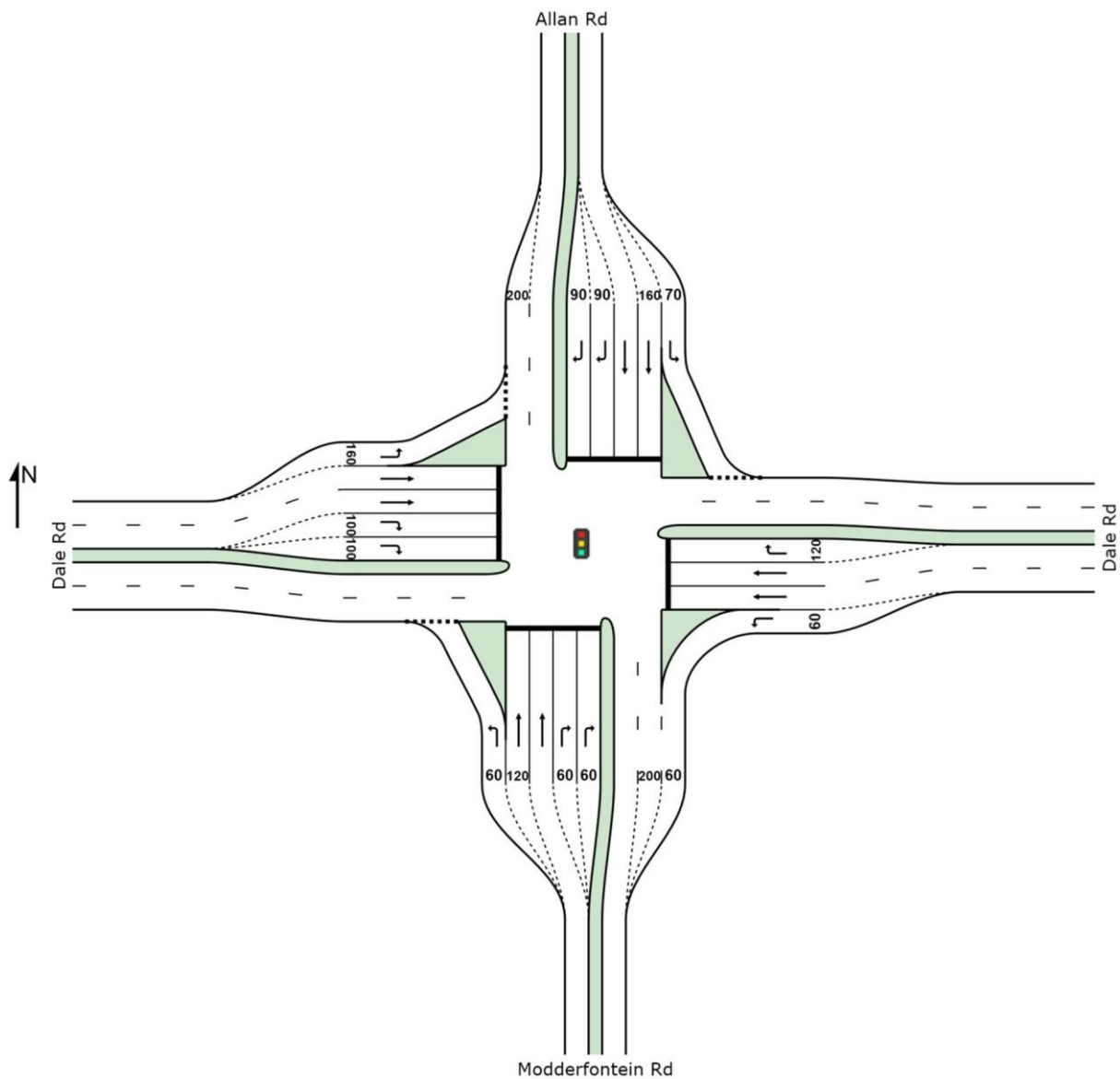


Site: Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Dale Rd & Modderfontein Rd

Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Signals - Fixed Time Isolated



Upgrades due to developer:

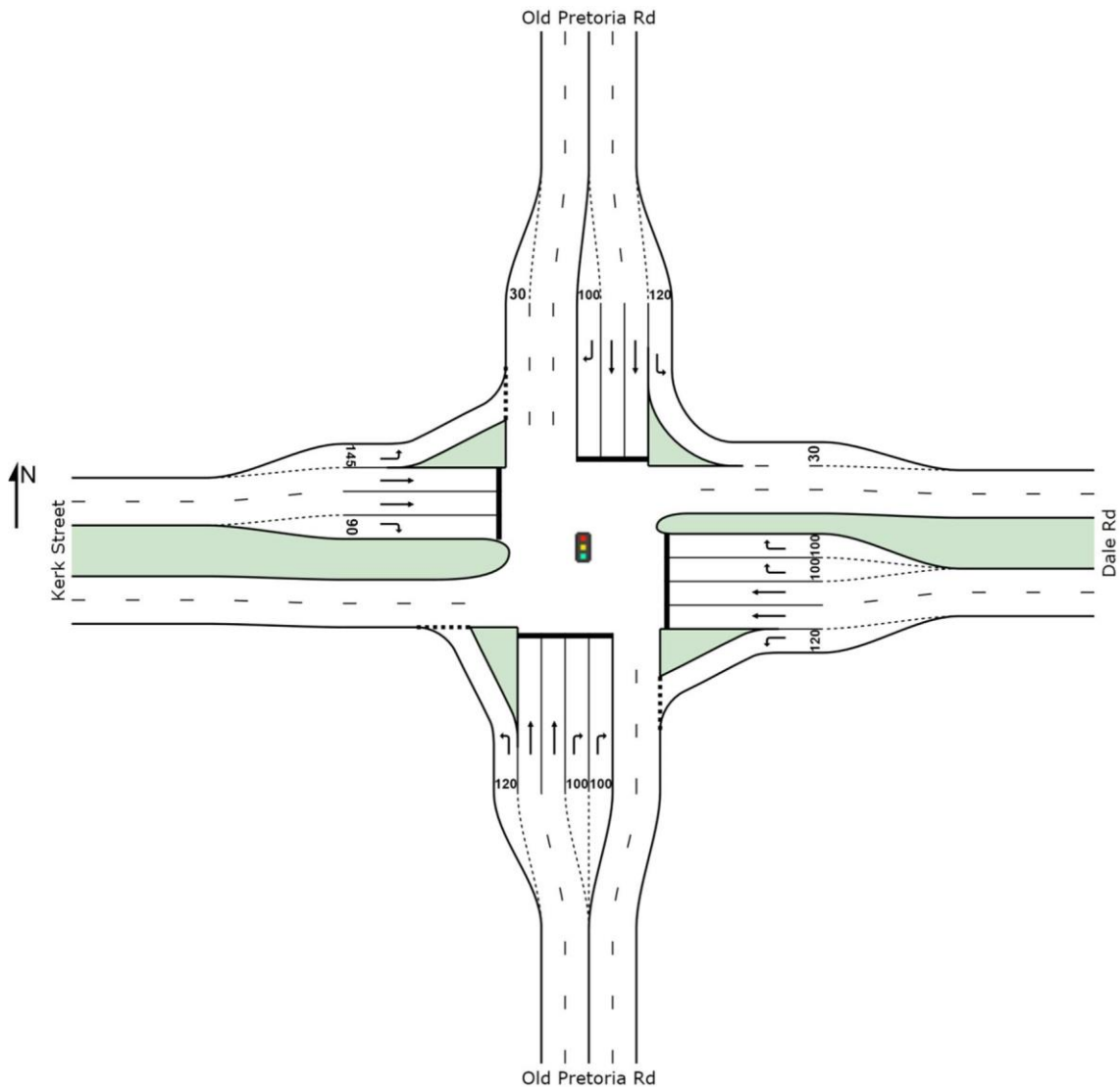
- The developer will be required to contribute to the upgrade of the link (Dale Road)
- Other upgrades to this intersection are not for the account of the developer as this intersection currently operates at capacity.

8. SITE LAYOUT



Site: Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Dale Rd & Old Pretoria Rd
Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour
Signals - Fixed Time Isolated



Upgrades due to developer:

- Upgrade of the right turn lane on the south and east approach.

A. SITE LAYOUT

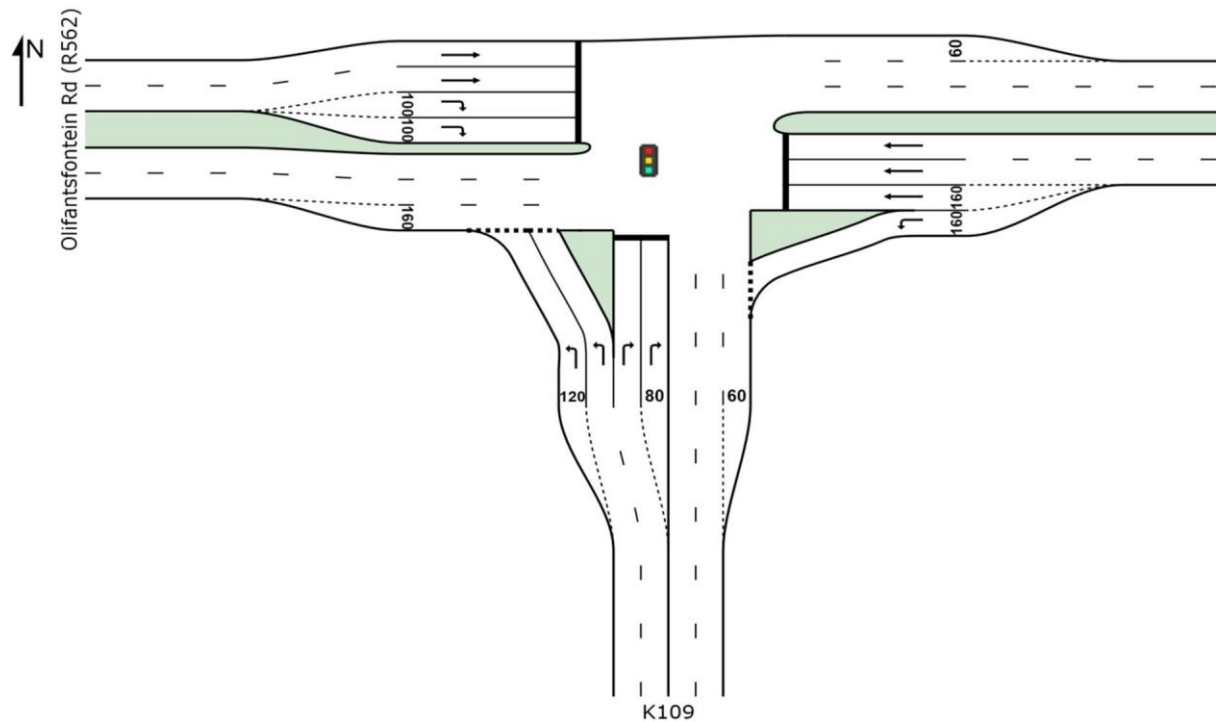


Site: Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Olifantsfontein Rd (R562) & K109 Intersection

Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Signals - Fixed Time Isolated



Upgrades due to developer:

- Upgrade of the right turn lane on the west approach.
- Upgrade of the slip lanes and one right turn lane on the south approach.
- Upgrade of the exit lane on the south approach.
- Upgrade of the left turn lane on the east approach.
- Other upgrades are not for the account of the developer.

B. SITE LAYOUT

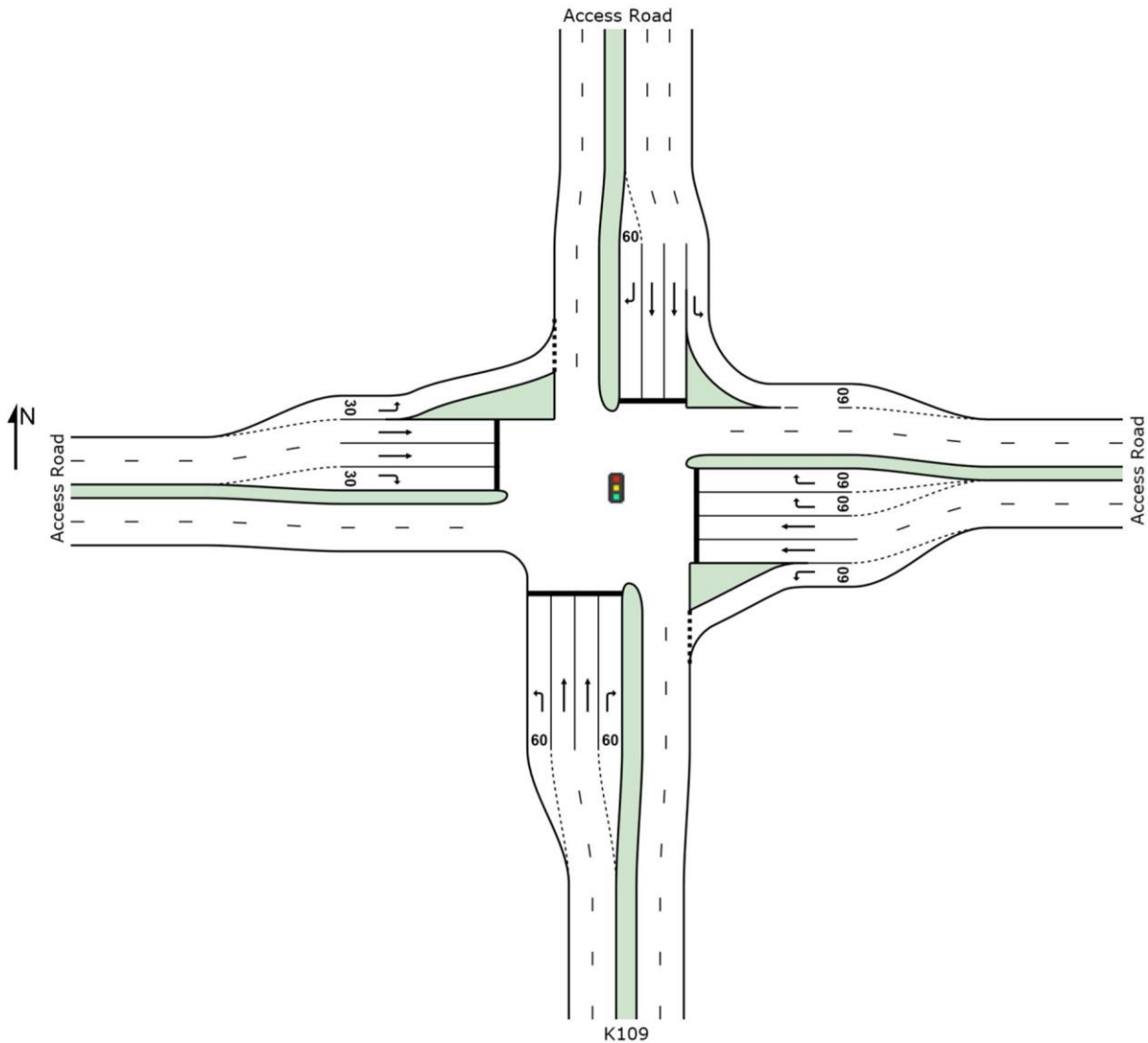


Site: Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

K109 & Access Road Intersection B

Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Signals - Fixed Time Isolated



Upgrades due to developer:

- Upgrade of the west and east approach.
- Upgrade of the left and right turn lanes on the south approach.
- Upgrade of the left and right turn lanes on the north approach.
- The developer will be required to contribute to the upgrade of the K109 link.

C. SITE LAYOUT

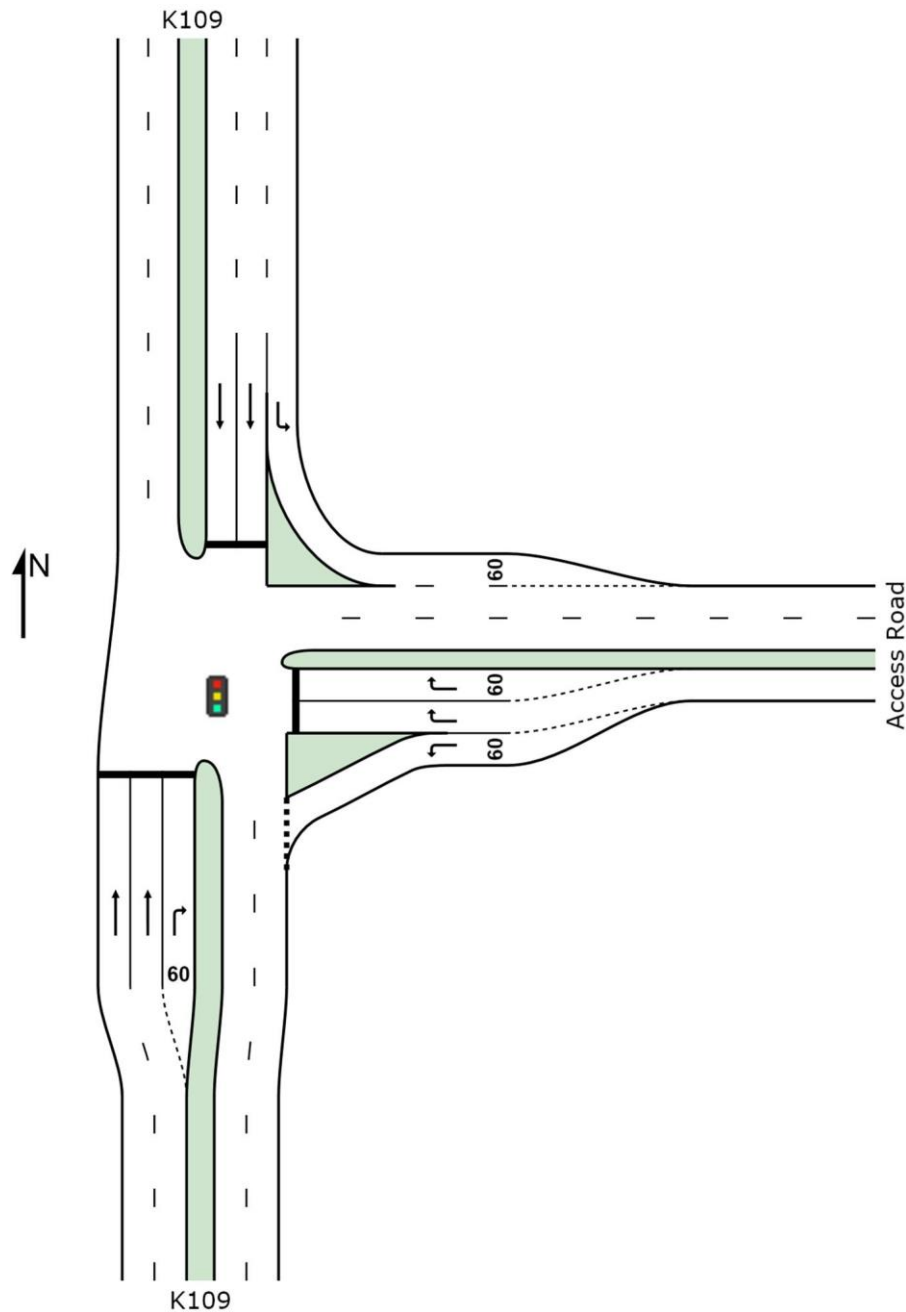


Site: Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

K109 & Access Road Intersection C

Dev Plus 2020 Background Plus Latent Dev_AM Peak Hour_UPGRADES

Signals - Fixed Time Isolated



Upgrades due to developer:



- Upgrade of the east approach.
- Upgrade of the right turn lane on the south approach.
- Upgrade of the left turn lanes on the north approach.




LEGEND

TRAFFIC SIGNAL

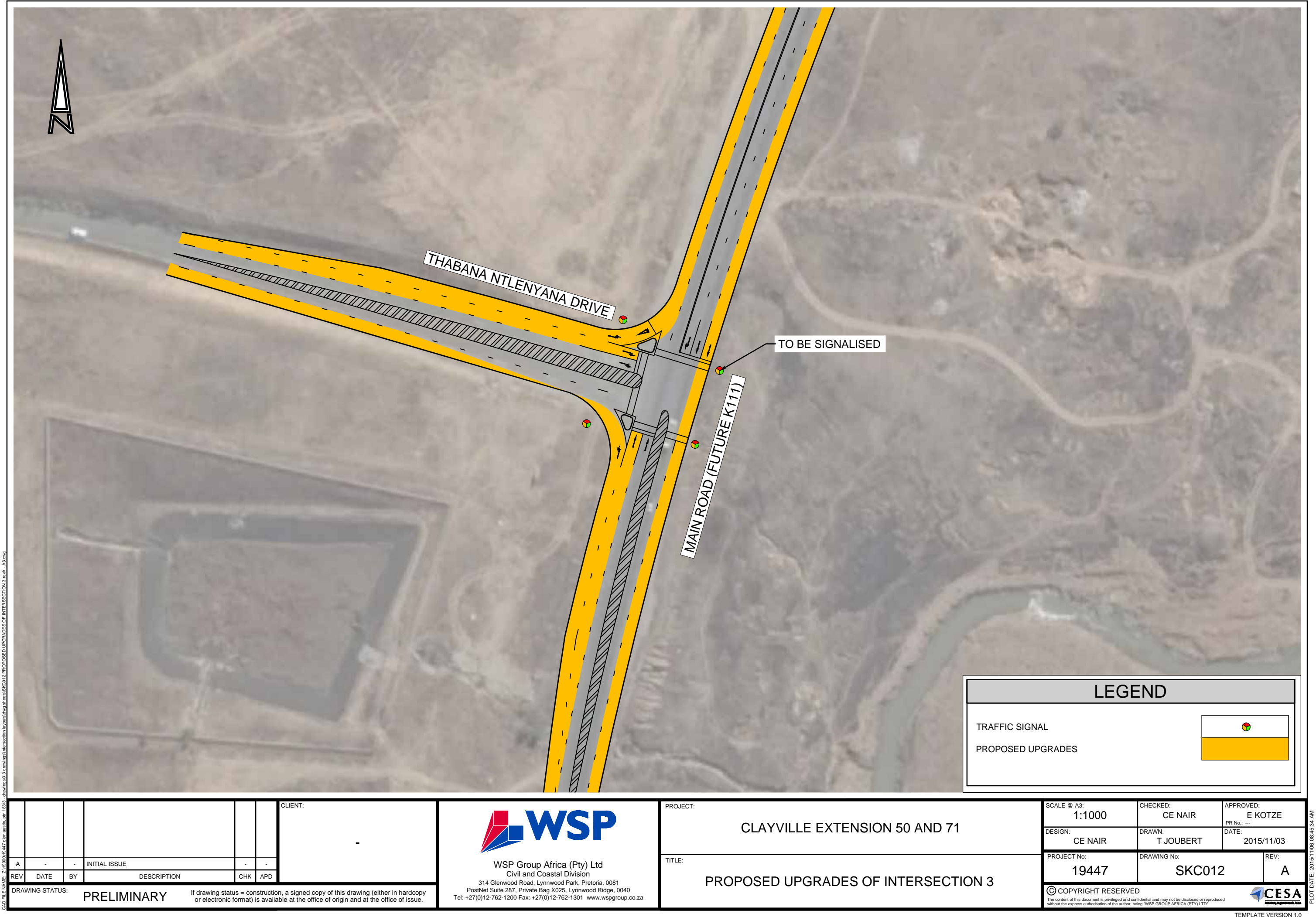
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						TITLE:		DESIGN:	DRAWN:	DATE:
						PROPOSED UPGRADES OF INTERSECTION 2		CE NAIR	T JOUBERT	2015/11/03
								PROJECT No:	DRAWING No:	REV:
								19447	SKC011	A
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								TEMPLATE VERSION 1.0		

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PLOT DATE: 2015/11/03 01:40:14 PM



LEGEND

TRAFFIC SIGNAL

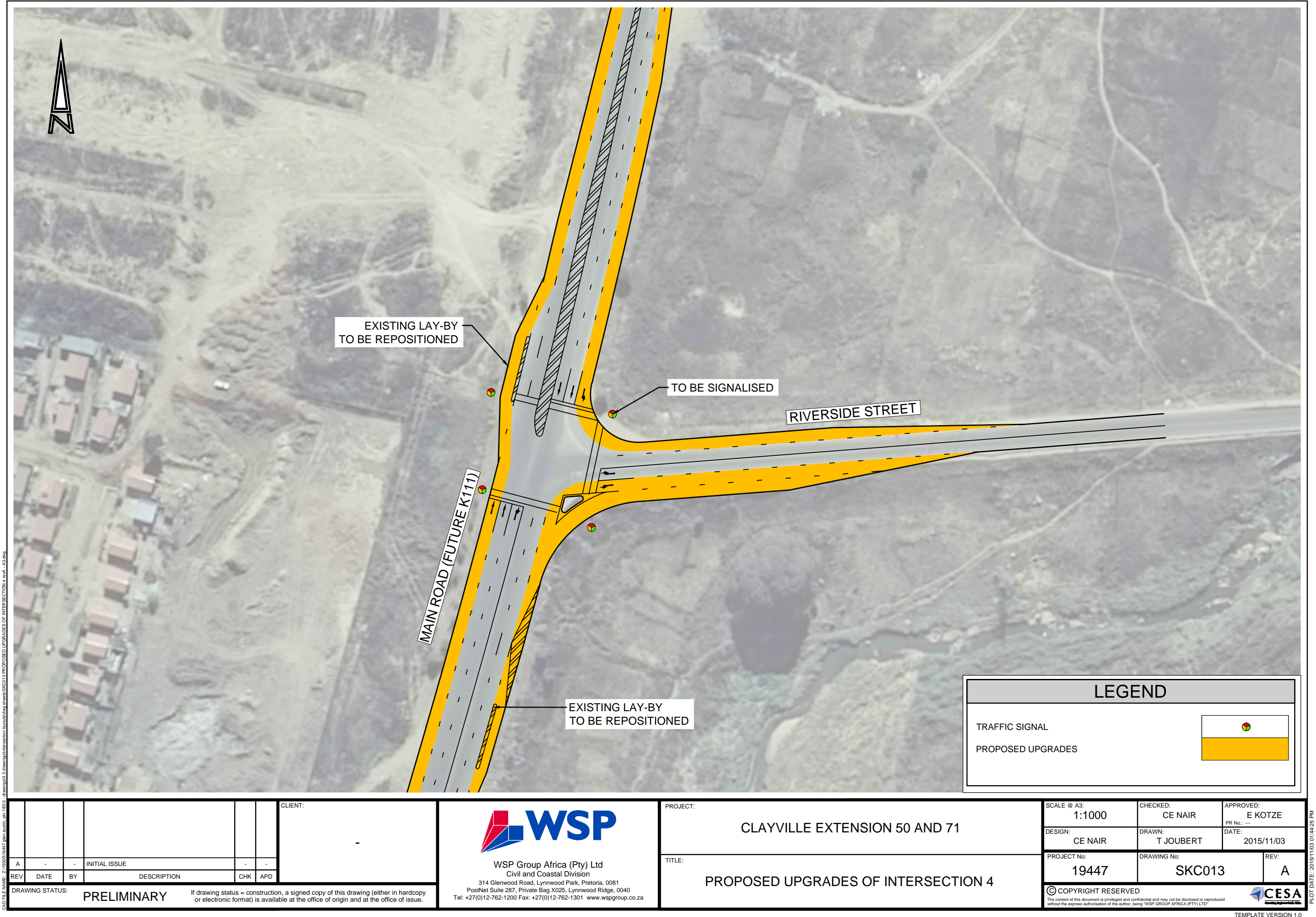
PROPOSED UPGRADES



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<div></div>				<div></div>		DATE:		2015/11/03	
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PROJECT:

CLAYVILLE EXTENSION 50 AND 71

TITLE:

PROPOSED UPGRADES OF INTERSECTION 4

SCALE @ A3:	CHECKED:	APPROVED:
1:1000	CE NAIR	E KOTZE
DESIGN:	DRAWN:	DATE:
CE NAIR	T JOUBERT	2015/11/03
PROJECT No:	DRAWING No:	REV:
19447	SKC013	A
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CAD FILE NAME: Z:\0000\19447\plan\autocad\plan\19447.dwg 15/11/2015 15:03:45 3 drawings\intersection layout\dwg\skc013 PROPOSED UPGRADES OF INTERSECTION 4 revA - A3.dwg



PLOT DATE: 2015/11/03 01:44:25 PM



LEGEND

TRAFFIC SIGNAL

PROPOSED UPGRADES



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REV	DATE	BY	DESCRIPTION	CHK	APD

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PROJECT:

CLAYVILLE EXTENSION 50 AND 71

TITLE:

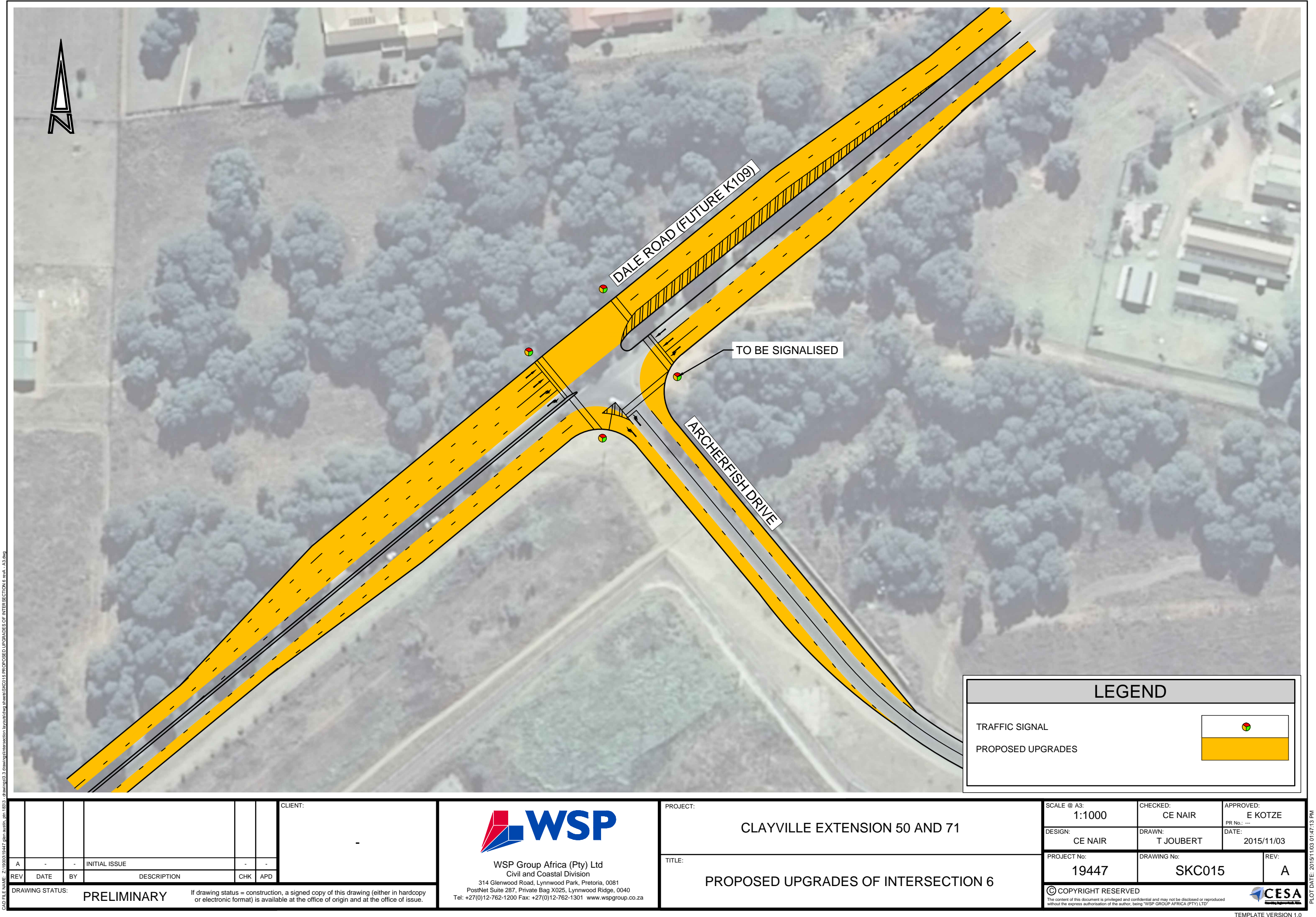
PROPOSED UPGRADES OF INTERSECTION 5

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DESIGN: CE NAIR	DRAWN: T JOUBERT	DATE: 2015/11/03
PROJECT No: 19447	DRAWING No: SKC014	REV: A
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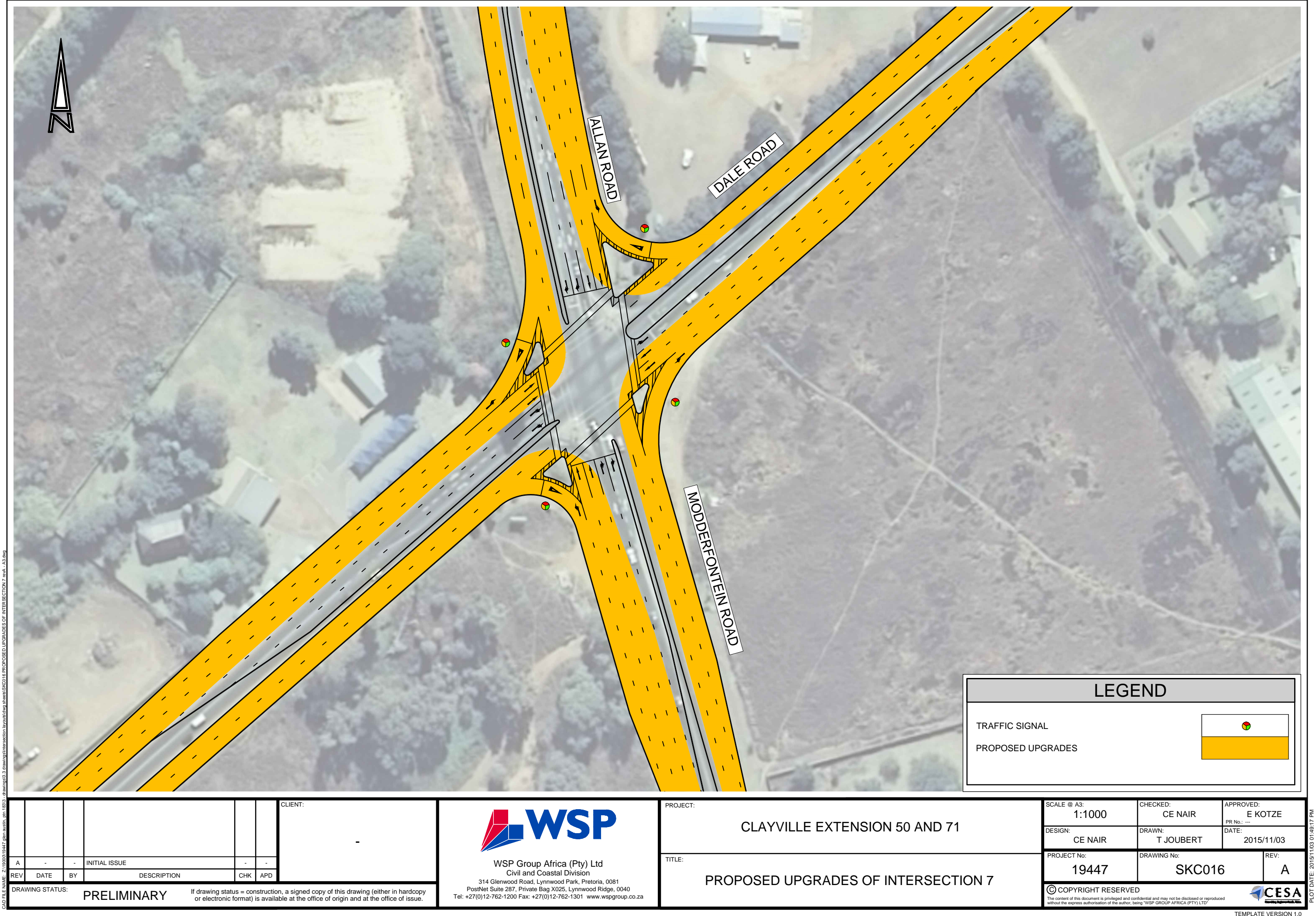
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PLOT DATE: 2015/11/03 01:45:52 PM



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DRAWN: T JOUBERT
CHECKED: CE NAIR
APPROVED: E KOTZE
PROJECT: 19447
DRAWING: SKC015
REV: A
DRAFTING STATUS: PRELIMINARY
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PROJECT:

CLAYVILLE EXTENSION 50 AND 71

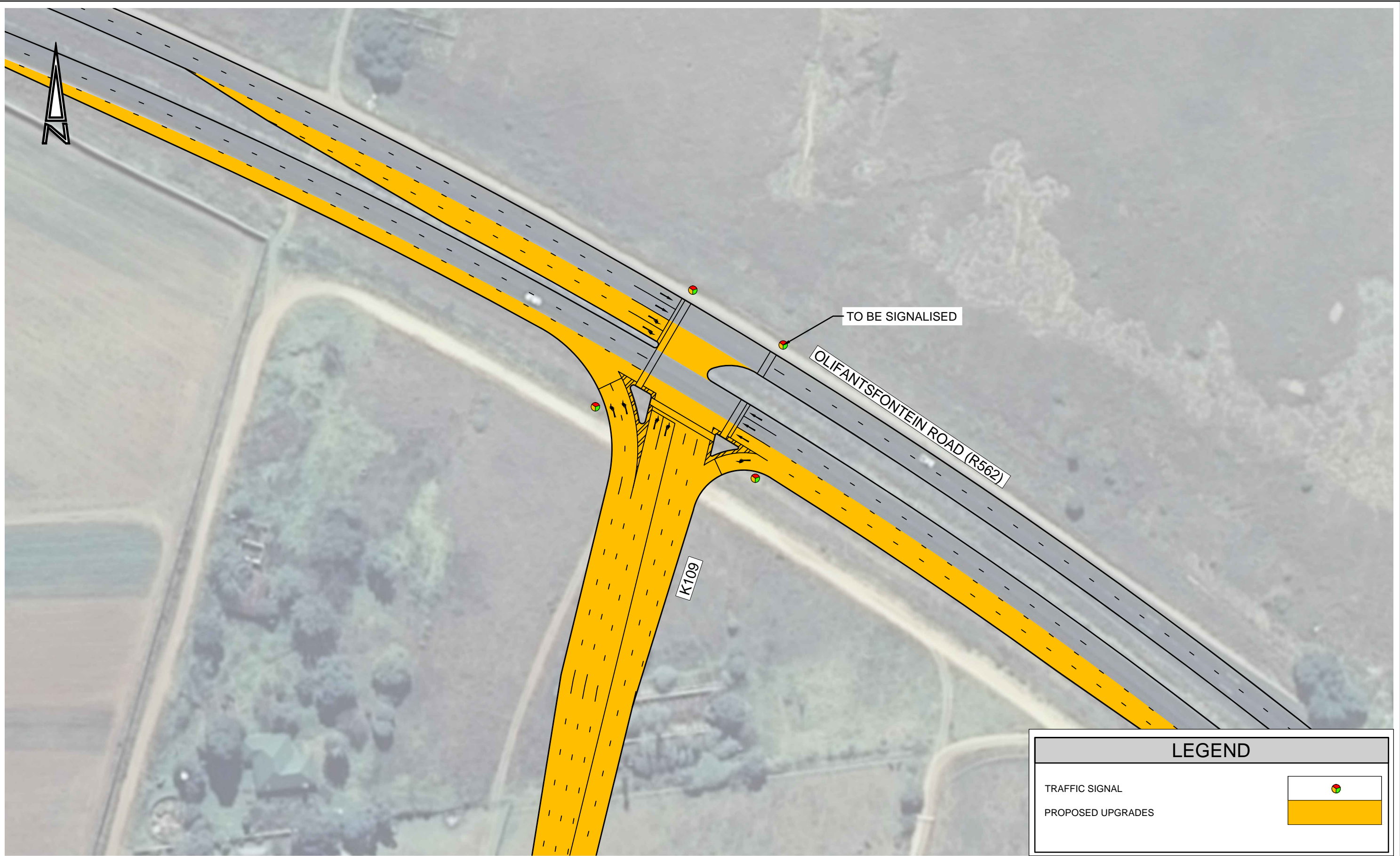
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PROPOSED UPGRADES OF INTERSECTION 7

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DESIGN:	DRAWN:	DATE:
CE NAIR	T JOUBERT	2015/11/03
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19447	SKC016	A
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CAD FILE NAME: Z:\000019447\plan\asphalt\plan 1903 - drawing\3.3 drawing\intersection layout\dwg\skc016 PROPOSED UPGRADES OF INTERSECTION 7 new - A3.dwg



PLOT DATE: 2015/11/03 01:49:17 PM



LEGEND

TRAFFIC SIGNAL

PROPOSED UPGRADES



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TITLE:

PROPOSED UPGRADES OF INTERSECTION A

SCALE @ A3:
1:1000

CHECKED:
CE NAIR

APPROVED:
E KOTZE

DESIGN:
CE NAIR

DRAWN:
T JOUBERT

DATE:
2015/11/03


PROJECT No:
19447

DRAWING No:
SKC018

REV:
A

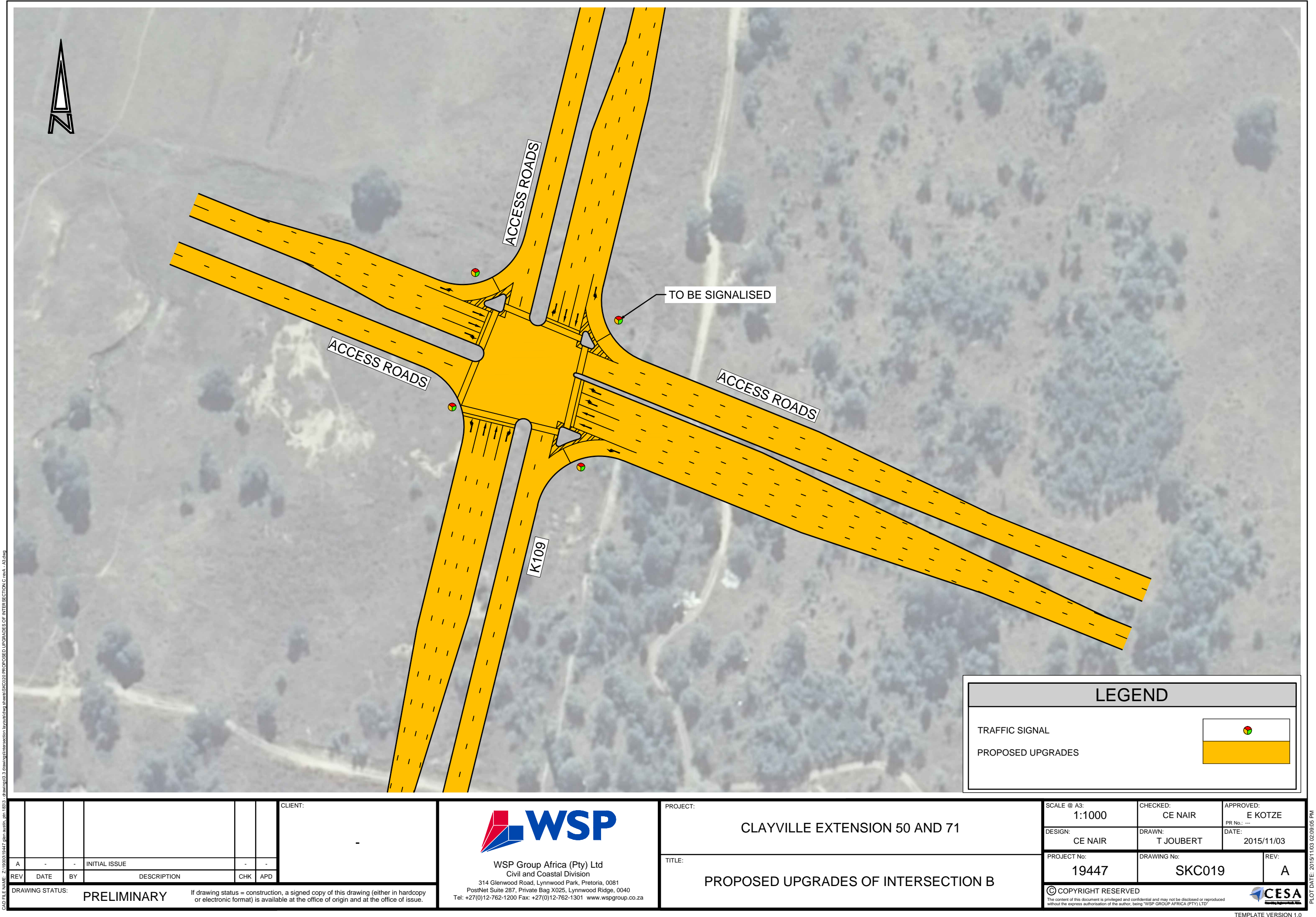
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PLOT DATE: 2015/11/03 02:03:25 PM



CAD FILE NAME: Z:\0000\19447\plan\as\as1.dwg 18/03/2015 14:03:33 drawing\intersection layout\dwg sheet\SKC019 PROPOSED UPGRADES OF INTERSECTION B revA - 13.dwg

A	-	-	INITIAL ISSUE	-	-
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PROJECT:
CLAYVILLE EXTENSION 50 AND 71

TITLE:
PROPOSED UPGRADES OF INTERSECTION B

SCALE @ A3: 1:1000	CHECKED: CE NAIR	APPROVED: E KOTZE
DESIGN: CE NAIR	DRAWN: T JOUBERT	DATE: 2015/11/03
PROJECT No: 19447	DRAWING No: SKC019	REV: A
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APPENDIX A-4

TRIP GENERATION CALCULATIONS



CLAYVILLE X50 & 71

TRIP GENERATION TABLE

2015/11/06 10:38

						COTO TRIP DATA MANUAL (TMH17)											Adjusted Peak Hour Trip Rate (veh/h)		Expected Peak Hour Trip Generation (Veh/h)								
						Trip Code	Peak Hour Base Trip Generation Rates (veh/h)						Trip Reduction Factors (%)					Trip Rate (veh/h)		Weekday AM			Weekday PM				
							Weekday AM	SPLIT		Weekday PM	SPLIT		Mixed-use (Pm)	Vehicle Ownership (Pv)	Transit Nodes or Corridors (Pt)	Total (Pc)	Weekday AM	Weekday PM	In	Out	TOTAL	In	Out	TOTAL			
Development		Land Use	Size (ha)	Unit of Measurement																							
TOTAL			154.65																			1691	3370	5061	3634	2237	5870
CLAYVILLE EXT.50	Residential 1	Dwelling Units (400m² and 25units/ha)	23.81	595	units	210 - Single Dwelling Units	1	25%	75%	1	70%	30%	0%	30%	15%	40.5%	0.595	0.595	89	266	354	248	106	354			
	Residential 2	Dwelling Units (160m² and 60units/ha)	12.90	774	units	231 - Townhouses	0.85	25%	75%	0.85	70%	30%	0%	40%	15%	49.0%	0.434	0.434	84	252	336	235	101	336			
	Residential 2	Dwelling Units (180m² and 55units/ha)	10.76	592	units	231 - Townhouses	0.85	25%	75%	0.85	70%	30%	0%	40%	15%	49.0%	0.434	0.434	64	192	257	180	77	257			
	Residential 2	Dwelling Units (216m² and 45units/ha)	7.05	317	units	231 - Townhouses	0.85	25%	75%	0.85	70%	30%	0%	40%	15%	49.0%	0.434	0.434	34	103	138	96	41	138			
	Residential 4	High Density Residential (180 units/ha)	15.74	2 833	units	220 - Apartments and Flats	0.65	25%	75%	0.65	70%	30%	0%	50%	15%	57.5%	0.276	0.276	196	587	783	548	235	783			
	Community Facility	Education	4.96	1 200	studens	530 - Public Secondary School	0.75	50%	50%	0.25	50%	50%	0%	60%	15%	66.0%	0.255	0.085	153	153	306	51	51	102			
	Business 2	Assumed Retail with FAR 1.0	1.63	163	100m² GLA	820 - Shopping Centre	1.24	65%	35%	7.01	50%	50%	10%	40%	15%	54.1%	0.567	3.216	60	32	93	262	262	524			
Business 3		Offices	2.56	256	100m² GLA	710 - Offices	2.1	85%	15%	2.1	20%	80%	5%	40%	15%	51.6%	1.017	1.017	221	39	260	52	208	260			
Subtotal			79.41																			901	1624	2525	1672	1081	2753
CLAYVILLE EXT.71	Residential 2	Dwelling Houses (160m²)	24.42	1 369	units	231 - Townhouses	0.85	25%	75%	0.85	70%	30%	0%	40%	15%	49.0%	0.434	0.434	148	445	593	415	178	593			
	Residential 2	Dwelling Houses (180m²)	8.05	420	units	231 - Townhouses	0.85	25%	75%	0.85	70%	30%	0%	40%	15%	49.0%	0.434	0.434	46	137	182	127	55	182			
	Residential 2	Dwelling Houses (216m²)	9.98	431	units	231 - Townhouses	0.85	25%	75%	0.85	70%	30%	0%	40%	15%	49.0%	0.434	0.434	47	140	187	131	56	187			
	Residential 4	High Density Residential (180 units/ha)	21.20	3 814	units	220 - Apartments and Flats	0.65	25%	75%	0.65	70%	30%	0%	50%	15%	57.5%	0.276	0.276	263	790	1054	738	316	1054			
	Business 2	Assumed Retail with FAR 1.0	4.33	433	100m² GLA	820 - Shopping Centre	0.87	65%	35%	4.93	50%	50%	10%	40%	15%	54.1%	0.399	2.261	112	60	173	489	489	979			
	Community Facility	Education	7.26	1 200	studens	520 - Public Primary School	0.85	50%	50%	0.3	50%	50%	0%	60%	15%	66.0%	0.289	0.102	173	173	347	61	61	122			
Subtotal			75.24																			790	1746	2536	1962	1155	3117