

REMAINDER OF THE FARM OUTSPAN 1960,
BLOEMFONTEIN

TOWNSHIP ESTABLISHMENT

TRAFFIC IMPACT STATEMENT


OCTOBER 2019



Project: 7195

PO Box 25054, Langenhoven Park, 9330, 12 AG Visser Street, Langenhoven Park, Bloemfontein
Tel & Fax: 051 446 2647, Cell: 083 381 5884, E-mail: kma@telkomsa.net

REPORT SHEET

Property Description:	<i>Remainder of the Farm Outspan 1960, Bloemfontein</i>
Municipal Area:	<i>Mangaung Metro Municipality</i>
Application:	<i>Township Establishment</i>
Type of Report:	<i>Traffic Impact Statement</i>
Project Number:	<i>7195</i>
Declaration	<i>I, Koot Marais, author of this study, hereby certify that I am a professional traffic engineer (registration No 920023) and that I have the required experience and training in the field of traffic and transportation engineering as required by the Engineering Council of South Africa (ECSA), to compile traffic impact studies and I take full responsibility for the content, including all calculations, conclusions and recommendations made herein.</i>
Compiled by:	<i>Koot Marais Pr Eng</i>
Signed:	
Date:	<i>October 2019</i>

PREPARED BY:



PO Box 25054, Langenhoven Park, 9330, 12 AG Visser Street, Langenhoven Park, Bloemfontein
Tel & Fax: 051 446 2647, Cell: 083 381 5884, E-mail: kma@telkomsa.net

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1 INTRODUCTION

1.1 Aim of the Study

The aim of this study was to determine and report on the traffic impact of township establishment on the **Remainder of the Farm Outspan 1960** to establish an Agricultural Related Facility.

1.2 Background

It is the intention to undertake township establishment on the property to establish a facility mainly focussing on serving the agricultural industry and this study was performed in support of the change in land use application.

The developer is as follows: OVK
P. O. Box 96
Ladybrand

1.3 Site Location

The development is situated between the R64 (P59/1) and the T5023, between Kenilworth Road and the Abrahamskraal Road in the Bainsvlei area.

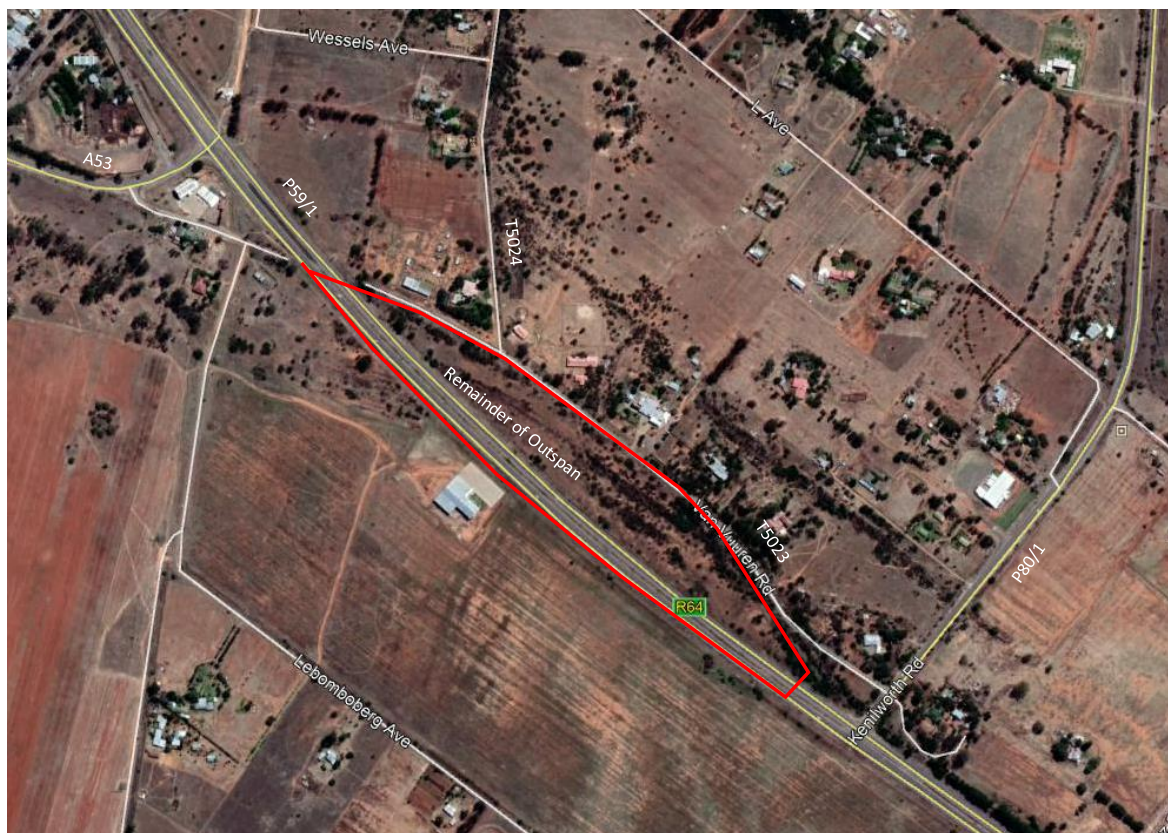
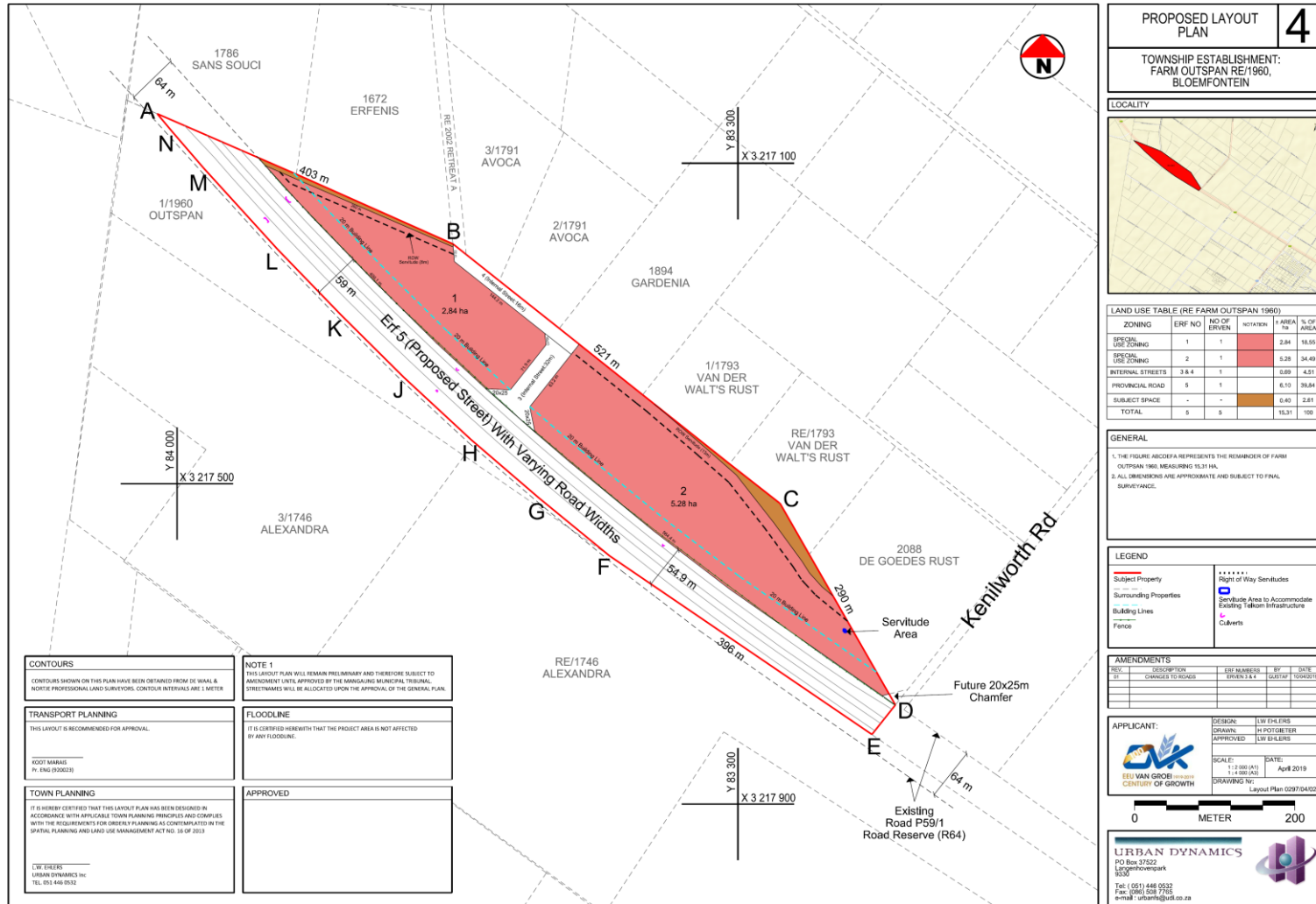


Figure 1.1: Locality Plan

1.4 Proposed Development

The planned layout is shown below:



The layout will make provision for two erven, which will be given special use zonings, which will make provision for the following (See Appendix A for the Schedules)

Erf 1

- a) Administrative offices (excluding medical consulting rooms) with a maximum GLA of 2 000 m²; and
- b) A Caretakers Dwelling.

Erf 2

- a) Agricultural related retail sales area with a maximum GLA of 1 000 m²;
- b) Agricultural related storage area with a maximum GLA of 2 000 m²;
- c) Workshop with a maximum GLA of 500 m²;
- d) Outside exhibition area with a maximum GLA of 200 m²;
- e) Public Garage (including a convenience store with a maximum GLA of 200 m²); and
- f) A Caretakers Dwelling.

How this translates into land uses for trip generation purposes is discussed in Chapter 3.

1.5 Scope of Analysis

1.5.1 Period for Analysis

Based on the type of proposed development and the nature of traffic flow in the area, both the morning and afternoon peak periods need to be investigated.

1.5.2 Warrants for a Traffic Impact Study

The development is expected to generate between 50 and 150 additional peak hour trips and according to the "Manual for Traffic Impact Studies"¹, a Traffic Impact Statement is warranted.

1.5.3 Extent of Analysis

As per the requirements only access to the development and the intersections on both sides have to be investigated. Given the location of the development, the following intersections were investigated.



Figure 1.3 Intersections Investigated

- a) Intersection A: New intersection on R64
- b) Intersection B: R64 / Abrahamskraal Road (A53) Intersection
- c) Intersection C: Kenilworth Road (P80/1) / R64 Intersection

Due to the need to include the development as a latent right, the trip distribution was extended over an extensive area (not shown in traffic diagrams).

1.5.4 Assessment Years

The considerable extent of latent rights included in the analysis (see Section 1.6.2) already makes provision for future traffic growth, with the result that it is believed that it is not necessary to develop horizon year scenarios based on a general traffic growth rate.

As a conservative approach, such scenarios were however developed, but only a 1.5% annual growth rate was assumed.

The base year was assumed to be 2020.

The base year and five years after the base year have been analysed.

1.6 Available Information

1.6.1 Traffic Counts

The following traffic counts were used:

Intersection	Source	Date Counted		Growth Rate
Kenilworth / R64	Counted by KMA for Outspan	AM	2019/05/30	1.5%
		PM	2019/05/28	1.5%
		Sat		1.5%
Kenilworth / T5023	Counted by KMA for Outspan	AM	2019/05/30	1.5%
		PM	2019/05/28	1.5%
		Sat		1.5%
Bains Game Lodge / R64	Counted by KMA for Outspan	AM	2019/09/18	1.5%
		PM	2019/09/18	1.5%
		Sat	2016/08/13	1.5%
Abrahamskraal Rd /R64	Counted by KMA for Plot 2 Fairhaven	AM	2018/05/22	1.5%
		PM	2018/05/22	1.5%
		Sat		1.5%

1.6.2 Latent Rights

The Manual for Traffic Impact Studies describes Background Traffic as the existing traffic volumes, approved developments and anticipated developments, **taking market absorption into account**. The latter means that the rate of actually expected development should thus still be considered, with the result that all applied for developments, and more accurately rezonings or township establishments for which traffic impact studies have been compiled, should not necessarily be assumed to be anticipated developments.

Only developments that are expected to be developed within the forecast period should be considered. It is however not easy to estimate the mentioned market absorption.

TMH 16 prescribes as follows:

3.5.1 Other developments as well as future potential development in the area must be taken into account in the estimation of future background traffic. The following developments must be taken into account:

- a) Approved developments that have not yet been fully implemented. The traffic demand of such developments must be established from traffic impact assessments that have been submitted for the developments. The Municipality will make such assessments available to the Assessor.*
- b) Developments that are likely to occur during the study horizon of the traffic assessment. The Municipality must provide estimates of the future traffic demand that may be generated by such development.*

3.5.2 The traffic demand due to the above developments are accumulated and added to the traffic counts. No growth rate is applied to the traffic demand estimated for these developments. The growth rate used in the analysis also depends on the extent to which such other developments are taken into account.

3.5.3 The Municipality is responsible for providing the above data. Where such data are not available, there will be no obligation on the Assessor to take such developments into account. In such cases, use will only be made of the traffic growth rate to estimate future traffic demand.

Although the above does not specifically mention market absorption, the indication is that the Municipality should consider these aspects and provide an estimate.

In principle, in instances with some spare capacity and realistic latent rights, all latent rights can be considered. In areas with high development pressure, market absorption should be considered, or alternatively, the growth method should be utilised rather than considering individual latent rights.

The following extensive latent rights can potentially be considered.

No	Description	Project No	Impact in Study
1	Plot 6, Vredenhof (It was assumed that 2/3 of the development was still vacant at the time of the study)	6366	Yes
2	Plot 36 Spitskop	6552	Yes
3	Plot 14 & 33 Spitskop	6552	Yes
4	Plot 15 Spitskop	6876	Yes
5	Plot 27 Spitskop	6232	Yes
6	The rezoning of Plot 38, Kwaggafontein	6237	No
7	Subdivision 1 of Cecilia 2352	6229	No
8	Portion 1 and the open area to the south of the N8, adjacent to the N1	-	No
9	Rezoning of Plots 40 and 42 Quaggafontein	6529	No
10	Rezoning of Plots 44 and 45 Quaggafontein	6529	No
11	Spar Extension		Yes
12	Plot 8 Spitskop	6517	Yes
13	Plot 6 Stirling	6587	Yes
14	Plot 50 Spitskop	6392	Yes
15	Plot 11 Spitskop	6483	Yes
16	Plot 11 Vredenhof	6533	Yes
17	Portion 1 and the Remainder of the Farm Retreat	6745	Yes
18	Plot 13 Spitskop	6791	Yes
19	Erf 454, Langenhoven Park	6884	Yes
20	Plot 3, Quaggafontein Small Holdings,	6705	No
21	Plot 6/9, Quaggafontein Smallholdings,	6934	No
22	Portion 1 of Plot 37 Quaggafontein	7013	No
23	Cecilia Park South	6911	Yes
24	Plot 7/9, Quaggafontein Smallholdings,	7032	No
25	Plot 14 Vredenhof	6823	Yes
26	Plot 26 Spitskop	6500	Yes
27	Plots 47 & 49 Quaggafontein	7113	No
28	Plot 102 & R/24 Spitskop	6583	Yes
29	Plot 31 Spitskop	7168	Yes
30	Plot 37 Spitskop	7190	Yes
31	Portion 2 of Plot 9 Quaggafontein		No
32	Plot 39 & 43 Quaggafontein	7232	No
33	Plot 2 Fairhaven	7219	Yes
34	Plot 3 Fairhaven	7277	Yes
35	Plot 5 Spitskop	7281	Yes
36	Plot 7 Spitskop	7196	Yes
37	Plot 44 Quaggafontein	7319	No
38	Plot 49 Quaggafontein	7329	No
38	Portion 1 of Plot 3, Spitskop	7218	Yes

2 BACKGROUND INFORMATION

2.1 Existing Road Network

The most important roads in the area are the following:

Street / Road	Road No	Route No	Description	Geometry	Classification	Functional Classification	Jurisdiction
R64 Dealesville Road	P59/1	R64	The provincial road links Bloemfontein with Kimberley via Dealesville and Boshof. The road also links Bainsvlei and Langenhoven Park with the rest of Bloemfontein.	Rural four lane divided road to the west of Jan Spies Street	Arterial	Arterial	Free State Province
Nelson Mandela Drive		N8	The road also links Bainsvlei and Langenhoven Park with the rest of Bloemfontein.	Urban six lane divided road	Arterial	Arterial	Mangaung Metro Municipality
Muller Road	T5029		This road links the Stirling and Vredenhof area with the R64	Rural undivided two-lane road	Collector	Collector	Free State Province
Du Plessis Road	T5208 (partly)	M18	This is a main access to Langenhoven Park and Spitskop and does not provide direct access to properties	Urban undivided two-lane road with barrier kerbs	Arterial	Arterial	Mangaung Metro Municipality
Kenilworth Road	P80/1		This road provides access to small holding areas and the Tempe Airfield to the R64. It also links Frans Kleynhans Road with the R64.	Rural two lane undivided road without raised sidewalks	Collector	Collector	Free State Province
Van Vuuren Road	T5023 becoming T5024		This road serves the smallholdings to the north of the R64.	Rural gravel road	Local Road	Residential Access Loop	Free State Province
Abrahamskraal Road	A53		The road links the Bainsvlei area with the R64	Rural two lane undivided road	Arterial	Arterial	Free State Province

Unless otherwise clarified,

A rural geometry implies a road without kerbs and raised sidewalks

An urban geometry implies a road with kerbs and raised sidewalks

2.2 Existing Land Use

The area is in general vacant and surrounded by a variety of land uses.

2.3 Road Planning

Due to the limited spacing between the T5023 and the P59/1 it is not advisable to allow development that will increase volumes at this intersection. The current spacing is as follows:



As it is expected that the P80/1 / P59/1 intersection will in due course be signalised, the spacing should be 200-300m according to TRH 26.

To ensure acceptable access it has in principle been agreed with the Free State Province that a new intersection will be established on the P59/1 and that the T5023 will be closed at the P80/1.

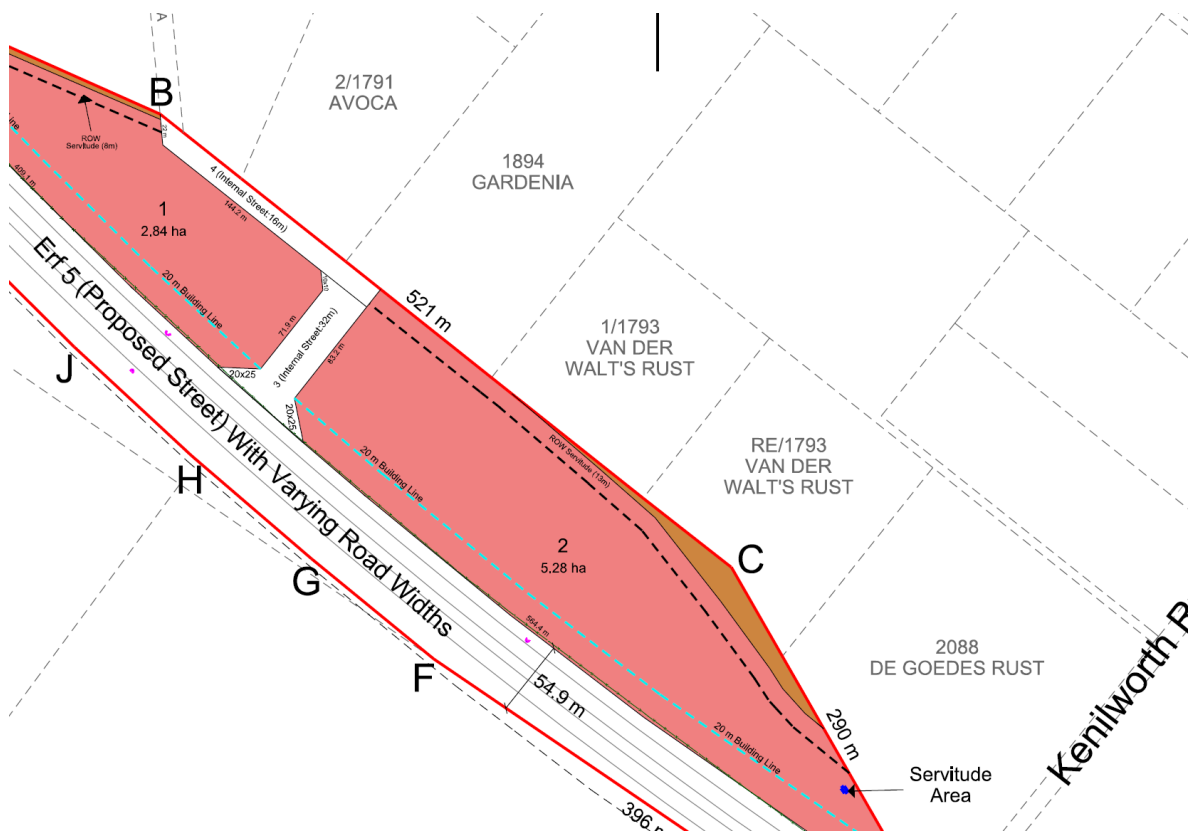
With this configuration, spacing will be as follows:



The R64 (P59/1) can be classified as a Class 2 arterial and the urban nature of the road is extending towards the west and with a development such as the development under consideration, the road will be included as a street as part of the Township Establishment. All the intersections on the road is expected to be signalised in due time.

Based on TRH 26 the required spacing for a U2 road with signalised intersections is $400\text{m} \pm 15\%$ (for T-Junctions). The spacing is thus acceptable.

In the process the T5023 will be closed and the T5024 will obtain access to the main road network from the new link.



As shown, the Remainder and Portion 1 of 1793 Van der Walt's Rust and 2088 De Goedes Rust will obtain access via a 13m Right-of Way Servitude.

The above mentioned planning have in principle been discussed with relevant role players, but is still subject to a formal public participation process

The development will not be directly affected by any other known road planning.

3 TRIP GENERATION

3.1 Trip Generation Rates - TMH 17

Possible relevant land uses for this development as described in the TMH 17 are as follows.

3.1.1 Service Industries 110

Service industries provide industrial services to the general public. Typical service industries include vehicle repairs, appliance and television repairs, etc.

3.1.2 Warehousing and Distribution 150

Warehouses are primarily used for the storage and distribution of materials, but may include office and other functions associated with such storage. Goods are often sorted and distributed from these warehouses.

3.1.3 Single Dwelling Unit 210

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

3.1.4 Offices 710

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

3.1.5 Building Materials 812

A building material centre is a free-standing facility that sells building hardware and materials. May include a component of hardware and paint sales.

3.1.6 Hardware and Paint Store 816

Hardware and Paint Stores are generally free-standing facilities at which only hardware and/or paint is sold. May include a very small component of building material.

3.1.7 Shopping Centre 820

A shopping centre is an integrated (mixed-use) group of commercial establishments that operate as a unit. May include small components of other land uses, such as restaurants, hardware and paint shops, etc.

3.1.8 Bulk Trade Centre 830

Bulk trade centres are generally free-standing commercial facilities at which goods are sold in bulk to either the public or to businesses.

3.1.9 Filling Station 946

Filling Stations at which the primary business is the fuelling of motor vehicles. Related facilities such as a convenience shop, service facilities and a car wash are not included.

3.2 Assumed Rates

Many of the applied for land uses do not exactly fit into any of the above descriptions. To determine appropriate trip generation rates, trip generation at the SENWES (Hinterland) facility in Curie Avenue, which is similar to the planned development, was determined during the afternoon peak hour of 12 September 2019. The determined trip generation was as follows:

PM Trips	In	Out
186	79	107
	42%	58%

Although the exact size of SENWES is not known, the approximate size of the facility is as follows:

- Retail Portion – 4900m²
- Storage Building- 4900m²
- Outside Storage- 4700m²

The estimated GLA of the facility is thus 14500m² (storage is included in the GLA). This equates to a trip generation rate of 1.3 trips per 100m² (42:58)

By comparing this to the trip generation of the different land uses mentioned, the most comparable land use will be a Bulk Trade Centre with a trip generation of 1.5 trips per 100m² (40:60) As the description to a large degree fits the type of development, it is believed that this is an appropriate land use to assume. The retail area, storage area as well as the exhibition area should be included as part of the facility.

The workshop was considered as a Service Industry.

3.3 Reduction Rates

3.3.1 General

The following reduction factors were considered.

a) Mixed-Use Reduction

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.

A significant number of trips between the different land uses are expected, with the result that the mixed-use reduction factor was assumed for all the land uses, except for the Bulk Trade Centre.

b) Vehicle Ownership Reduction

The purpose of this factor is to make provision for households that are to various degrees reliant on public transport (and where public transport is not available, to long distance walking). No reduction was assumed.

3.4 Trips Generated

Table 3.1: Possible trip generation

No	Land Use	No	Unit	Reduction Factors					AM PEAK								PM PEAK										
				Pm	Pv	Pv	Pt	Pc	TGR	TGR	Split		PHF	AM	AM	In	Out	TGR	TGR	Split		PHF	PM	PM	In	Out	
				Mixed	Low	V Low	Trans			Reduc	In	Out			Reduc				Reduc			Reduc					
Industrial																											
110	Service Industry		100m ²	5%	20%	30%	15%		0.90		75%	25%							0.90		25%	75%					
110	Service Industry	500	100m ²	5%				0.05	0.90	0.86	75%	25%		5	4	3	1	0.90	0.86	25%	75%		5	4	1	3	
Residential																											
210	Single Dwelling		unit	10%	40%	70%	15%		1.00		25%	75%							1.00		70%	30%					
210	Single Dwelling	2	unit	10%				0.1	1.00	0.90	25%	75%		2	2	0	1	1.00	0.90	70%	30%		2	2	1	1	
Offices																											
710	Offices		100m ²	20%	20%	30%	15%		2.10		85%	15%							2.10		20%	80%					
710	Offices	2 000	100m ²	20%				0.2	2.10	1.68	85%	15%		42	34	29	5	2.10	1.68	20%	80%		42	34	7	27	
Retail																											
830	Bulk Trade Centre		100m ²	10%	30%	60%	15%		1.10		70%	30%							1.50		40%	60%					
830	Bulk Trade Centre	3 200	100m ²					0	1.10	1.10	70%	30%		35	35	25	11	1.50	1.50	40%	60%		48	48	19	29	
Services																											
946	Filling Station		Station	0%	0%	0%	0%		0.00		65%	35%							0.00		50%	50%					
946	Filling Station	1	Station					0	0.00	0.00	65%	35%		0	0	0	0	0.00	0.00	50%	50%		0	0	0	0	
Total																											
														79	71	54	17						92	83	27	56	

4 TRIP DISTRIBUTION

Trip distribution was based on the analogue method with consideration of gravitational distributions. The figures below show the different scenarios.

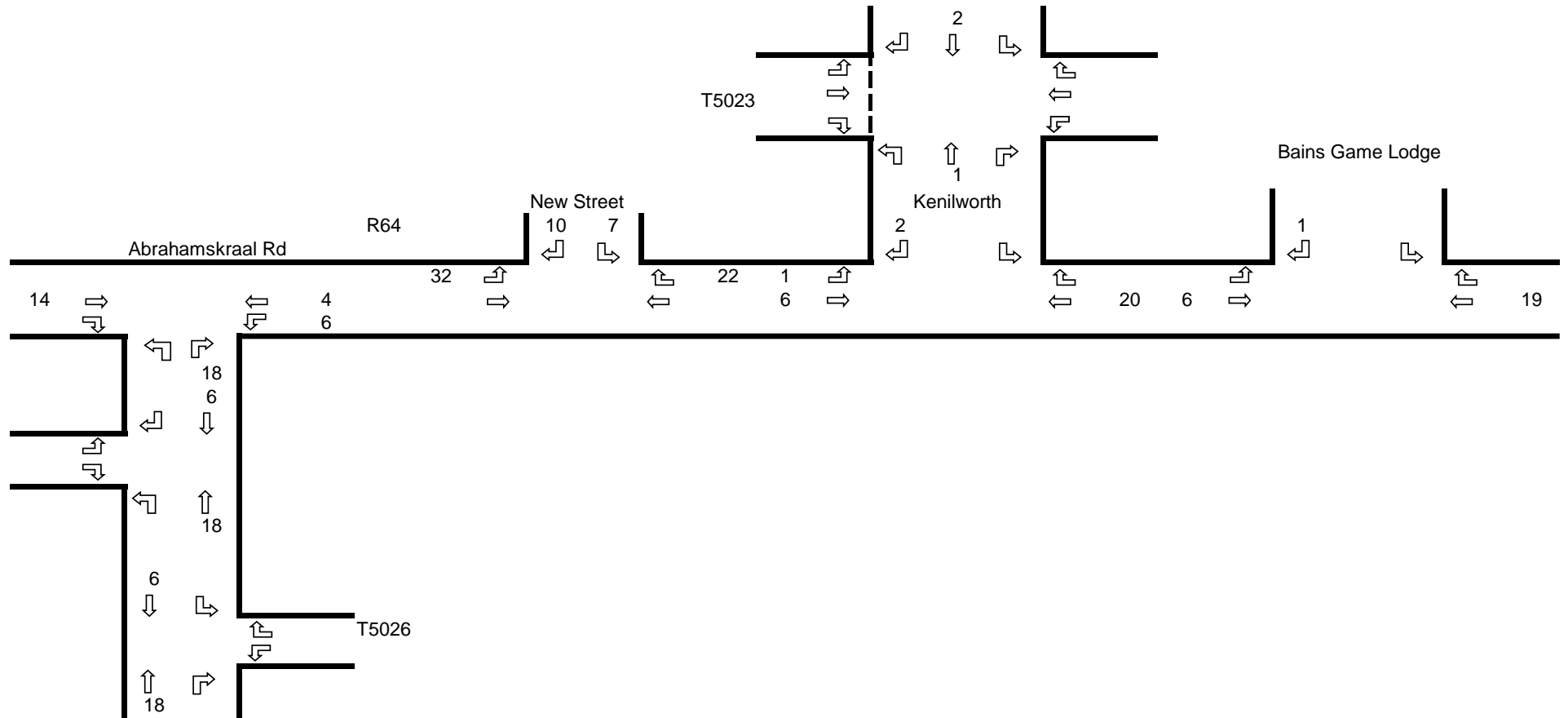


Figure 4.1a: AM Trip Distribution – Other Uses



Figure 4.1b: AM Trip Distribution – Other Uses

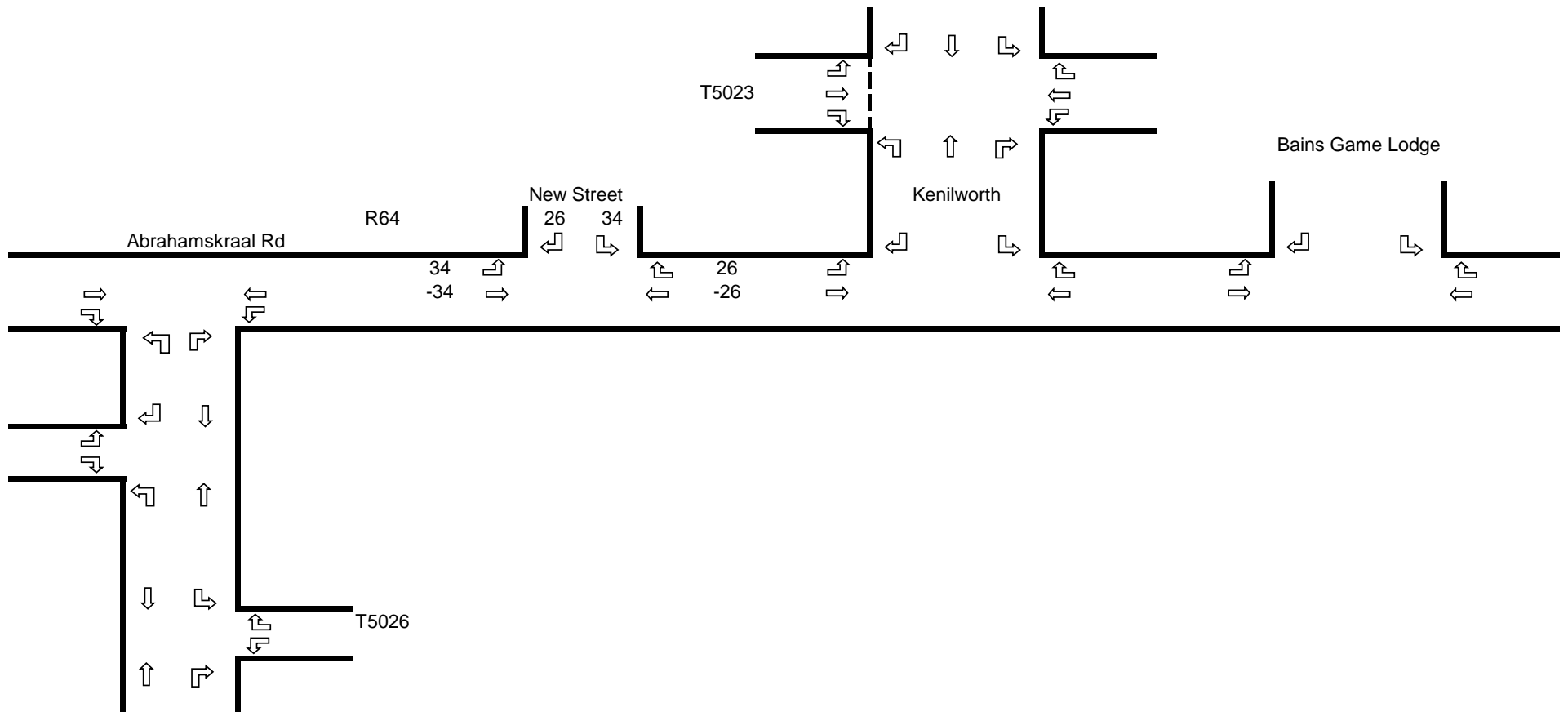


Figure 4.1c: AM Trip Distribution – Filling Station

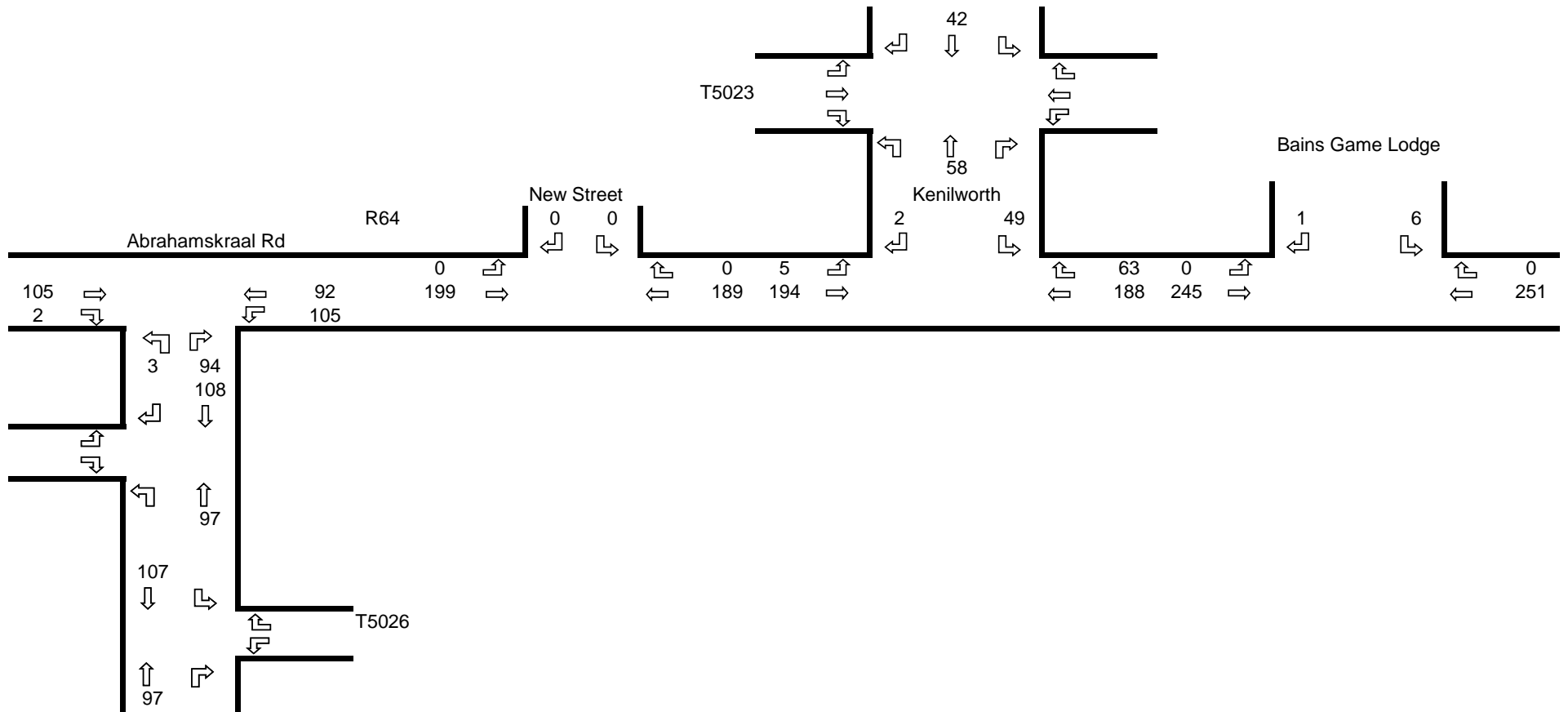


Figure 4.1d: AM Latent Rights

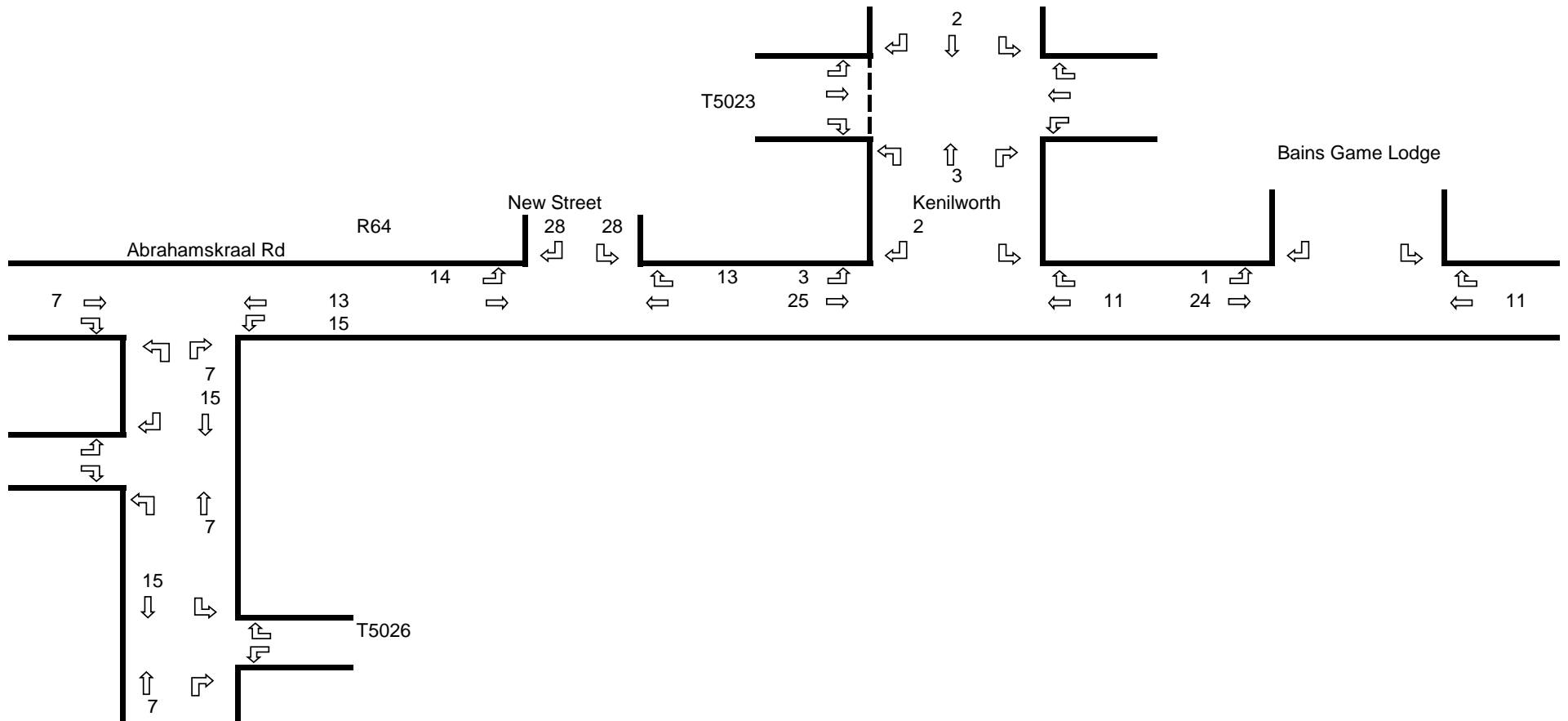


Figure 4.2a: PM Trip Distribution – Other Uses

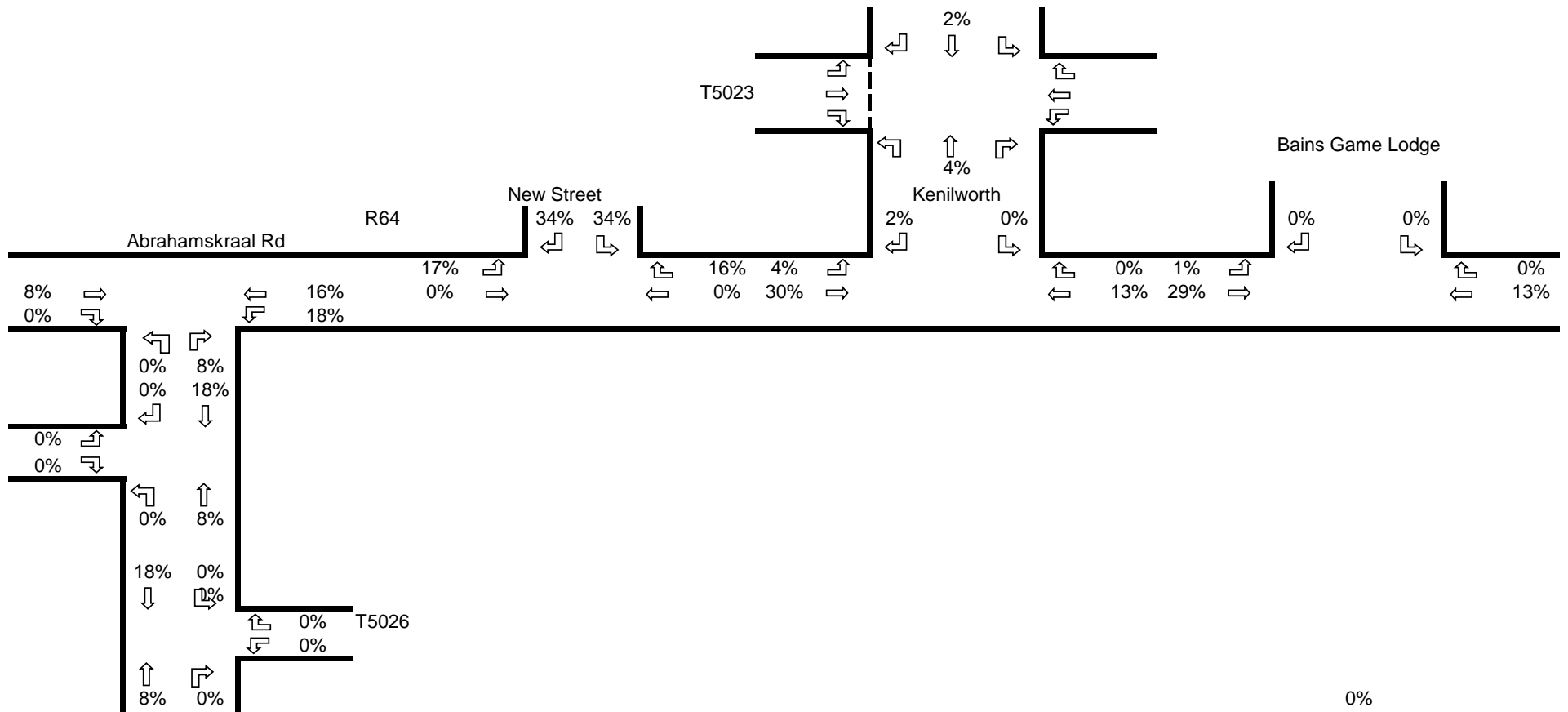


Figure 4.2b: PM Trip Distribution – Other Uses

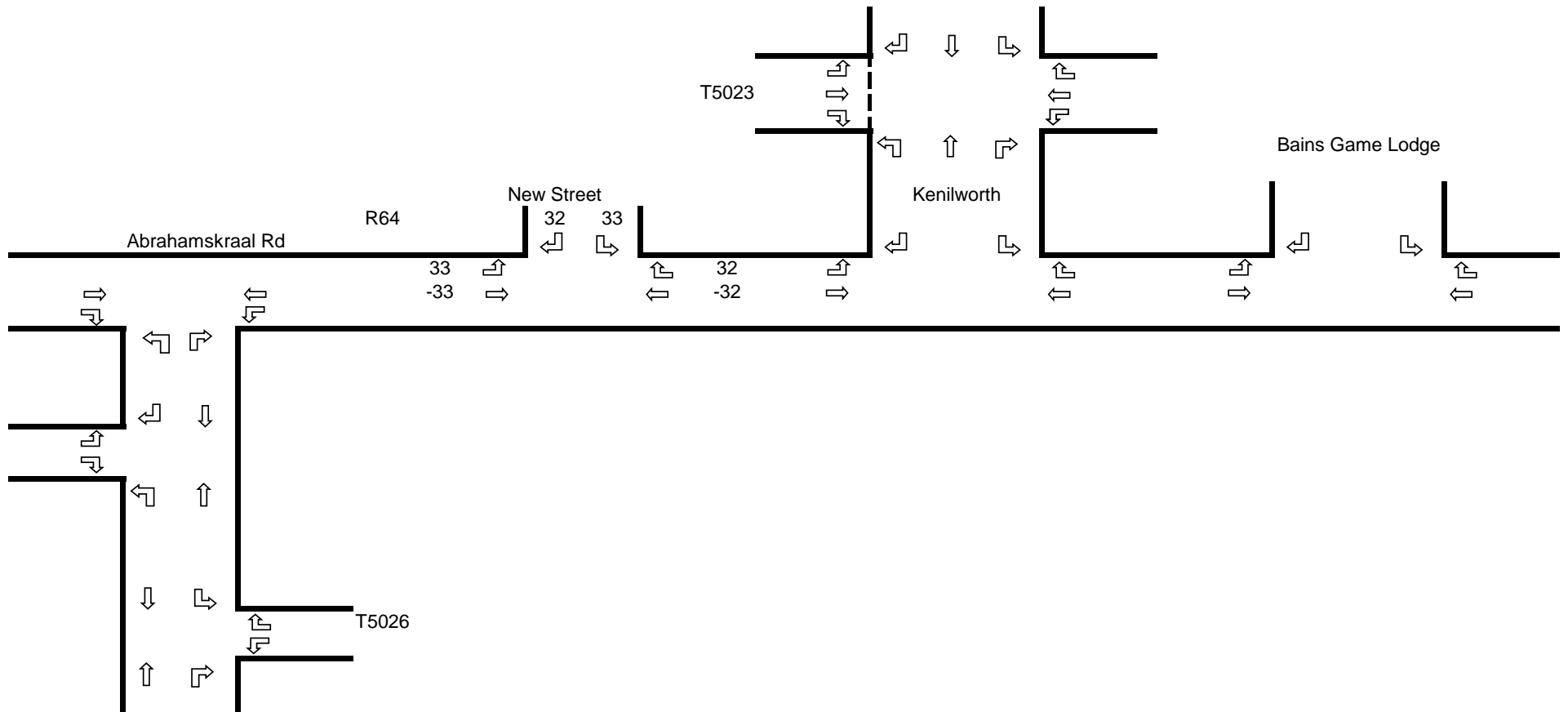


Figure 4.2c: PM Trip Distribution – Filling Station

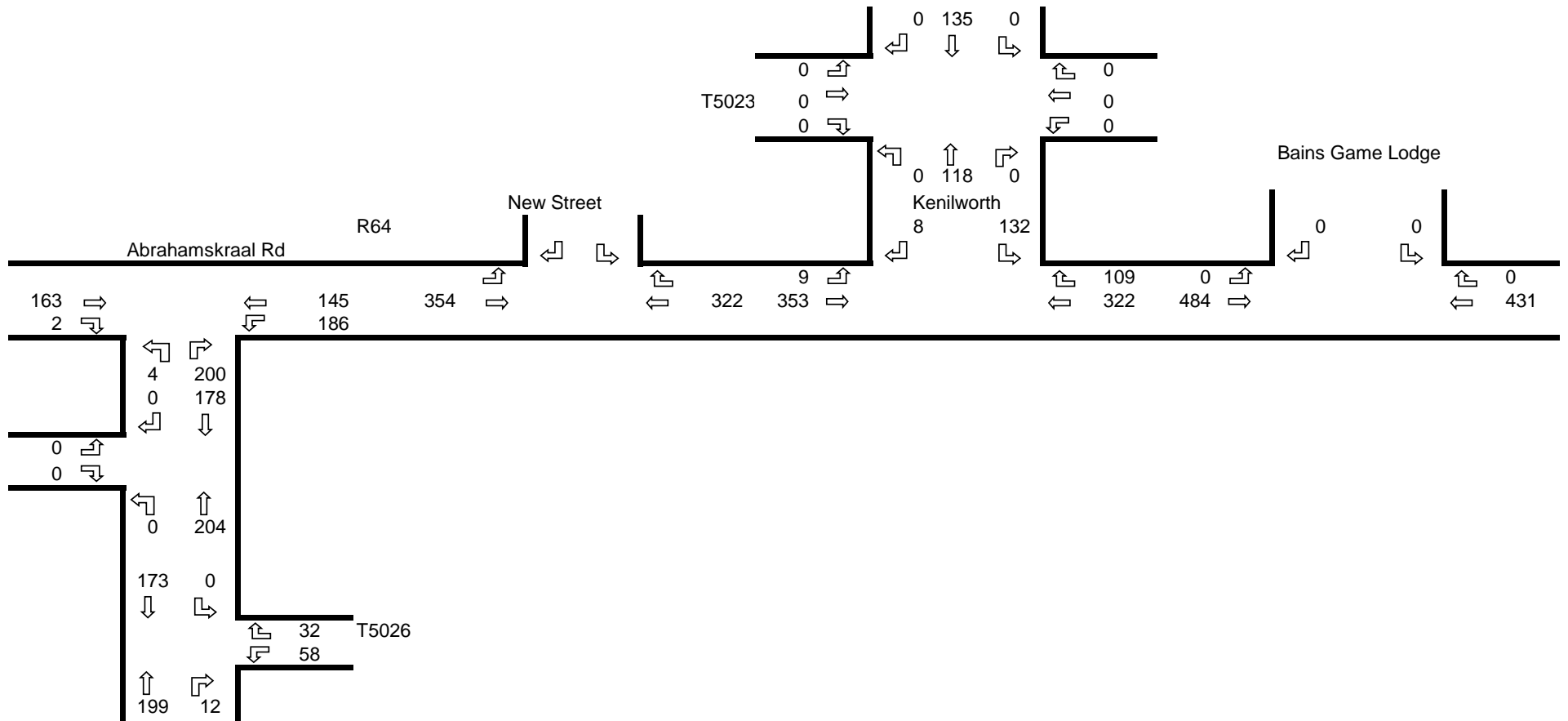


Figure 4.2d: PM Latent Rights

5 TRIP ASSIGNMENT

The generated trips have been assigned to the background traffic volumes. The following figures show the traffic volumes for the different peak periods and scenarios.

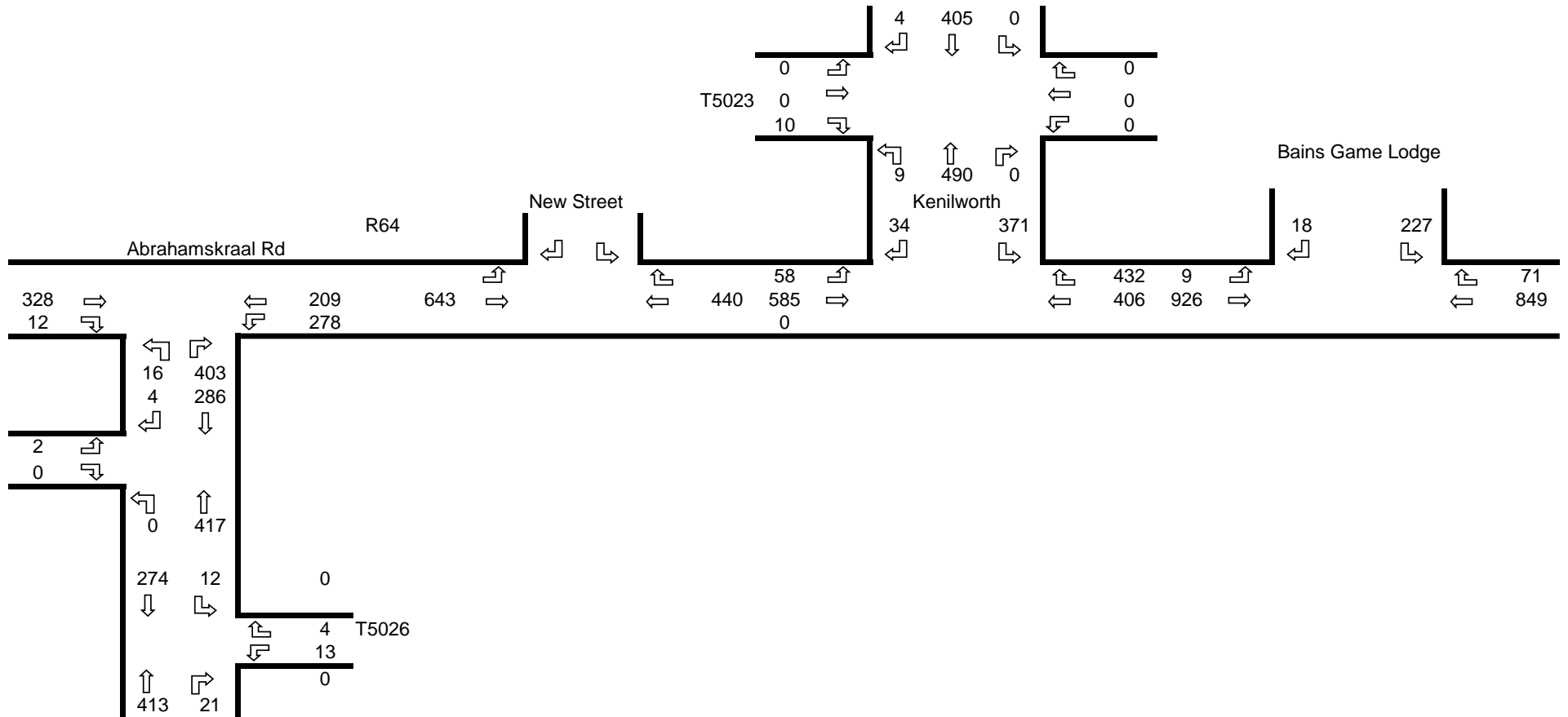


Figure 5.1a: 2019 AM Peak Hour Volumes

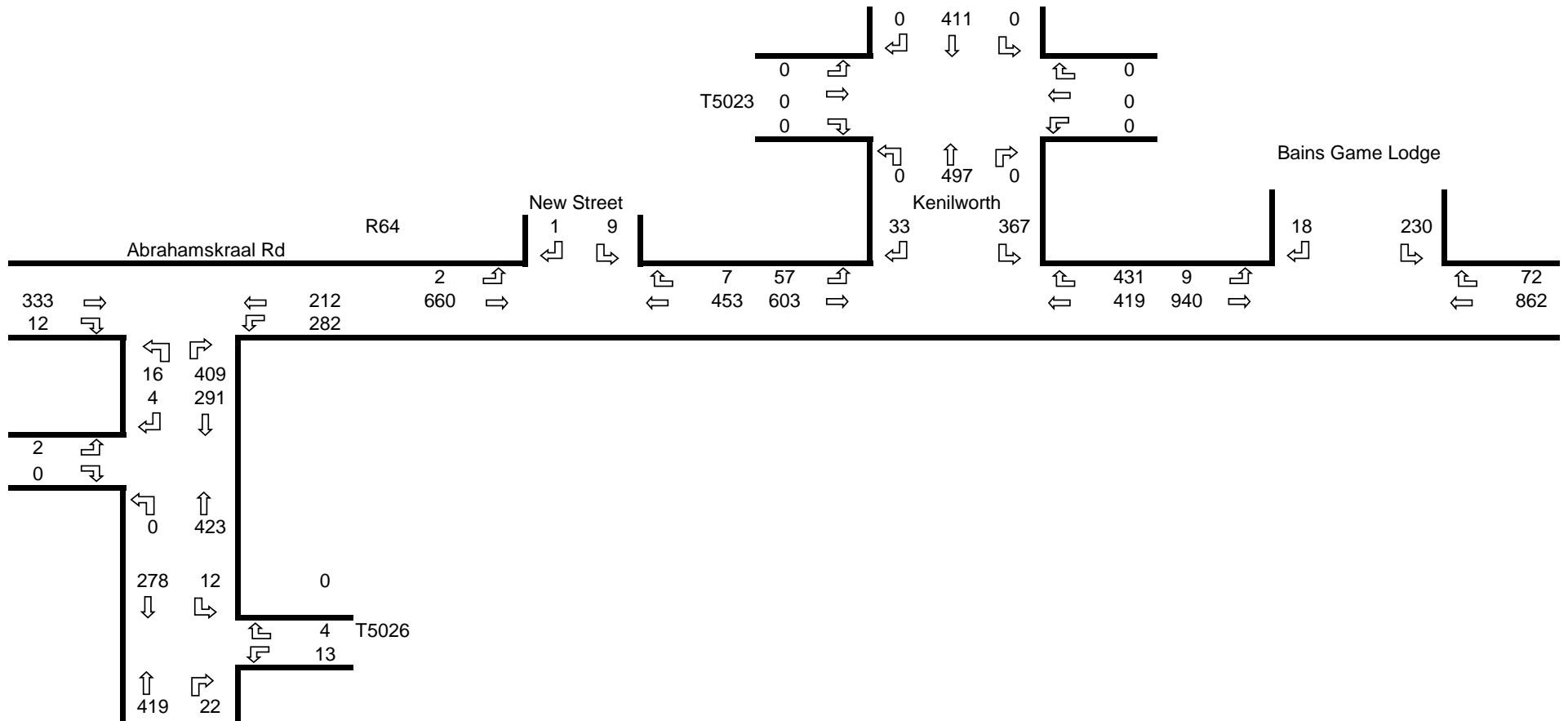


Figure 5.1b: 2020 AM Peak Hour Volumes (T5023 closed)

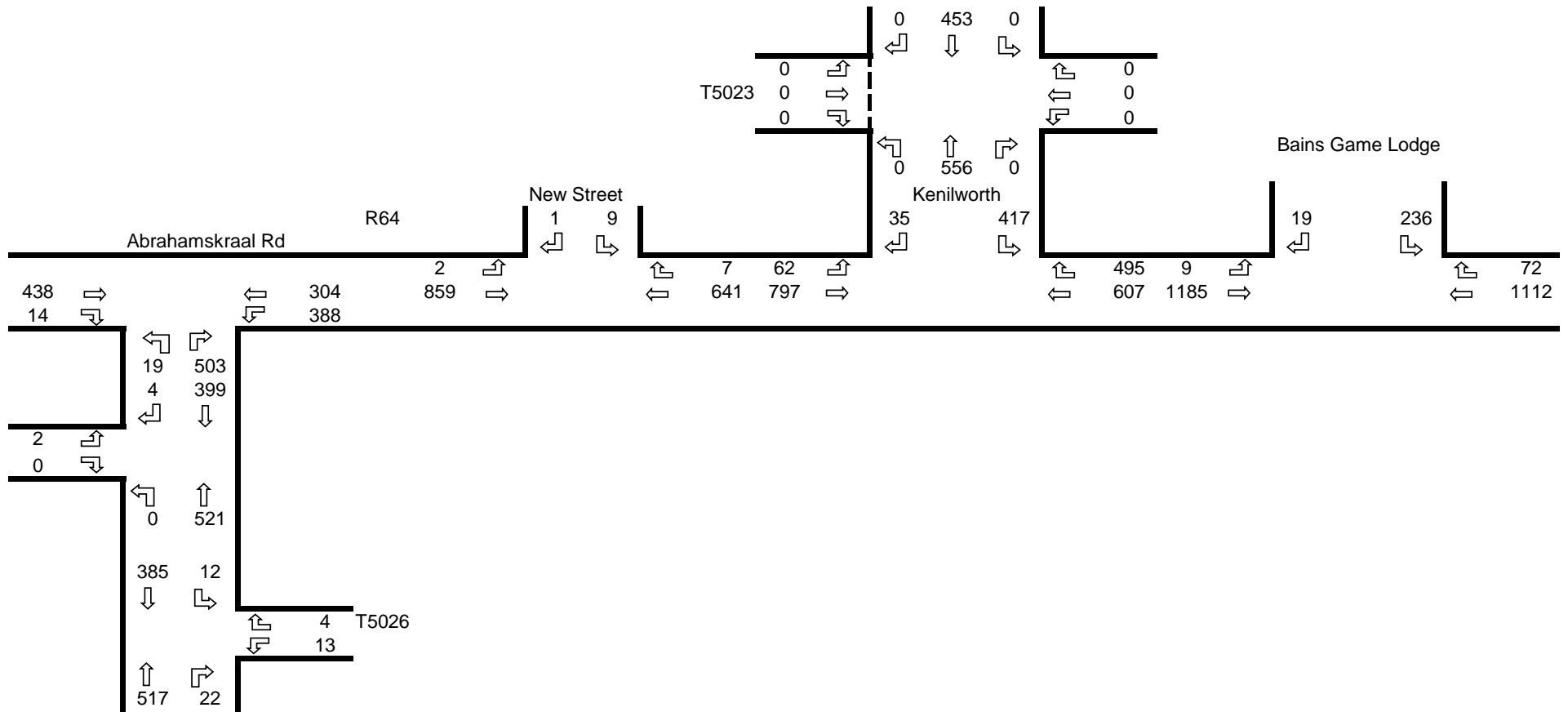


Figure 5.1c: 2020 AM Background Peak

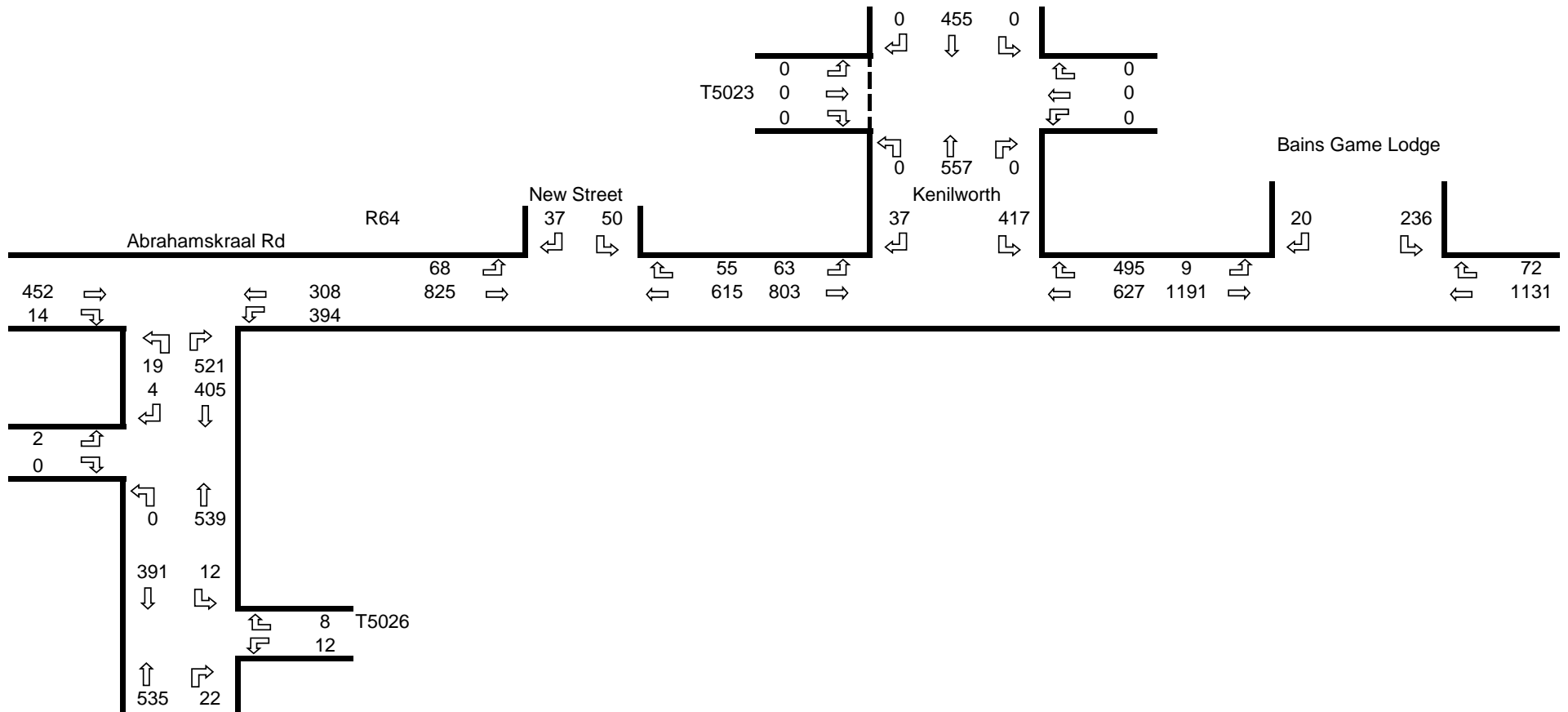


Figure 5.2: 2020 AM Background Peak with development

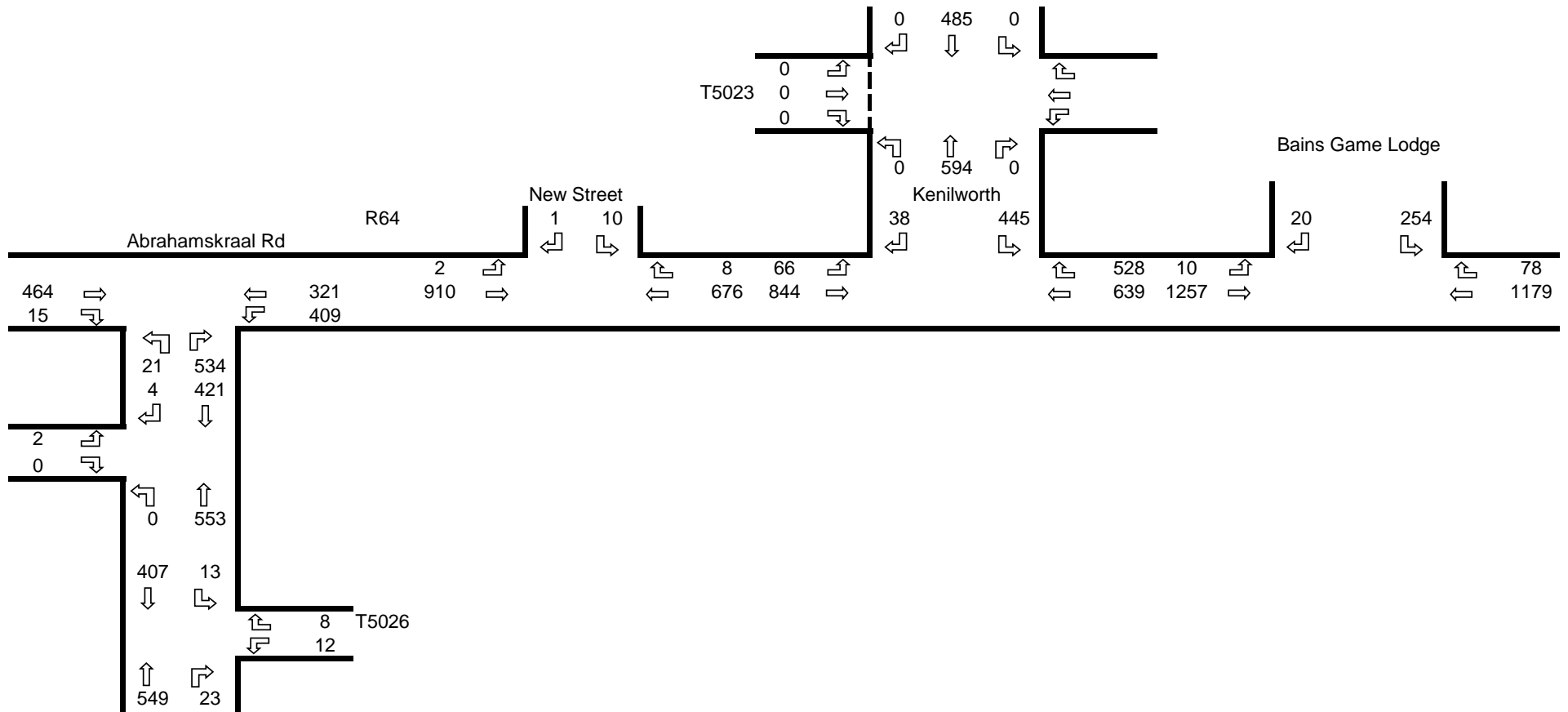


Figure 5.3: 2025 AM Background Peak

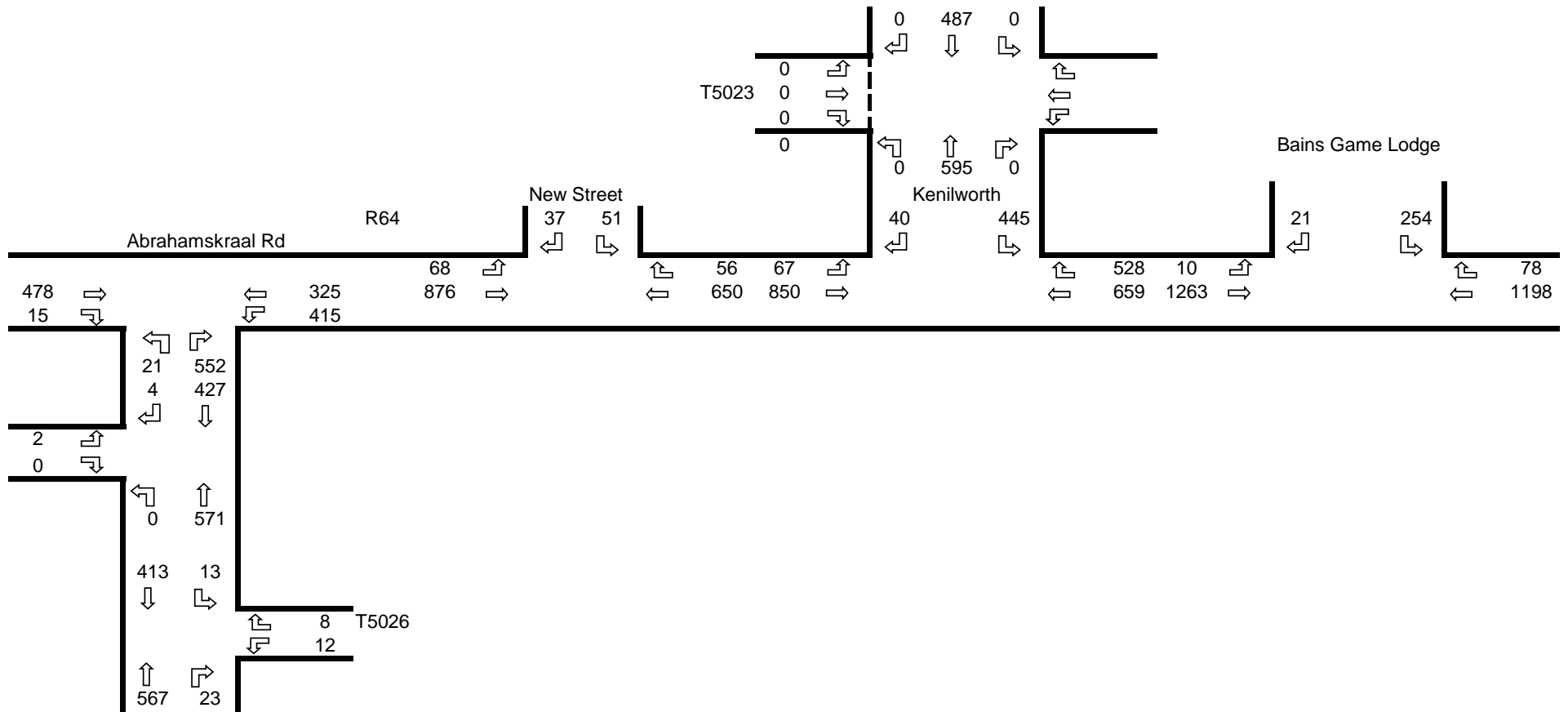


Figure 5.4: 2025 AM Background Peak with development

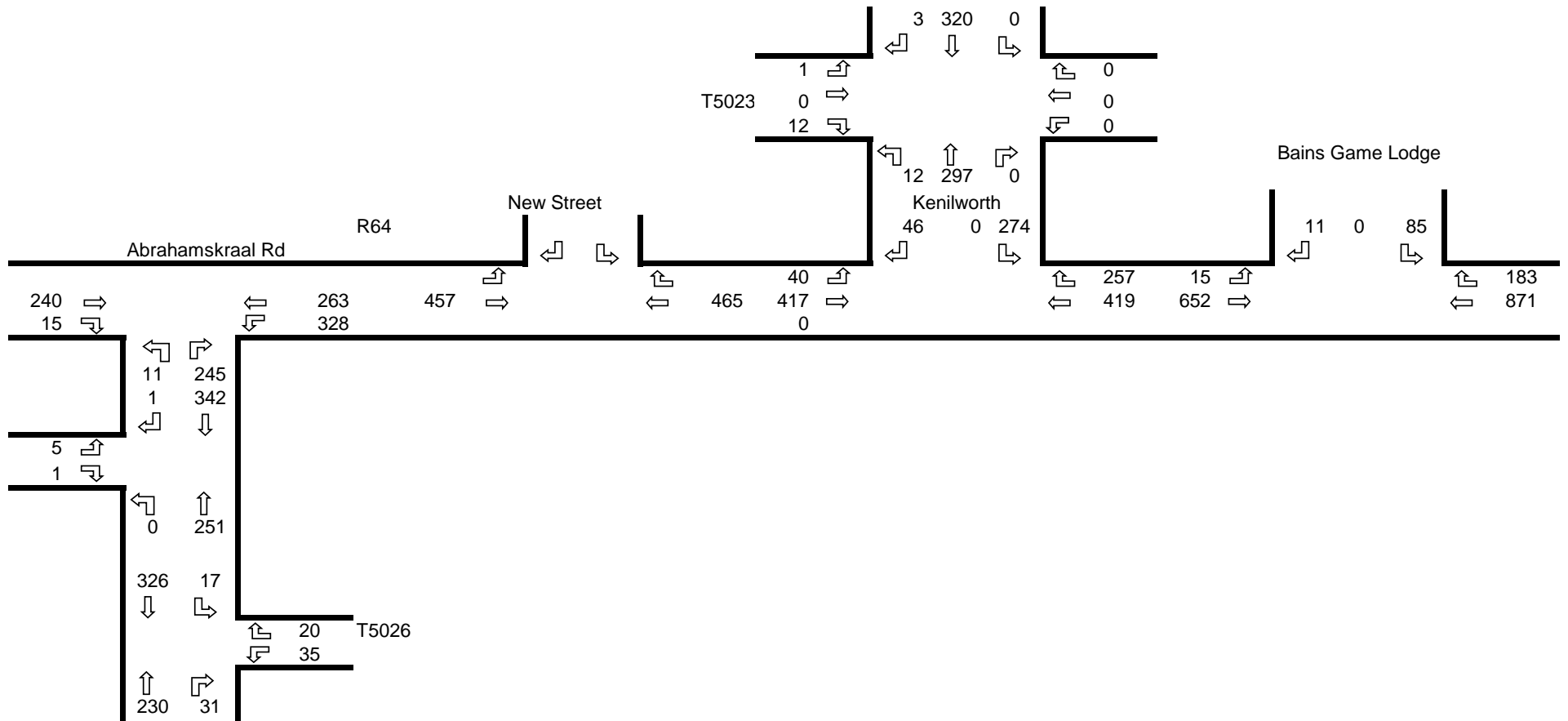


Figure 5.5a: 2019 PM Peak Hour Volumes

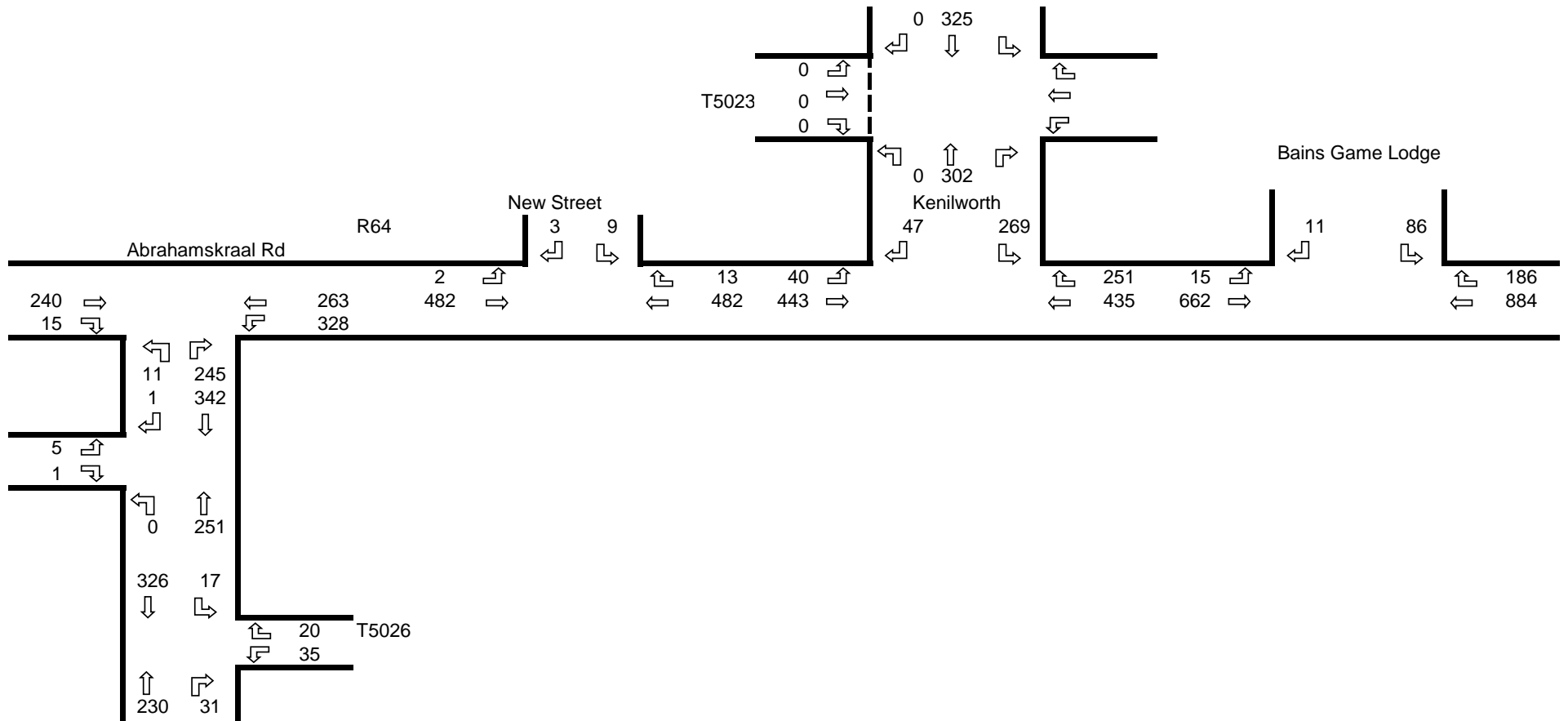


Figure 5.5b: 2020 PM Peak Hour Volumes (T5023 closed)

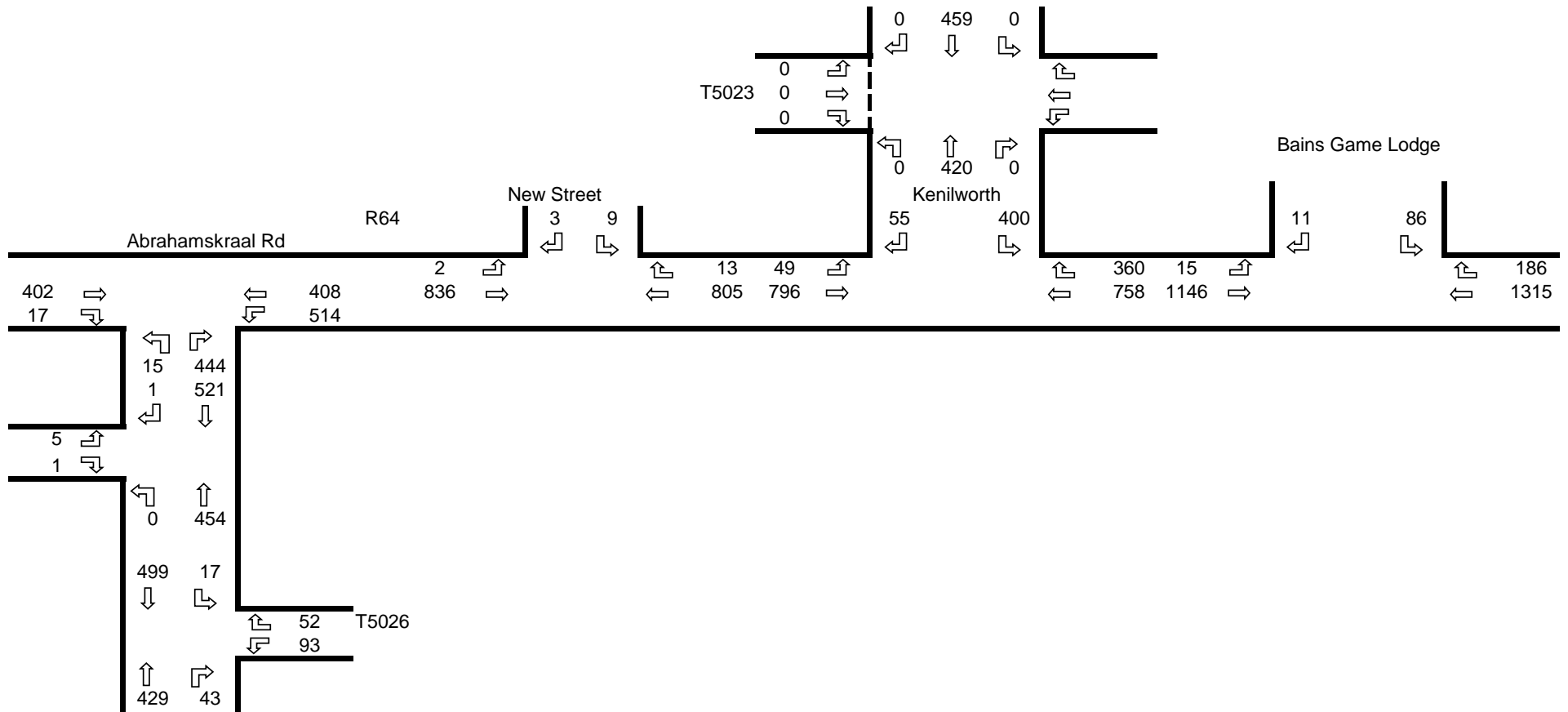


Figure 5.5c: 2020 PM Background Peak



Figure 5.6: 2020 PM Background Peak with development

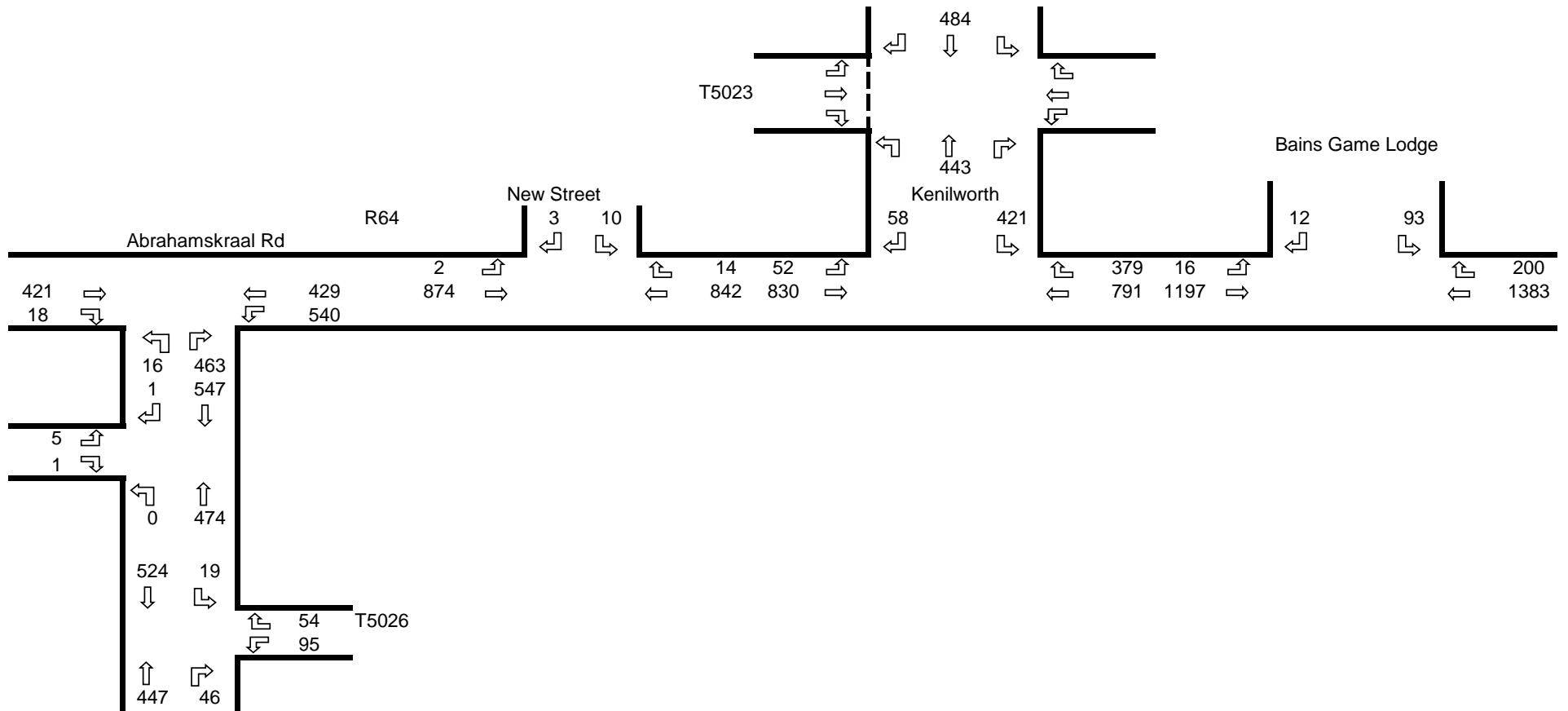


Figure 5.7: 2025 PM Background Peak

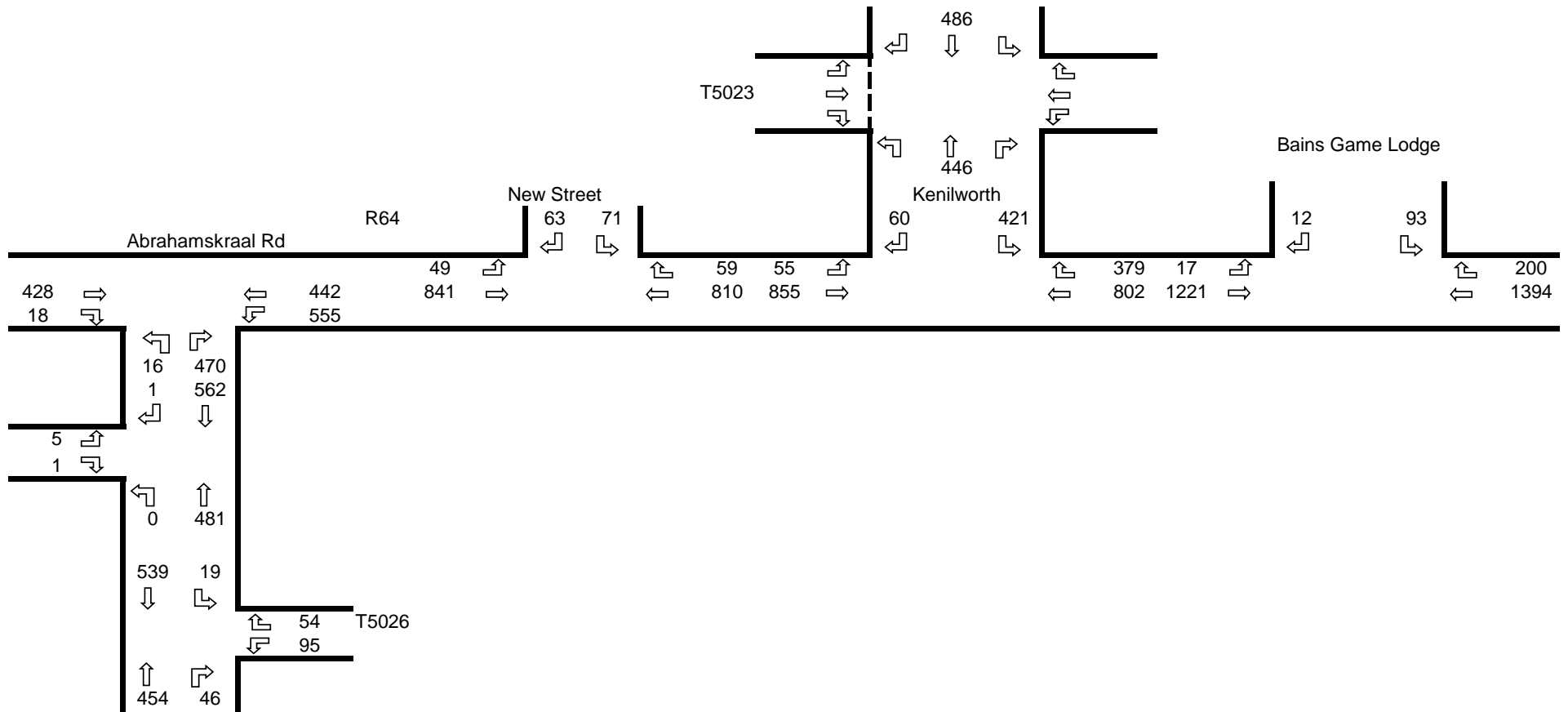


Figure 5.8: 2025 PM Background Peak with development

6 CAPACITY ANALYSIS

Capacity analyses were performed by means of the SIDRA program. The table below shows the Levels of Service of the different traffic movements. Levels of Service (LOS) give an indication of operational characteristics in a traffic stream and their perception by motorists and passengers. Levels of service A to D are usually assumed to be acceptable, with LOS E regarded as the maximum flow rate, or capacity of the facility.

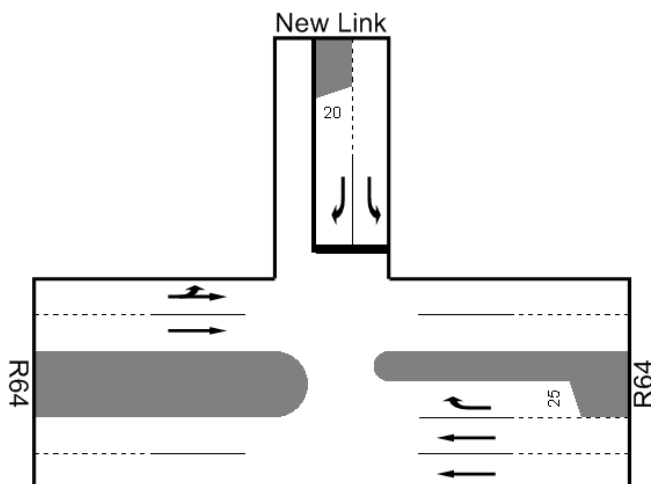


Figure 6.1 Intersections Investigated

- a) Intersection A: New intersection on R64
- b) Intersection B: R64 / Abrahamskraal Road (A53) Intersection
- c) Intersection C: Kenilworth Road (P80/1) / R64 Intersection

6.1 Intersection A: New intersection on R64

The expected layout is as follows:



Expected Layout

Levels of service with this layout will be as follows for the worst case scenarios.

Intersection: New Link / R64		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
4	2025 AM Peak with development	C		F		A	C				A	A	
8	2025 PM Peak with development	C		F		A	C				A	A	

Right turning from the north might experience capacity problems, the volumes are however limited and the layout can be considered to be acceptable.

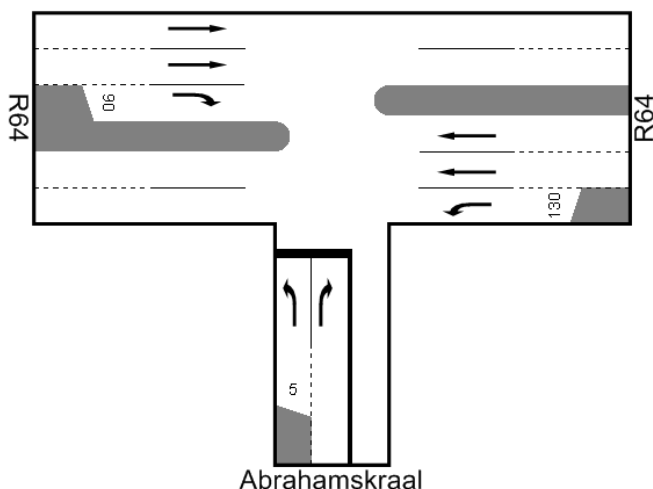
Queues will be as follows:

Intersection A		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
Average Queues													
4	2025 AM Peak with Development	0.3		0.6		0.0	0.2				0.0	0.0	
8	2025 PM Peak with Development	0.3		1.9		0.0	0.2				0.0	0.0	

Queues will be limited.

6.2 Intersection B: R64 / Abrahamskraal Road Intersection

The current layout is as follows:



Current Layout

It was already previously shown that this intersection will experience capacity problems with the implementation of latent rights.

Levels of service with this layout will be as follows.

Intersection: R64 / Abrahamskraal		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
1a	2019 AM Peak				A	A		B		D		A	B
1c	2020 AM Background Peak				A	A		B		F		A	B
5a	2019 PM Peak				A	A		B		C		A	B
5c	2020 PM Background Peak				A	A		C		F		A	C

95th Percentile queues will be as follows:

Intersection B		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
95th Percentile Queues													
1a	2019 AM Peak				0	0		0.1		12.1		0	0.1
1c	2020 AM Background Peak				0	0		0.2		130		0	0.1
5a	2019 PM Peak				0	0		0.1		4.1		0	0.1
5b	2020 PM Background Peak				0	0		0.2		134		0	0.2

The intersection will thus experience capacity problems with latent rights, irrespective of whether the development is implemented or not. The development on its own will not result in capacity problems.

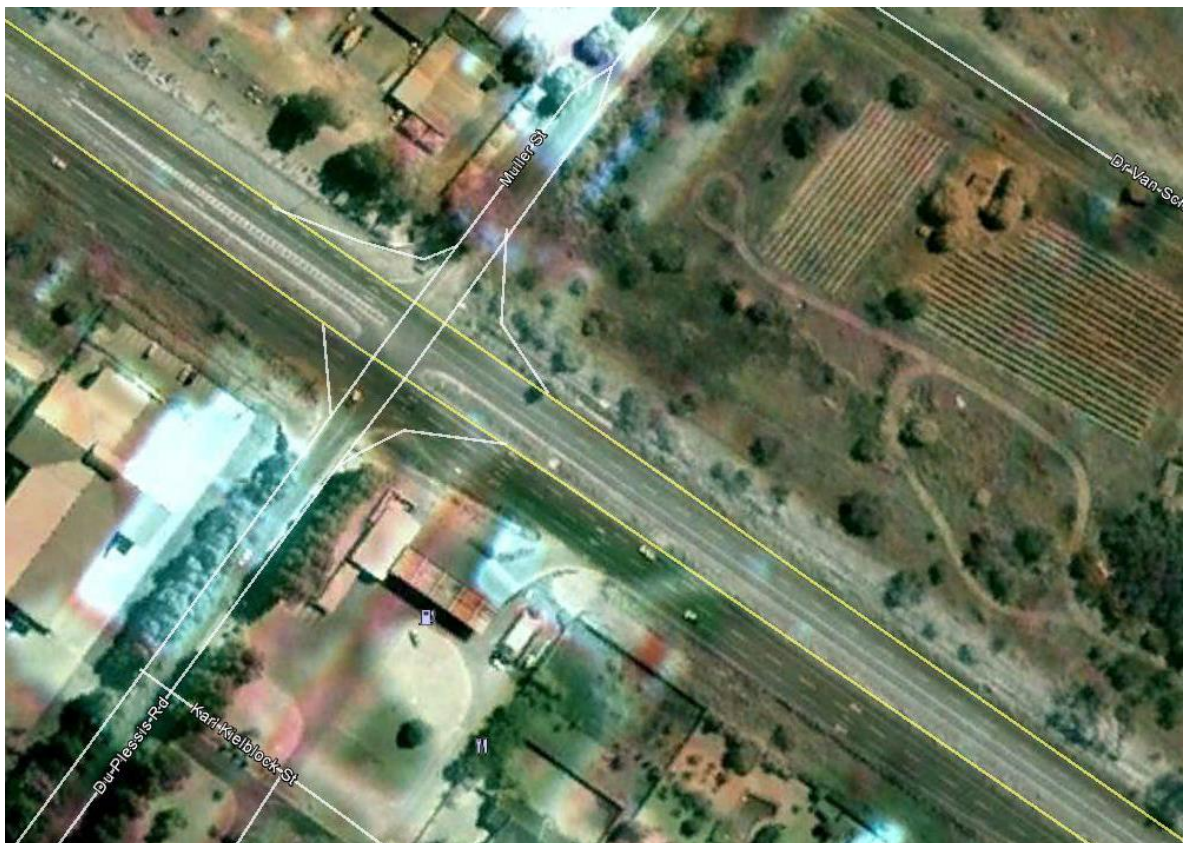
The fact that a large number of vehicles will be affected means that the intersection cannot continue to operate in its current form.

Average queues will be as follows:

Intersection B		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
Average Queues													
1a	2019 AM Peak				0	0		0		4.1		0	0
1c	2020 AM Background Peak				0	0		0		52		0	0
5a	2019 PM Peak				0	0		0		1.3		0	0
5b	2020 PM Background Peak				0	0		0		53.5		0	0.1

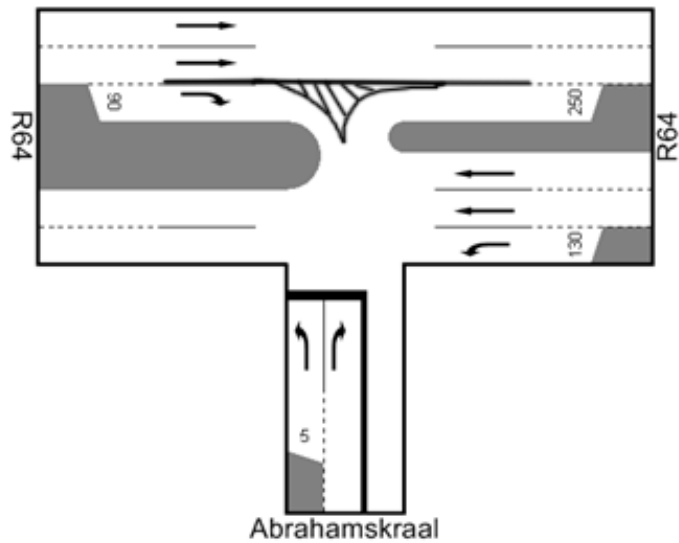
Based on the above, signalisation is expected to be required with the implementation of latent rights. Signalisation is however not ideal in this position due to the relatively rural nature of the area.

The intersection can be changed to a priority controlled intersection with a protected right turn from the south and an acceleration lane for this movement, typical of the layouts of the intersections with Du Plessis Road and Jac van Rhyn Road prior to being signalised. The previous layout of the Du Plessis Road / R64 intersection is shown below.



Previous layout of Du Plessis Road / R64 intersection

The following layout can be considered.



Recommended Upgraded Layout

Levels of service with this layout will be as follows.

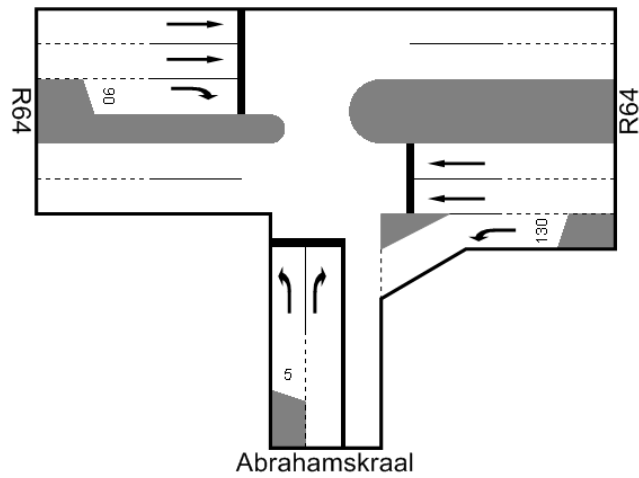
Intersection: R64 / Abrahamskraal		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
2b	2020 AM Peak with development				A	A		B		D		A	B
6b	2020 PM Peak with development				A	A		C		F		A	C

The changes will not solve the capacity problems, but as shown in tables below, queue lengths will significantly improve, and the need for signalisation can be extended. The need for signalisation should be investigated on a regular basis thereafter.

Intersection B		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
95th Percentile Queues													
2b	2020 AM Background Peak with Development				0	0		0.2		15		0	0.1
6b	2020 PM Background Peak with Development				0	0		0.2		21		0	0.2

Intersection B		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
Average Queues													
2b	2020 AM Background Peak with Development				0	0		0		7.6		0	0
6b	2020 PM Background Peak with Development				0	0		0		5.2		0	0

In the longer term, the intersection will however probably have to be signalised. The following layout should be considered.



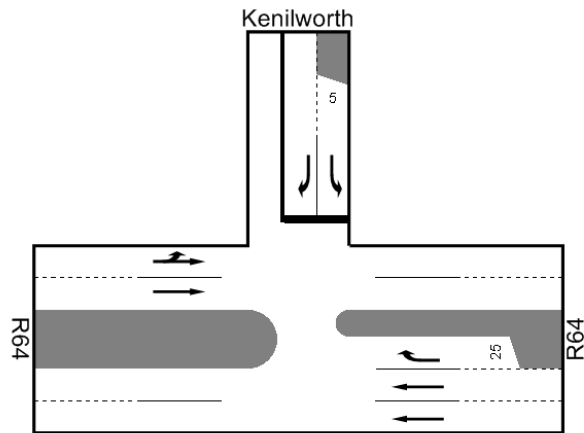
Possible Signalisation

Worst case levels of service with this layout will be as follows

Intersection: R64 / Abrahamskraal		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
4	2025 AM Peak with development				A	C		B		B		C	D
8	2025 PM Peak with development				A	C		B		B		C	D

6.3 Intersection C: Kenilworth Road / R64 Intersection

The current layout is as follows:



Current Layout

It was already previously shown that this intersection will experience capacity problems with the implementation of latent rights.

Levels of service with this layout will be as follows.

Intersection: Kenilworth / R64		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
1a	2019 AM Peak	C		E		A	C				A	A	
1c	2020 AM Background Peak	F		F		A	D				A	A	
2	2020 AM Peak with development	F		F		A	D				A	A	
5a	2019 PM Peak	C		D		A	B				A	A	
5c	2020 PM Background Peak	F		F		A	D				A	A	
6	2020 PM Peak with development	F		F		A	D				A	A	

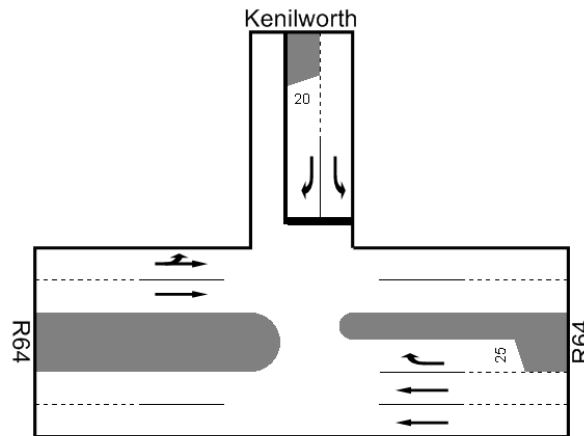
Queues will be as follows:

Intersection C		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
Average Queues													
1a	2019 AM Peak	2.7		0.4		0	2.7				0	0	
1c	2020 AM Background Peak	20.7		1		0	3.6				0	0	
2	2020 AM Peak with Development	21.5		1.1		0	3.6				0	0	
5a	2019 PM Peak	1		0.3		0	0.7				0	0	
5b	2020 PM Background Peak	15.5		2.5		0	3.3				0	0	
6	2020 PM Peak with Development	19.4		2.6		0	3.6				0	0	

As shown, the intersection is already experiencing capacity problems but does not qualify for signalisation. With the implementation of latent rights the intersection will qualify.

The development under consideration will not have a significant impact on the intersection.

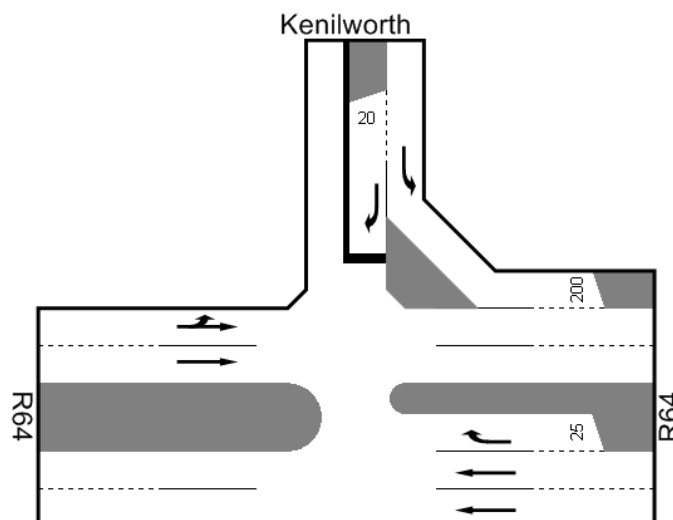
It was previously shown that the intersection could be improved by constructing a short right turning lane from the north, with the left turn lane as the main lane, as shown below:



Recommended Improvement

The above improvement will reduce queue lengths but will not resolve the situation.

Vehicles are currently using the tarred shoulder as a continuous acceleration lane and this layout can be formalised as follows.



Possible Improvement

Levels of service will improve as shown below.

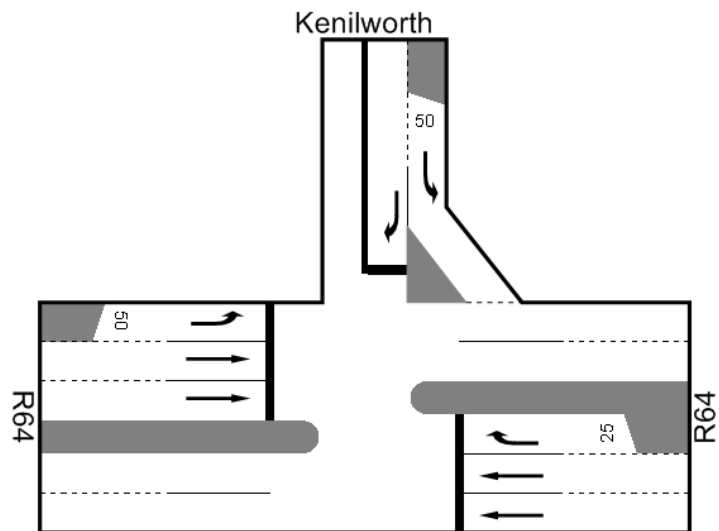
Intersection: Kenilworth / R64		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
2	2020 AM Peak with development	C		F		A	D				A	A	
6	2020 PM Peak with development	B		F		A	D				A	A	

By formalising this layout, queues will improve as shown above.

Intersection C		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
Average Queues													
2	2020 AM Peak with Development	7.3		1.1		0	3.6				0	0	
6	2020 PM Peak with Development	7		2.6		0	3.6				0	0	

Although the situation will improve, the intersection will still qualify for signalisation

When the intersection qualifies for signalisation, the following layout could be considered:



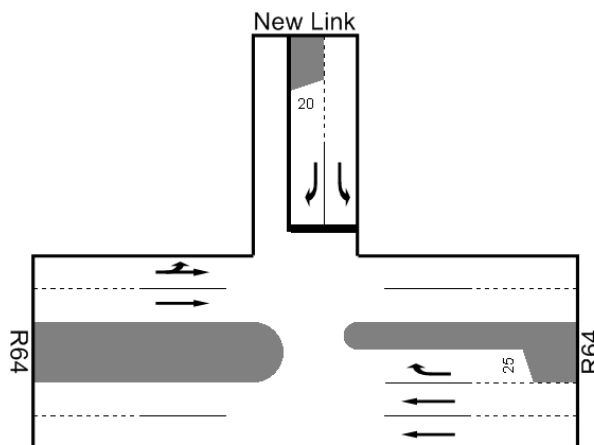
Possible Signalisation

Worst case levels of service will be as follows:

Intersection: Kenilworth / R64		North			East			South			West		
		L	T	R	L	T	R	L	T	R	L	T	R
4	2025 AM Peak with development	B		C		B	C				B	B	
8	2025 PM Peak with development	C		C		B	C				B	B	

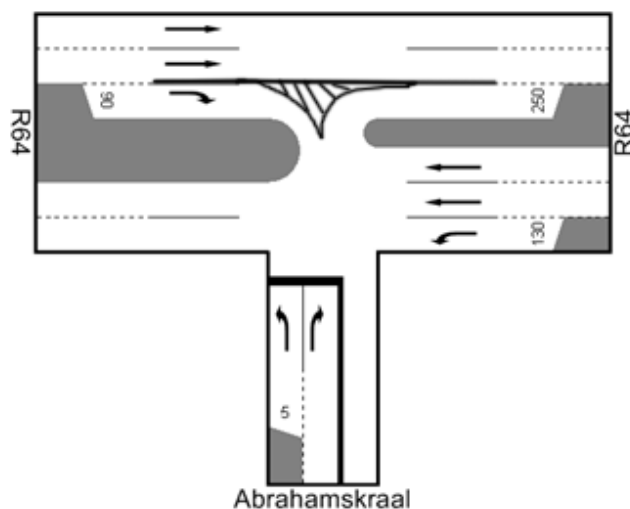
6.4 Summary

1. As an intersection on an Arterial the **New Intersection on the R64** might experience capacity problems as a priority controlled intersection but should function acceptable, given traffic volumes.

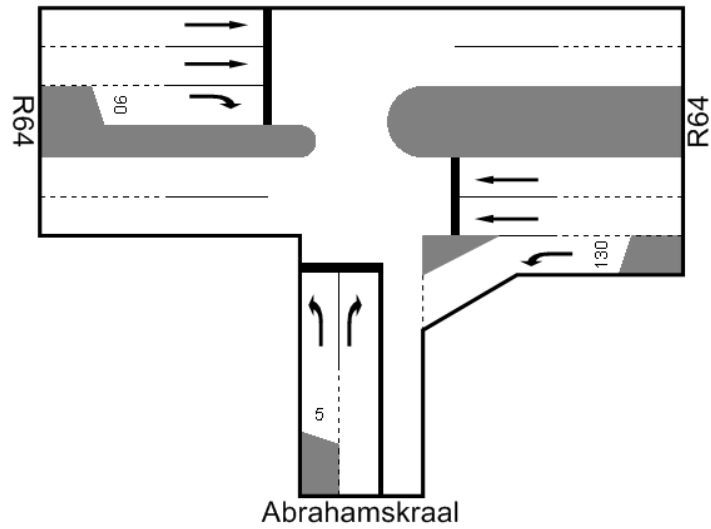


2. The **Abrahamskraal Road / R64 intersection** will continue to operate at acceptable levels of service, but with the expected latent rights will eventually require signalisation.

Queues can be improved and signalisation postponed by means of an acceleration lane from the south to the east.

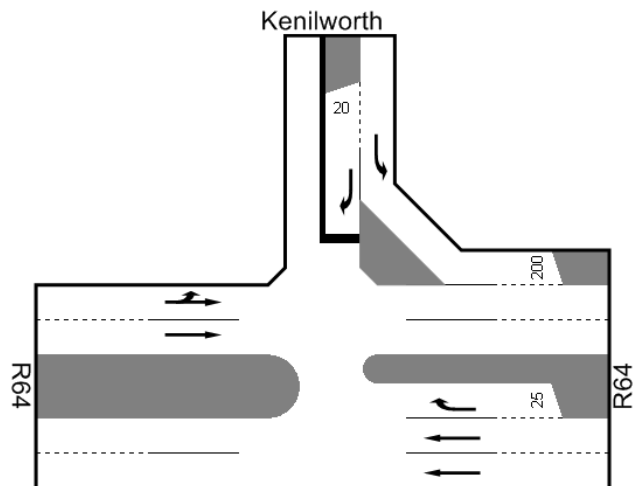


If eventually signalised, the following layout should be considered.

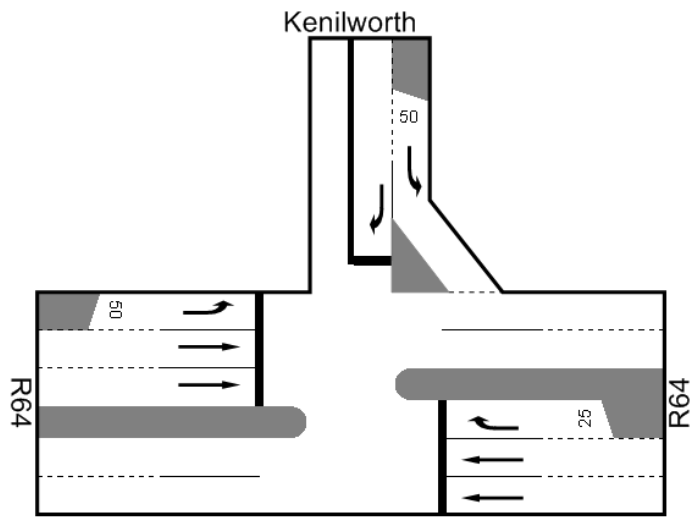


3. The **Kenilworth Road / R64** intersection is expected to experience capacity problems with latent rights., irrespective of the development under consideration.

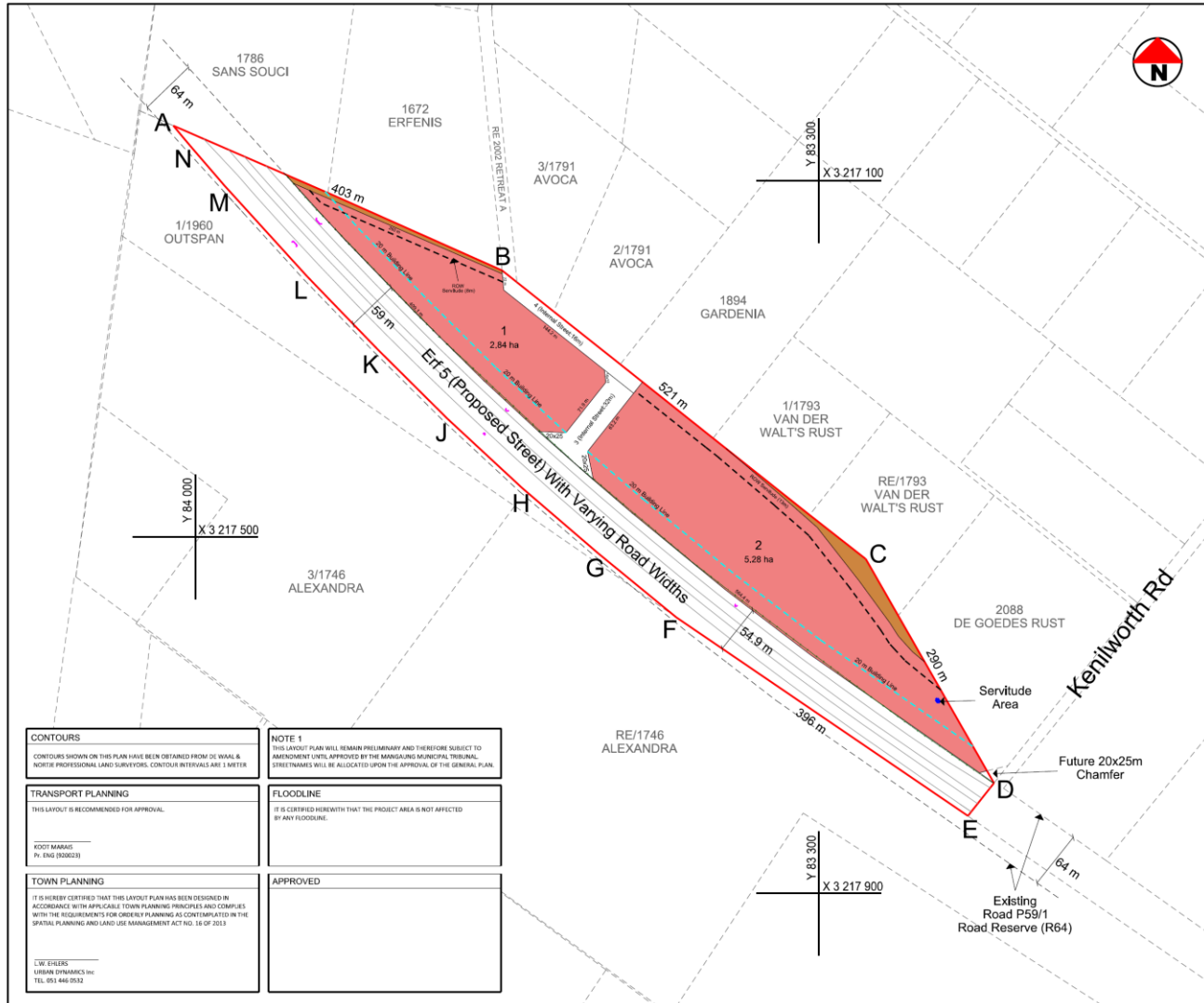
The intersection could qualify for signalisation in due time, mainly because of the left turning from the north. Vehicles are currently using the tarred shoulder as a continuous acceleration lane. By formalising this layout, queues and levels of service will improve.



When the intersection qualifies for signalisation, the following layout could be considered:

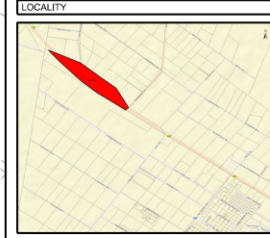


7 SITE DEVELOPMENT PLAN



PROPOSED LAYOUT PLAN **4**

TOWNSHIP ESTABLISHMENT:
FARM OUTSPAN RE/1960,
BLOEMFONTEIN



LAND USE TABLE (RE: FARM OUTSPAN 1960)

ZONING	ERF NO	NO OF ERFEN	NOTATION	A AREA ha	% OF AREA
SPECIAL USE ZONING	1	1		2.84	18.95
SPECIAL USE ZONING	2	1		5.28	34.49
INTERNAL STREETS	3 & 4	1		0.69	4.51
PROVINCIAL ROAD	5	1		6.10	39.84
SUBJECT SPACE	-	-		0.40	2.61
TOTAL	8	5		15.31	100

GENERAL

1. THE FIGURE ABCDEFA REPRESENTS THE REMAINDER OF FARM OUTSPAN 1960, MEASURING 15.31 HA.

2. ALL DIMENSIONS ARE APPROXIMATE AND SUBJECT TO FINAL SURVEYANCE.

LEGEND

Subject Property	Right of Way Servitudes
Surrounding Properties	Servitude Area to Accommodate Building Tallness Infrastructure
Building Lines	Culverts
Fence	

AMENDMENTS

REV	DESCRIPTION	ERF NUMBER	BY	DATE
01	CHANGES TO R64S	ERFEN 3 & 4	LS/STW	10/04/2015

APPLICANT: EEU VAN GROEI CENTURY OF GROWTH

DESIGN: LW EHLERS

DESIGNED BY: LW EHLERS

APPROVED BY: LW EHLERS

SCALE: 1:2 000 (A1), 1:4 000 (A2)

DATE: April 2019

DRAWING NO: Layout Plan 0297/04/02

0 METER 200

URBAN DYNAMICS

PO Box 37522 Langenhovenpark 9502

Tel: (051) 446 0532 Fax: (051) 508 7765 e-mail: info@urban-dyn.co.za

CONTOURS

CONTOURS SHOWN ON THIS PLAN HAVE BEEN OBTAINED FROM DE WAAL & NORTJE PROFESSIONAL LAND SURVEYORS. CONTOUR INTERVALS ARE 1 METRE.

TRANSPORT PLANNING

THIS LAYOUT IS RECOMMENDED FOR APPROVAL.

RODIT MARAIS
PL ENG (2005/21)

NOTE 1

THIS LAYOUT PLAN WILL REMAIN PRELIMINARY AND THEREFORE SUBJECT TO AMENDMENT UNTIL APPROVED BY THE MANAGING MUNICIPAL TRIBUNAL. STREET NAMES WILL BE ALLOCATED UPON THE APPROVAL OF THE GENERAL PLAN.

FLOODLINE

IT IS CERTIFIED HEREWITH THAT THE PROJECT AREA IS NOT AFFECTED BY ANY FLOODLINE.

TOWN PLANNING

IT IS HEREBY CERTIFIED THAT THIS LAYOUT PLAN HAS BEEN DESIGNED IN ACCORDANCE WITH APPLICABLE TOWN PLANNING PRINCIPLES AND COMPLIES WITH THE REQUIREMENTS FOR ORDINARY PLANNING AS CONTAINED IN THE SPATIAL PLANNING AND LAND-USE MANAGEMENT ACT NO. 16 OF 2013.

LW EHLERS
URBAN DYNAMICS Inc
TEL 051 446 0532

APPROVED

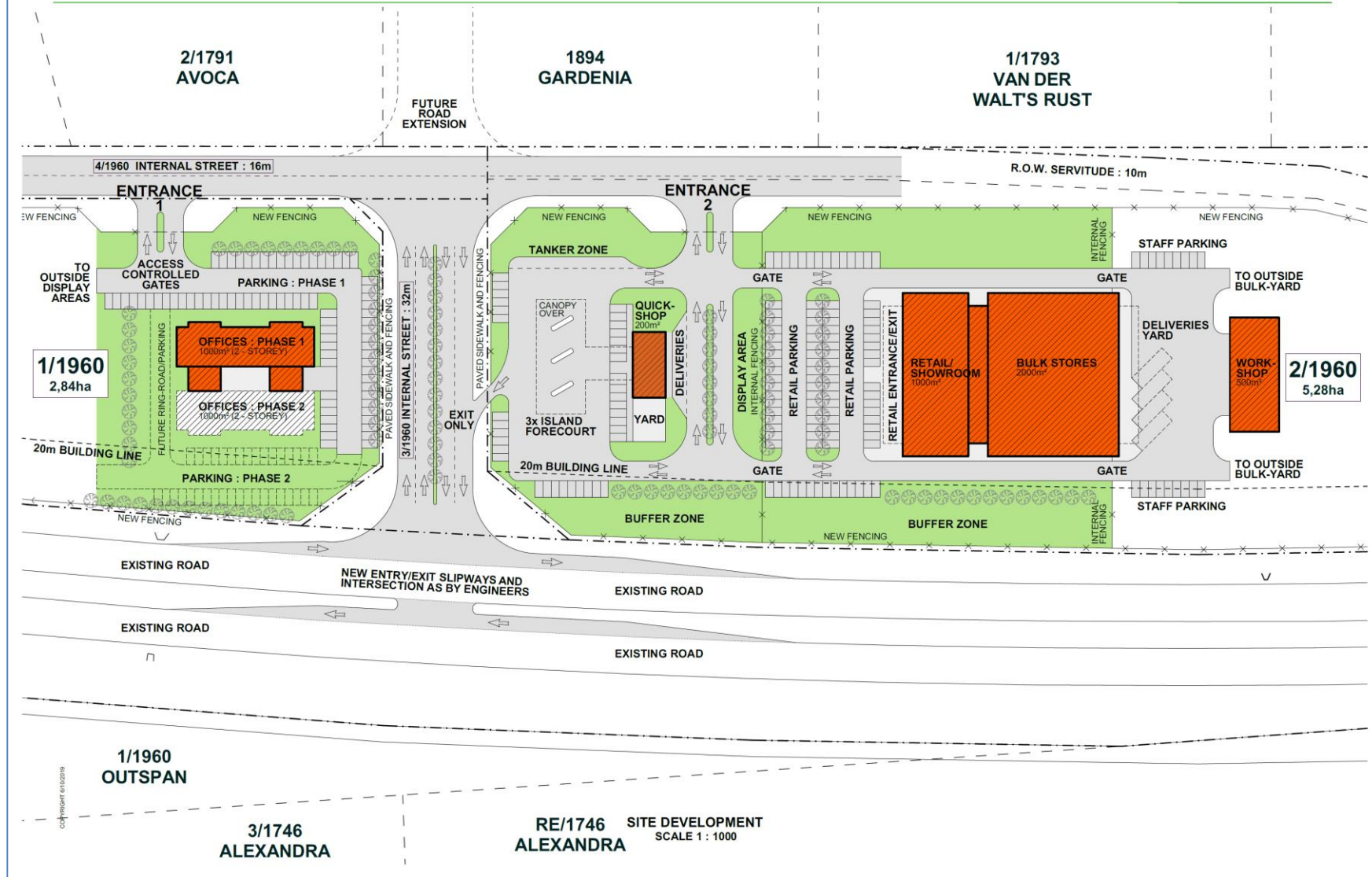
The following aspects of the site development plan are of importance.

No	Basic Aspects
1	Intersections
a	Number of intersections
	<i>Discussion:</i>
	One new intersection will be established.
b	Spacing
	<i>Discussion:</i>
	See Section 2.3
c	Traffic Control Measures
	<i>Discussion:</i>
	See Section 6.1
d	Traffic Capacity
	<i>Discussion:</i>
	See Section 6.1
e	Provision of deceleration lanes and turning lanes
	<i>Discussion:</i>
	See Section 6.1
f	Storage space at intersection versus queue lengths
	<i>Discussion:</i>
	See Section 6.1
g	Continuity of Road Reserve Boundaries
	<i>Discussion:</i>
	The extension of the T5024 will have a 16m reserve. The link with the R64 will have a reserve of 32m to ensure sufficient space for turning lanes.
h	Required Improvements
	<i>Discussion:</i>
	As discussed elsewhere
i	Phasing of Required Improvements
	<i>Discussion:</i>
	Not relevant. The changes to the road network are required with the establishment of the development.
j	Vertical alignment of intersections
	The vertical alignment of intersections should be acceptable considering the gradient of roads.
2	Internal Roads
a	Road Classification
	<i>Discussion:</i>
	The new road can be classified as a Major Residential Access Link 5(a)
b	Width of Road Reserves
	<i>Discussion:</i>
	See 1g.
c	Splays
	<i>Discussion:</i>
	All splays are 10m x 10m as a minimum
d	Road widths
	<i>Discussion:</i>
	The initial section of the road will accommodate a significant portion of heavy vehicles and should be 7.5m as a minimum

e	Road Curves
	<i>Discussion:</i>
	The new road reserve makes provision for 90-degree bend, whilst a bend of approximately 135 degrees will be established where the new road links with the T5024. This is not ideal as the curve can be hazardous for speeding vehicles, especially southeast bound vehicles. (the section from the east is relatively short). This alignment is however unavoidable. Proper signage is important and it might also be necessary to construct a speed hump on the approach to the intersection.
f	Super elevation
	<i>Discussion:</i>
	No super elevation would be required.
g	Gradient of Roads
	<i>Discussion:</i>
	The site is relatively flat and no problems are expected with gradients of the roads.
h	Traffic Circulation
	<i>Discussion:</i>
	Normal traffic circulation is possible and will be acceptable.
i	Capacity of Road Links
	<i>Discussion:</i>
	No road link is expected to carry traffic volumes that would require more than one lane per direction.
j	General Sight Distances
	<i>Discussion:</i>
	Sight distances are in general acceptable.
k	Pedestrian Movements
	<i>Discussion:</i>
	Limited pedestrian movement is expected and movement will be accommodated on sidewalks.
l	Illumination of Streets
	<i>Discussion:</i>
	Street illumination should be provided where necessary.
m	Refuse Removal
	<i>Discussion:</i>
	Normal refuse removal will take place and vehicles should be able to move throughout the area.
n	Public Transport
	<i>Discussion:</i>
	Provision should be made for public transport bays on the main site. Consideration can also be given to establishing a lay-by in the vicinity of the new intersection..
o	Emergency Vehicle Access
	<i>Discussion:</i>
	Emergency vehicles should be able to access all areas.
p	Potential Conflict Areas
	<i>Discussion:</i>
	The layout does not have any particular conflict areas.
q	Heavy Vehicle Usage
	<i>Discussion:</i>

	Moderate heavy vehicle volumes are expected.
r	Jurisdiction of Roads
	<i>Discussion:</i>
	It is the intention that the new internal roads be taken over by the Municipality.
3	Legal Aspects
	The right-of-way servitude to provide access to the Remainder and Portion 1 of 1793 Van der Walt's Rust and 2088 De Goedes Rust and this needs to be registered.
4	Other Aspects
	<p>Although access to the sites can be finalised as part of the Site Development Plan approval process, a concept layout has already been compiled as shown below.</p> <p>The following aspects are of importance with regards to the layout:</p> <ol style="list-style-type: none"> 1. Provision is made for a 4-lane road with a median. This is not strictly necessary, but can be employed 2. No access is provided from the R64. It is unlikely that access from the R64 will be possible. Access to the filling station may be considered, but the access should only be for a bona-vide filling station, which might be difficult to achieve. 3. No provision is made for access from the link road, except an exit from the filling station. Spacing will not allow access from the link road. An exit from the filling station (with a median) might be possible depending on spacing determined by actual detail design. If viable, an exit from the filling station will intersect at an angle close to 90 degrees. 4. Access from the internal street to the erven is shown with reasonable spacing. Spacing of accesses will be determine at SDP stage.

OVK OUTSPAN DEVELOPMENT



8 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions can be made from the study:

- a) Based on the zoning, the development can, as a worst case, generate 71 and 83 new trips during the morning and afternoon peak hours.
- b) The development is not expected to have a significant impact on the road network.
- c) To accommodate the development, the intersection of the T5023 with Kenilworth Road will have to be closed and a new intersection established on the R64. This will in fact improve spacing.
- d) The Abrahamskraal Road / R64 intersection is still operating at acceptable levels of service and will continue to do so with only the trip generation of the development under consideration. The intersection is however expected to experience capacity problems with latent rights and might eventually have to be signalised. The intersection can however be improved by means of an acceleration lane from the south to the east, which should postpone the need for signalisation.
- e) The Kenilworth Road / R64 intersection is expected to experience capacity problems with latent rights, irrespective of the development under consideration.

The intersection could qualify for signalisation in due time, mainly because of the left turning from the north. Vehicles are currently using the tarred shoulder as a continuous acceleration lane. By formalising this layout, queues and levels of service will improve. In the longer term signalisation might however be required.

- f) The Township Establishment Layout Plan is acceptable and appropriate site development plans should be possible.

Based on the findings of the study the change in land use can be recommended from a traffic point of view.

9 REFERENCES

1. **Manual for Traffic Impact Studies**, Department of Transport, Pretoria, 1995
2. **South African Trip Generation Rates**, Department of Transport, Pretoria, 1995
3. **ITE Trip Generation Rates, 6th Edition**, Institute of Transportation Engineers, Washington, 1998
4. **Transportation and Land Development**, Institute of Transportation Engineers, Washington, 1988
5. **UTG 1, Guidelines for the Geometric Design of Urban Arterial Roads**, CSIR, Pretoria, 1986
6. **National Guidelines for Road Management in South Africa**, COTO
7. **Spacing of Accesses on Major Arterials**, Department of Transport, Pretoria, 1993
8. **UTG 7, Guidelines for the Geometric Design of Urban Local Residential Streets**, CSIR, Pretoria, 1989
9. **SANRAL Geometric Design Guidelines**, SANRAL, 2004
10. **TRH 26, South African Road Classification and Access Management Manual, Version 1.0**, COTO, 2012
11. **Traffic Flow Theory, 3rd Edition**, SC van As & HS Joubert, Pretoria, 1990

APPENDIX A

ANNEXURE D: AMENDMENT OF SCHEME SCHEDULES

Amend section 9, Table “C” of the Bainsvlei Town Planning Scheme, No. 1 of 1984 (as amended) by the addition of “Special Use ??”, that should read as follows:

Use zone	How indicated on map	Purposes for which land may be used	Purposes for which land in a use zone may be used with the approval of the Municipality
“Special Use ??” Erf 1 Bloemfontein Ext.____, located on the Remainder of the Farm Outspan 1960.	Orange marked “S”	<p>Permitted uses:</p> <p>a) Administrative offices (excluding medical consulting rooms) with a maximum GLA of 2 000 m²; and</p> <p>b) A Caretakers Dwelling.</p> <p>Coverage: No Restriction</p> <p>Height: No Restriction</p> <p>Parking: As prescribed in Section 25 of the Bainsvlei Town-Planning Scheme No 1 of 1984.</p> <p>Building line: Subject to the Bainsvlei Town-Planning Scheme No 1 of 1984.</p> <p>Access: To the satisfaction of the Mangaung Metro Municipality.</p>	<p>Consent uses</p> <p>a) Additional office space with a maximum GLA of 2 000 m².</p>
“Special Use ??” Erf 2 Bloemfontein Ext.____, located on the Remainder of the Farm Outspan 1960.	Orange marked “S”	<p>Permitted uses:</p> <p>a) Agricultural related retail sales area with a maximum GLA of 1 000 m²;</p> <p>b) Agricultural related storage area with a maximum GLA of 2 000 m²;</p> <p>c) Workshop with a maximum GLA of 500 m²;</p> <p>d) Outside exhibition area with a maximum GLA of 200 m²;</p> <p>e) Public Garage (including a convenience store with a maximum GLA of 200 m²); and</p> <p>f) A Caretakers Dwelling.</p> <p>Coverage: No Restriction</p> <p>Height: No Restriction</p> <p>Parking: As prescribed in Section 25 of the Bainsvlei Town-Planning Scheme No 1 of 1984.</p> <p>Building line: Subject to the Bainsvlei Town-Planning Scheme No 1 of 1984.</p> <p>Access: To the satisfaction of the Mangaung Metro Municipality.</p>	<p>Consent uses</p> <p>a) Additional retail sales area of 1 000 m²; and</p> <p>b) Additional storage area of 2 000 m².</p>

Wysig Artikel 9, Tabel “C” van die Bainsvlei Dorpsaanlegkema, No. 1 van 1984 (soos gewysig) deur die byvoeging van “Spesiale Gebruik ??”, wat soos volg moet lees:

Gebruiksone	Hoe op kaart aangewys	Doeleindes waarvoor grond gebruik mag word	Doeleindes waarvoor grond in 'n gebruiksone met goedkeuring van die Munisipale Raad gebruik mag word
“Spesiale Gebruik ??” Erf 1 Bloemfontein Uitbr.____ geleë op die Restant van die plaas Outspan 1960.	Oranje gemerk “S”	<p>Toelaatbare gebruike:</p> <p>a) Administratiewe kantore (mediese spreekkamers uitgesluit) met 'n maksimum BVO van 2 000 m², en</p> <p>b) 'n Opsigters woning.</p> <p>Dekking: Geen Beperking</p> <p>Hoogte: Geen Beperking</p> <p>Parking: Soos voorgeskryf in Artikel 25 van die Bainsvlei Dorpsaanlegkema No. 1 van 1984.</p> <p>Boulyne: Onderworpe aan die Bainsvlei Dorpsaanlegkema No. 1 van 1984.</p> <p>Toegange: Tot bevrediging van die Mangaung Metro Munisipaliteit.</p>	<p>Vergunnings gebruike:</p> <p>a) Addisionele kantoor ruimte met 'n maksimum GLA van 2 000m².</p>
“Spesiale Gebruik ??” Erf 2 Bloemfontein Uitbr.____ geleë op die Restant van die plaas Outspan 1960.	Oranje gemerk “S”	<p>Toelaatbare gebruike:</p> <p>a) Landbou verwante kleinhandelsarea met 'n maksimum BVO van 1 000 m²;</p> <p>b) Landbou verwante stoor area met 'n maksimum BVO van 2 000 m²;</p> <p>c) Werkswinkel met 'n maksimum BVO van 500 m²;</p> <p>d) Buite uitstalaarea met 'n maksimum BVO van 200 m²;</p> <p>e) Publieke Garage (insluitend 'n geriefswinkel met 'n BVO van 200 m²); en</p> <p>f) 'n Opsigters woning.</p> <p>Dekking: Geen Beperking</p> <p>Hoogte: Geen Beperking</p> <p>Parking: Soos voorgeskryf in Artikel 25 van die Bainsvlei Dorpsaanlegkema No. 1 van 1984.</p> <p>Boulyne: Onderworpe aan die Bainsvlei Dorpsaanlegkema No. 1 van 1984.</p> <p>Toegange: Tot bevrediging van die Mangaung Metro Munisipaliteit.</p>	<p>Vergunnings gebruike:</p> <p>a) Addisionele kleinhandelsarea van 1 000 m², en</p> <p>b) Addisionele stoor area van 2 000m².</p>