

Boschendal (Pty) Ltd



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## Transport Impact Assessment for the Development of Boschendal Village

J34022

*August 2017*

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### Head Office

14 Eglin Road, Sunninghill 2191  
Johannesburg, South Africa

Tel: +27 11 519 4600  
Fax: +27 11 807 5670

[www.gibb.co.za](http://www.gibb.co.za)



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## *BOSCHENDAL VILLAGE PROJECT PREAMBLE*

### **Overview of Boschendal Strategy:**

Over the past 15 years several development proposals have been generated for the Boschendal landholding, in various planning processes. This comprised extensive development proposals which saw significant portions of the farm being proposed for various extensive residential developments, a retirement village, equestrian estate and other residential estate “villages”. In 2012 new shareholders invested in the farm and reviewed these previous development approaches. The proposals which were at that stage being advertised for comment were withdrawn from the statutory processes.

The new owners adopted a different approach to the landholding, which can be summarised shortly as follows:

The **first leg** of the investment strategy is placing the primary emphasis on the agricultural activities as the key driver of activity and income. Significant investment has been and is currently being made into diversifying and expanding the agricultural activities on the estate including new orchards and vegetables, and establishing livestock, chicken and game farming.

The **second leg** of the strategy is to focus on the tourism and hospitality industry which is inextricably linked with the preservation of the heritage resources on the property. This includes providing increased and improved tourism opportunities, tourism accommodation, a wider offering of tourist and leisure activities which taps into, and builds on, the unique natural beauty and heritage assets of the farm.

The **third leg** of the investment strategy is to establish key development opportunities which will add long term value to the agricultural and tourism components identified above and which will transform degraded and derelict portions on the estate. To this end the consultant team was briefed to explore development opportunities within the ambit of the Municipality of Stellenbosch’s Spatial Development Framework (SDF) and various policies.

For the new Boschendal shareholders it is important to promote sustainability, ethical practices, social upliftment and empowerment with long term preservation of major heritage assets to ensure a business which contributes to the Dwarsriver Valley and the Western Cape economy. These principles are woven through the entire business approach.

The third leg of the investment strategy resulted in a team being briefed to prepare a new development proposal for a village which originates from the Municipality’s Spatial Development Framework. The Stellenbosch Municipal Spatial Development Framework promotes a series of interconnected nodes which are located at points of highest accessibility. The SDF identifies the Groot Drakenstein node as a future development node which is located at the R45/R310 intersection. This is an important cross-roads and a highly accessible point located equidistant between Stellenbosch, Franschhoek and Paarl. It is a typical location for a village and it is the aim of Boschendal to develop a rural ‘Cape Village’ with distinct and authentic urban qualities.

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### Vision

*“In essence, the character of the proposed development will be that of rural village, characterised by certain urban qualities, discreetly knitted into an agrarian landscape, whilst responding to the historical context of the area.”*

*Philip Briel (project architect)*

Due to the location of the proposal it is important that such a village is rooted in the Cape tradition of village-building. Traditionally Cape villages use a distinct grid layout and are varied as a result of topography and building typology. Importantly, in this setting, the heritage indicators play an important role in ensuring the development of an authentic Cape village and defining the extent and form of development, with emphasis being placed on urban edge-making, scenic route, density, public access, vistas and views, and authentic walled architecture.

The team developed a methodology which is informed by heritage, environmental sustainability, planning, engineering services, traffic and socio-economic informants which guide and shape the proposals.

### Principles which inform the design:

- This should not be a ‘gated community’, although security features are to be embedded and designed into the layout.
- There is a gradient of open accessible public places to private spaces where access is controlled.
- Buildings have an active interface with the street environment and reciprocally, the development will enhance and improve the immediate environment, which is a degraded site with an industrial activity which does not contribute to the area or the heritage character of the surrounding area. Human scale will be reinforced at the edges of public spaces and streets by the use of colonnades, verandas and pergolas where needed. Overlooking features like balconies, roof terraces and windows will be used as safe city mechanisms to ensure security through surveillance.
- Publically accessible areas are created which gives this village its unique character.
- Public activity will be located on a pedestrian orientated, walkable “high street”.
- Community facilities (for example a crèche or other similar education facility) can develop over time and should be located along the “high street” clustered with the police station to form a civic hub.
- Public transport drop off points will be located along Helshoogte Road (R310) at the civic hub.
- The village should be well-contained and as small and compact as possible.
- A variety of residential densities are provided which can serve a diverse community. To this end dwellings will vary from single dwelling free standing houses, row houses to entry level apartments which will be made available to key workers.
- The “high street” contains a variety of publicly orientated activities including shops, restaurants, offices, educational facilities, entry level housing, public parking and open space. A farmers’ market which is located centrally on the “high street” will be the main activity space. The area

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closer to the R45 will display a civic character as the existing police station forms part of that precinct already.

- The buildings in the development will be predominately of a horizontal character, unless specified differently in the urban design framework. Urban design framework, controls and guidelines will inform development proposals to ensure an appropriate architectural response and language in the village. It is however strongly resisted that houses all “look the same” and therefore various architects will be invited to design individual buildings within the village.
- New agricultural areas should be brought right up to the settlement edges. The town should respond to the predominant agricultural patterns, but must have strong spatial edge-definition in order to eliminate the possibility of future expansion or sprawl. The use of structural landscaping is paramount in achieving this principle, and edges of the village will be clearly defined through critical strategic structural planting.

### Specialist reports:

This report is one of a suite of specialist reports which contain the development proposals for and assesses the development impact of the proposed Boschendal Village development. These reports are:

Base line reports:

- 1) *Heritage Indicators and Directives –prepared by Nicolas Baumann, Sarah Winter, Dave Dewar and Piet Louw:* This report sets out the heritage indicators which informed the design process and which will serve as input for the Heritage Impact Assessment.
- 2) *Archaeological assessment of portions of Boschendal Estate –prepared by ACO Associates cc*
- 3) *Botanical Survey –undertaken by Nick Helm*
- 4) *Planning Status Quo report\_–Prepared by @Planning*
- 5) *Bulk engineering services report\_–prepared by ICE Group*
- 6) *Stormwater Management Plan\_–prepared by ICE Group*
- 7) *Electrical Services report\_–prepared by ICE Group*
- 8) *Freshwater ecosystems baseline report –Prepared by The Freshwater Consulting Group*
- 9) *Grondverslag vir die plaas Boschendal –Grondklassifikasie\_–Prepared by VinPro*
- 10) *Visual Impact Assessment Baseline Study –prepared by Quinton Lawson and Bernard Oberholzer*

### Reports outlining Proposals for various applications:

- 11) *Urban Design Framework, Controls and Architectural Guidelines –prepared by Philip Briel Architects*

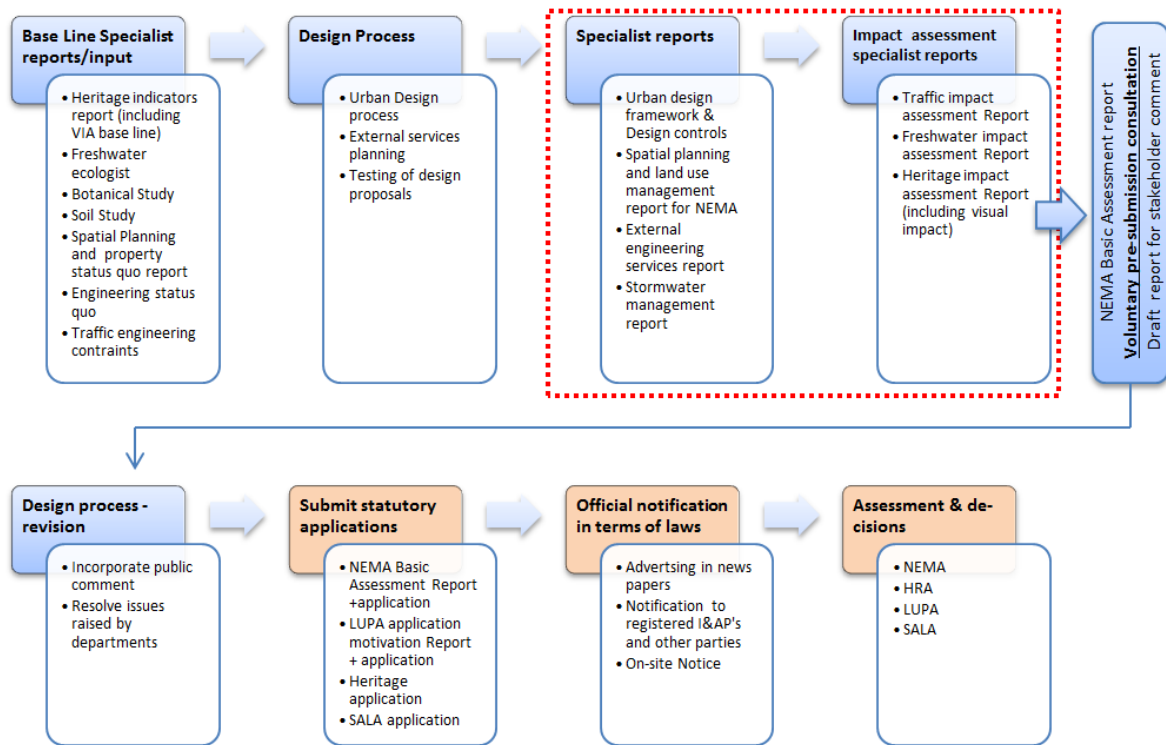
This report contains a series of plans which depict the development framework, controls and architectural guidelines. It illustrated the development intent and will guide all future site development plans and building plans.

- 12) *Land Use Planning report for NEMA purposes –prepared by @Planning*

This report provides and outline of the municipality’s land use planning policies and spatial development framework, describes the proposal, analyses all indicators and provides motivation for the development at the hand of the Western Cape Land Use Planning Act criteria.

**Impact assessment reports:**

- 13) *Water Use License application report* –prepared by Total Impact
- 14) *Transport Impact assessment for the development of Boschendal Village* –Prepared by GIBB
- 15) *Assessment of Freshwater Ecosystems*
- 16) *Heritage Impact assessment report* prepared by Baumann, Winter, Dewar & Louw
- 17) *Visual Impact Assessment report* included in Heritage Impact Assessment report
- 18) *Socio-economic impact assessment* report prepared by Tony Barbour
- 19) *Environmental Basic Assessment report* –prepared by Doug Jeffery Environmental Consultants



**Figure 1: Illustration of process and specialist reports, red dotted block indicating where we are in the process**

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# Transport Impact Assessment for the Development of Boschendal Village

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## Appendices

Appendix A: Development Trips

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# 1 *Introduction*

GIBB Pty (Ltd) was appointed by Boschendal (Pty) Ltd to undertake a Transport Impact Assessment (TIA) for the proposed development of the Boschendal Village.

The proposed development is bordered by the R45 in the north east, with the Helshoogte Road (R310) passing through the development, as shown in **Figure 1.1**. The R45 and Helshoogte Roads (R310) intersect at the Allee Blueue Estate in the north-east.

This proposed development will comprise approximately 475 residential units, shops, offices and guest accommodation. The residential component will vary between low density (high income, free standing units) and high density (middle income, apartments) areas.

The objective of this TIA is to determine the impact of the proposed development on the surrounding transport network and recommend any upgrades required to alleviate such impact. The location of the proposed development is shown in **Figure 1.2** and the Site Development Plan is shown in **Figure 1.3**.



PROJECT  
**Boschendal TIA**

Approved By  
A.Bulman



Scale NTS	Date May 2015
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DETAIL  
**Locality Plan**

Drawn By  
R.Adams

Checked By  
A.Johnson

Reviewed By  
K.Liebenberg

Project No. J34022	Drg No. Figure 1.1	Rev
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This drawing is not to be used in whole, or part, other than for the intended purpose and project as defined on this drawing.

Refer to the contract for full terms and conditions.





### Legend

Proposed Boschendal Village

PROJECT <b>Boschendal TIA</b>	Approved By A.Bulman		Scale NTS	Date May 2015
DETAIL <b>Site Location</b>	Drawn By R.Adams		Checked By A.Johnson	Reviewed By K.Liebenberg

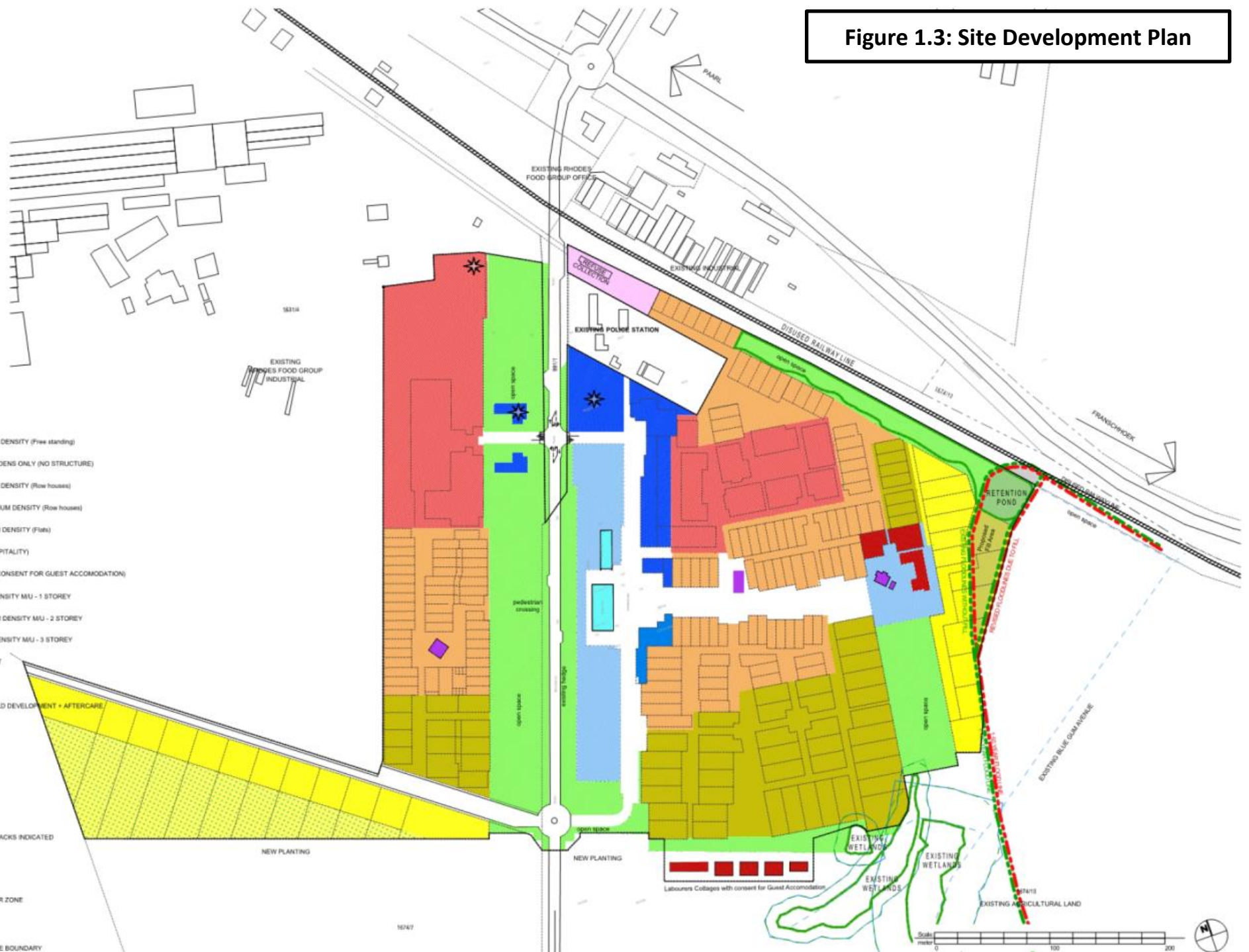
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**Figure 1.3: Site Development Plan**

**LAND USES:**

- RESIDENTIAL: LOW DENSITY (Free standing)
- RESIDENTIAL: GARDENS ONLY (NO STRUCTURE)
- RESIDENTIAL: LOW DENSITY (Row houses)
- RESIDENTIAL: MEDIUM DENSITY (Row houses)
- RESIDENTIAL: HIGH DENSITY (Flats)
- RESIDENTIAL (HOSPITALITY)
- COTTAGES (WITH CONSENT FOR GUEST ACCOMMODATION)
- BUSINESS: LOW DENSITY MU - 1 STOREY
- BUSINESS: MEDIUM DENSITY MU - 2 STOREY
- BUSINESS: HIGH DENSITY MU - 3 STOREY
- BUSINESS: MARKET
- CIVIC BUILDINGS
- ✱ CLINIC, EARLY CHILD DEVELOPMENT + AFTERCARE
- UTILITY REFUSE
- OPEN SPACE
- AGRICULTURAL
- ROADS PUBLIC
- ROADS PRIVATE
- EXISTING FARM TRACKS INDICATED
- 50 yr FLOODLINE
- 100 yr FLOODLINE
- WETLAND + BUFFER ZONE
- RETENTION POND
- DEVELOPMENT SITE BOUNDARY



**Fig. 81 Proposed land use | scale 1:3000 @ A3**

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## 2 Existing Road Network

### 2.1 Status Quo

The surrounding road network of the proposed site is shown in **Figure 2.1** and described below:

- **Helshoogte Road (R310)** is a two-lane undivided road and is classified as Class 2 Primary Arterial.
- The **R45** is a two-lane undivided road and is classified as Class 2 Primary Arterial.
- **Minor Road 6/4 (New Oaks Access)** is an unsurfaced Minor Road and is located 660m from the R45/Helshoogte T-Junction on Helshoogte Road (R310).
- **Bien Donna Road** is an unsurfaced Minor Road.
- **Delta Road** is a two-lane undivided Minor Road and a portion of the road situated north of the R45 is surfaced, whilst the section south of the R45 is unsurfaced.

The area surrounding the development comprises farms and vineyards and can be classified as a semi-rural development environment.

### 2.2 Road Network Upgrades

The R45 is currently being upgraded by the Western Cape Government (WCG), which includes the realignment of the R45 near the N1, landscaping and the construction of non-motorised transport (NMT) facilities. The extent of the upgrades, however, falls outside the study area of this report.

### 2.3 Existing Access Spacing

Existing access points are located at the following distances from the R45 / Helshoogte Road (R310) T-Junction and are indicated on **Figure 2.2**:

1. At 66m (Rhodes Offices)
2. At 166m (Rhodes Factory and Police Station)
3. At 550m (Wood Place (farm access))
4. At 660m (New Oaks/Rhodes Fruit access)

The access points at 1, 2 and 3 above currently do not meet the minimum spacing requirements as stated in the Western Cape Government (WCG) *Access Management Guidelines 2016*. According to the guidelines, the minimum spacing requirement for an unsignalised access along a Class 2 Primary Arterial within a semi-rural development environment (<1000m<sup>2</sup> GFA/ha) is 305m.



**Legend**

- Proposed Boschendal Village
- Existing Road Network**
- Main Roads
- Divisional Roads
- Minor Roads

PROJECT	<b>Boschendal TIA</b>
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Approved By	A.Bulman
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DETAIL	<b>Existing Road Network</b>
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Drawn By	Checked By	Reviewed By
R.Adams	A.Johnson	K.Liebenberg

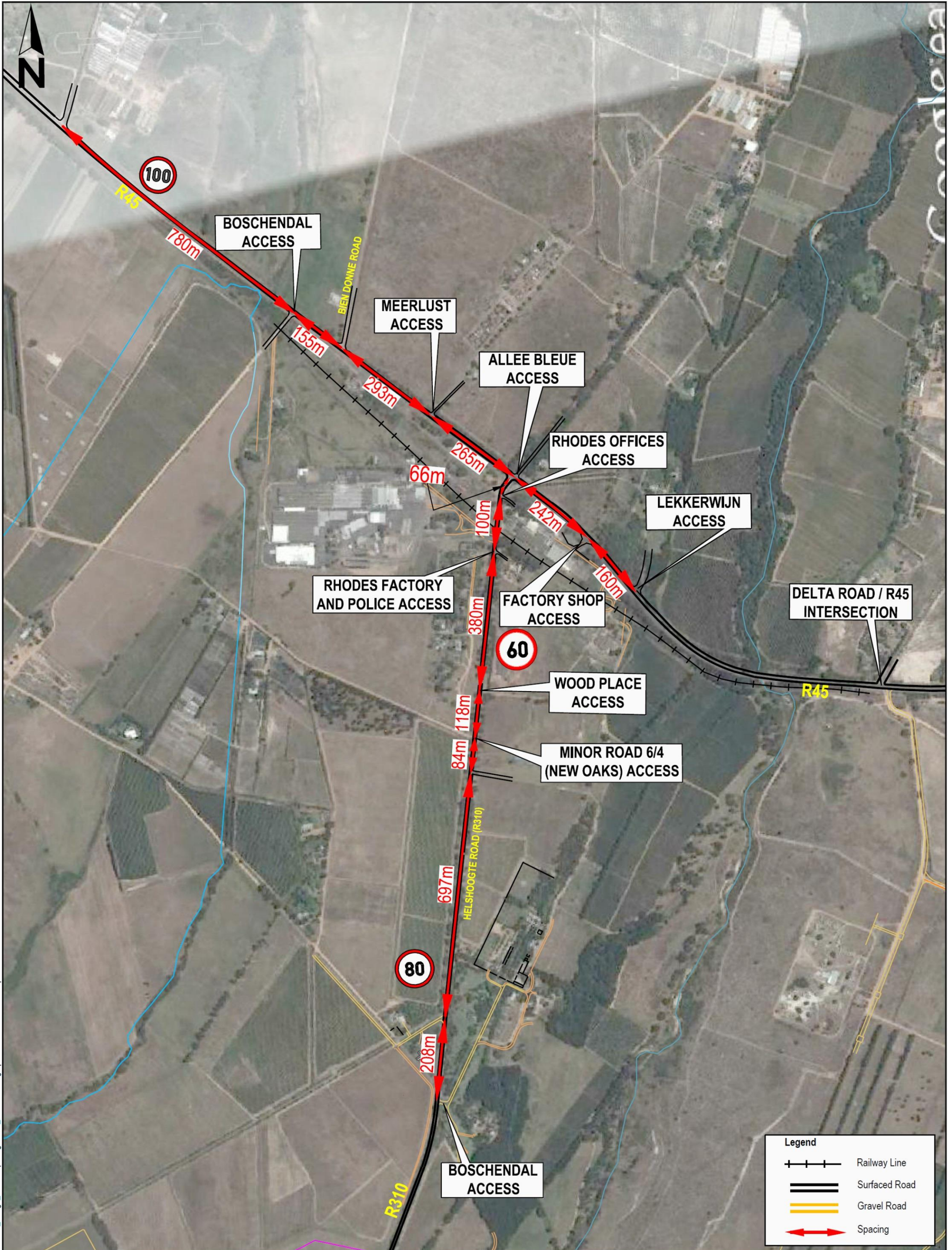



Scale	Date
NTS	May 2015

Project No.	Drg No.	Rev
J34022	/ Figure 2.1	/ 1

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<p>PROJECT</p> <p style="text-align: center;">Boschendal TIA</p>	<p>Approved By</p> <p style="text-align: center;">A.Bulman</p>											
<p>DETAIL</p> <p style="text-align: center;">Existing Access Spacing</p>	<table border="1" style="width: 100%;"> <tr> <td style="width: 33%;">Drawn By</td> <td style="width: 33%;">Designed By</td> <td style="width: 33%;">Reviewed By</td> </tr> <tr> <td style="text-align: center;">T.Falal</td> <td style="text-align: center;">S.Kiewiet</td> <td style="text-align: center;">A.Johnson</td> </tr> </table>		Drawn By	Designed By	Reviewed By	T.Falal	S.Kiewiet	A.Johnson				
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NTS	March 2014											
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J34022	/ Figure 2.2	/										

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### 3 Background Traffic

Manual traffic counts were undertaken on Tuesday, 8 April 2014 during the AM (07:00 – 09:30) and PM (15:30 – 18:00) peak periods at the following intersections, as shown in **Figure 3.1**.

- Helshoogte Road (R310) / Minor Road 6/4 (New Oaks Access)
- Helshoogte Road (R310) / Rhodes Food Access / Police Station Access
- Helshoogte Road (R310) / Rhodes Food Offices Access
- Helshoogte Road (R310) / Wood Place Access
- R45 / Bien Donne Road
- R45 / Boschendal Access
- R45 / Delta Road
- R45 / Factory Food Shop Access
- R45 / Helshoogte Road (R310) / Allee Blueue Access
- R45 / Meerlust Access

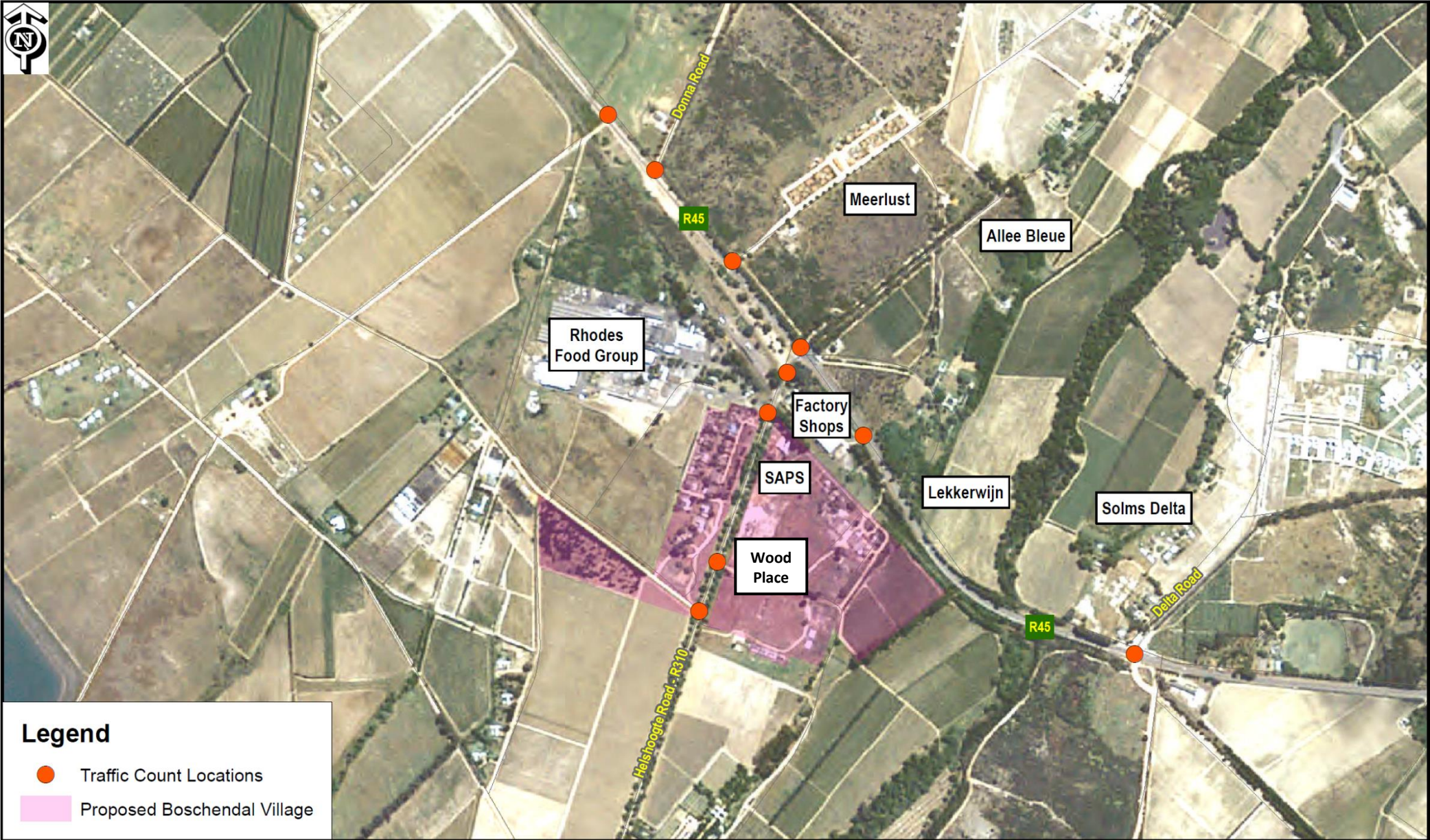
The results of the survey show that the AM and PM peak hours for the study area occur between 07:00 – 08:00 and 16:45 – 17:45 respectively. The AM and PM peak background traffic volumes for the study area are shown in **Figures 3.2** and **3.3** respectively.

In order to estimate the future background traffic, the average annual growth rate of traffic arriving at the R 45 / Helshoogte Road (R310) intersection was determined by comparing historical *WCG Road Network Information Systems (RNIS)* traffic data with the traffic counts conducted for this study (see **Table 3.1** below).

**Table 3.1: Estimation of the average annual growth rate**

Approach Name	Volumes of Traffic Approaching Intersection					
	2005 (WCG: RNIS)		2014 (GIBB)		Average Annual Growth Rate	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
R 45 - Eastbound	355	472	550	381	4.98%	-2.35%
R 45 - Westbound	478	513	282	484	-5.69%	-0.64%
Helshoogte Road (R310) - Northbound	476	491	441	412	-0.84%	-1.93%
<b>Intersection Total</b>	<b>1309</b>	<b>1476</b>	<b>1273</b>	<b>1277</b>	<b>-0.31%</b>	<b>-1.60%</b>

The annual average growth rate over the past 10 years has been slightly negative. A conservative approach was, however, followed and it was assumed that the study area will experience a low annual growth rate of 2% pa. An assessment period of 5 years was selected as recommended by the Department of Transport's (DoT) *Manual for Traffic Impact Studies RR 93/635 (1995)* for developments generating more than 150 peak hour trips. The 2019 Background Traffic for the AM and PM peak hours are shown in **Figures 3.4** and **3.5** respectively.



**Legend**

- Traffic Count Locations
- Proposed Boschendal Village

PROJECT	<b>Boschendal TIA</b>
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Approved By	A.Bulman
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Scale	NTS	Date	May 2015
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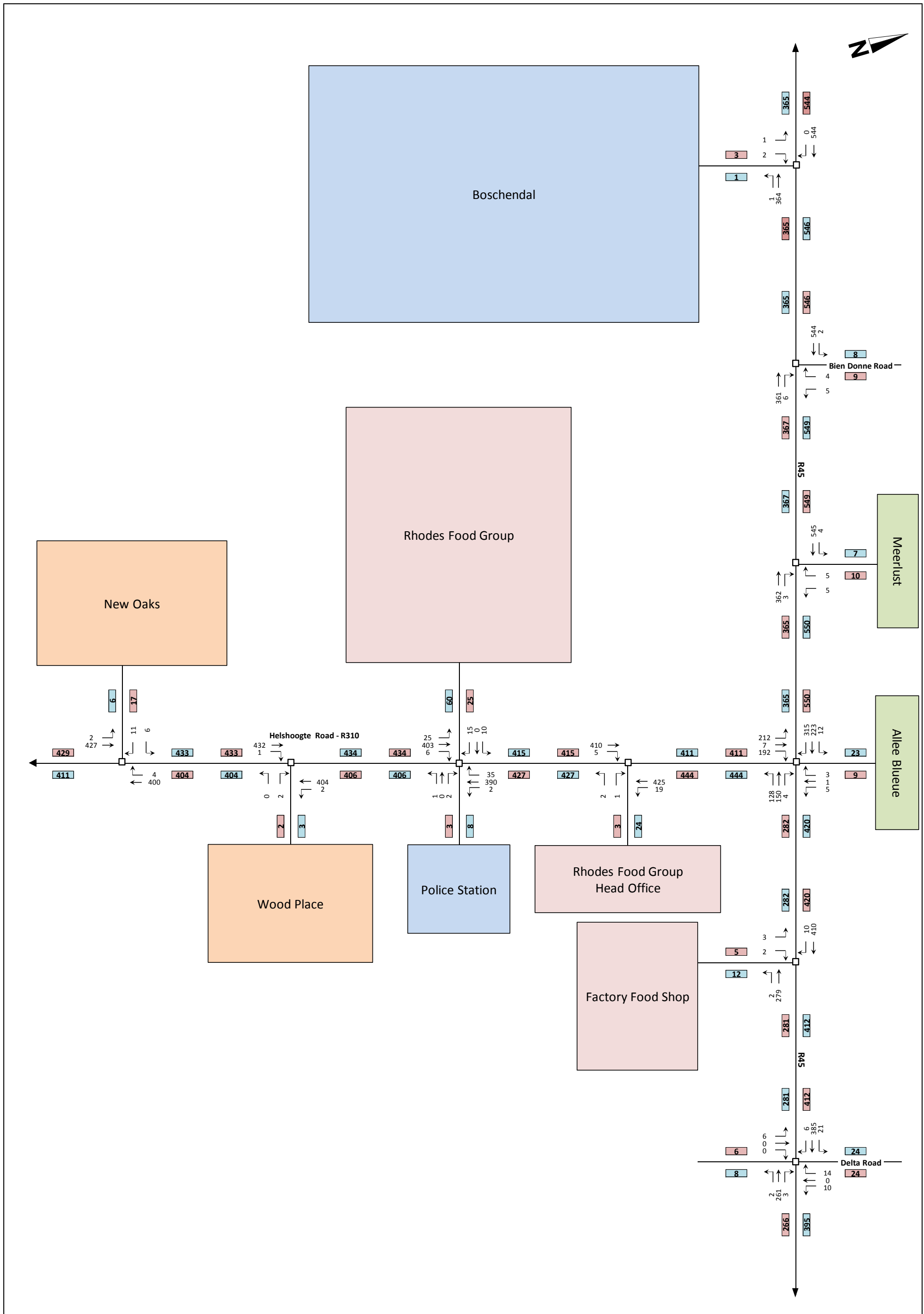
DETAIL	<b>Traffic Count Location</b>
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Drawn By	Checked By	Reviewed By
R.Adams	A.Johnson	K.Liebenberg

Project No.	Drg No.	Rev
J34022	/ Figure 3.1	/

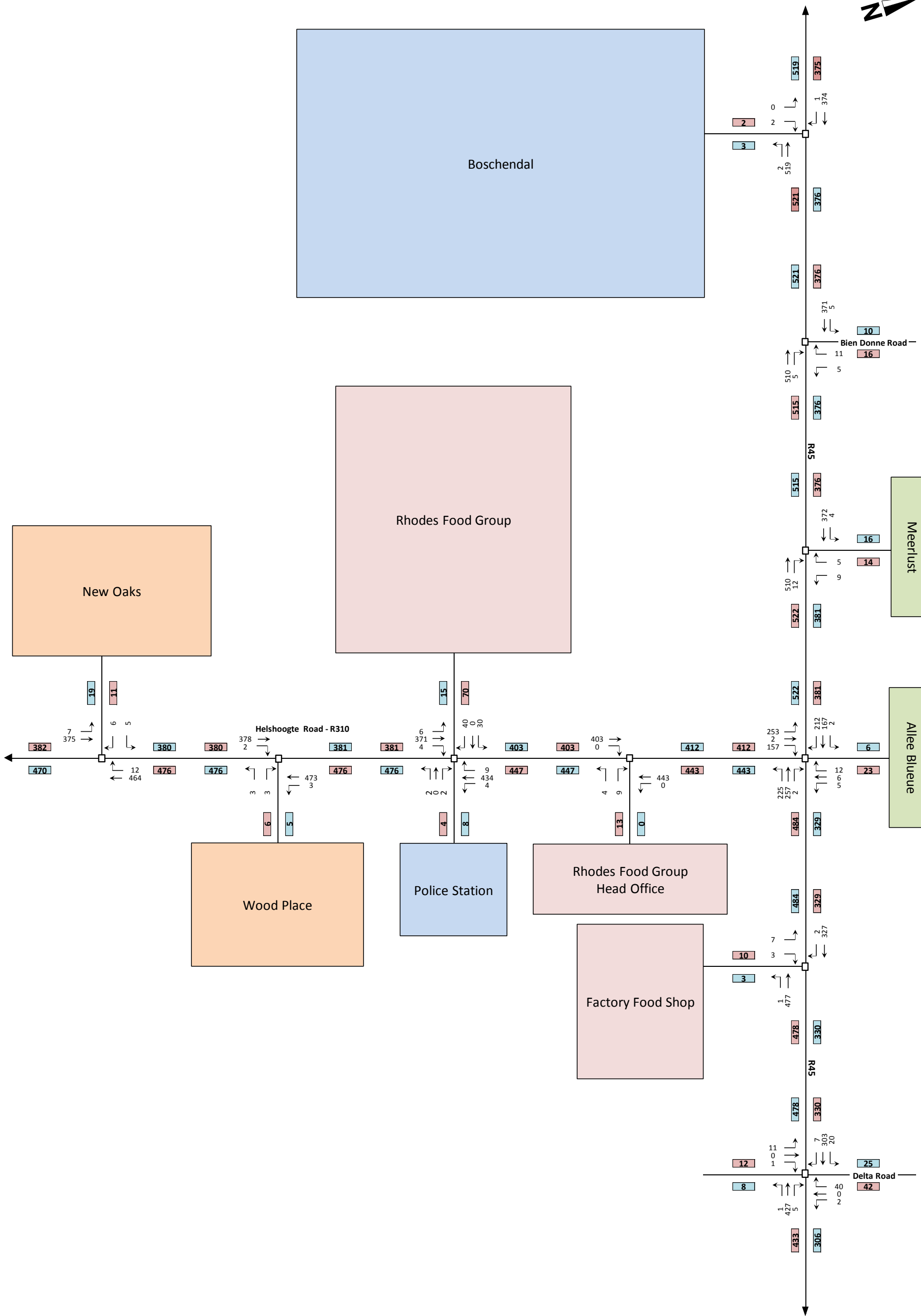
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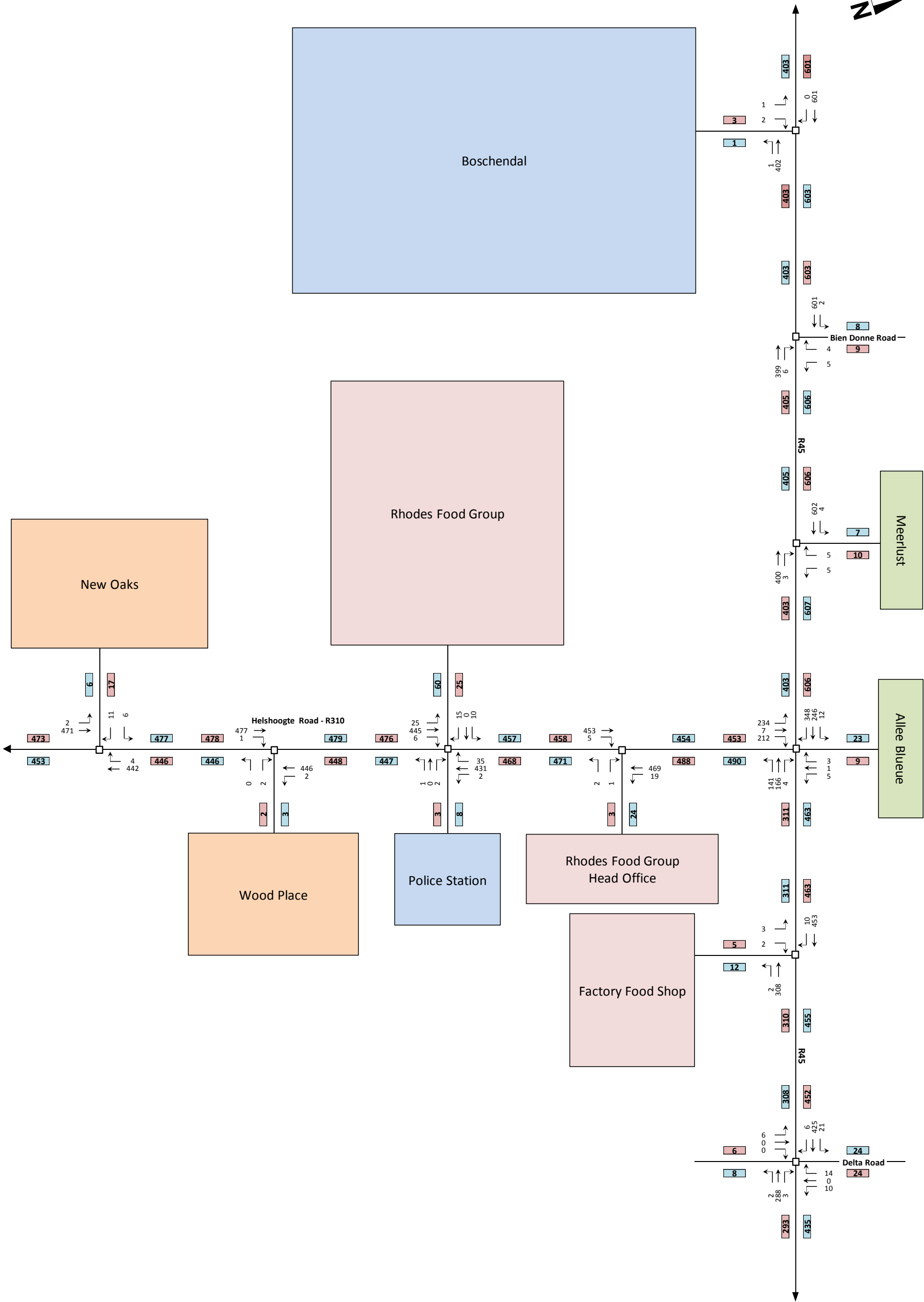



PROJECT	Boschendal TIA				DRAWN BY	R.Adams	CHECKED BY	S.Kiewiet				
	DETAIL	AM Peak Background Traffic - 2014			REVIEWED BY	K.Liebenberg	APPROVED BY	A.Bulman				
SCALE				NTS	DATE	May-15	PROJECT NO.	J34022	DRG NO.	Figure 3.2	REV	

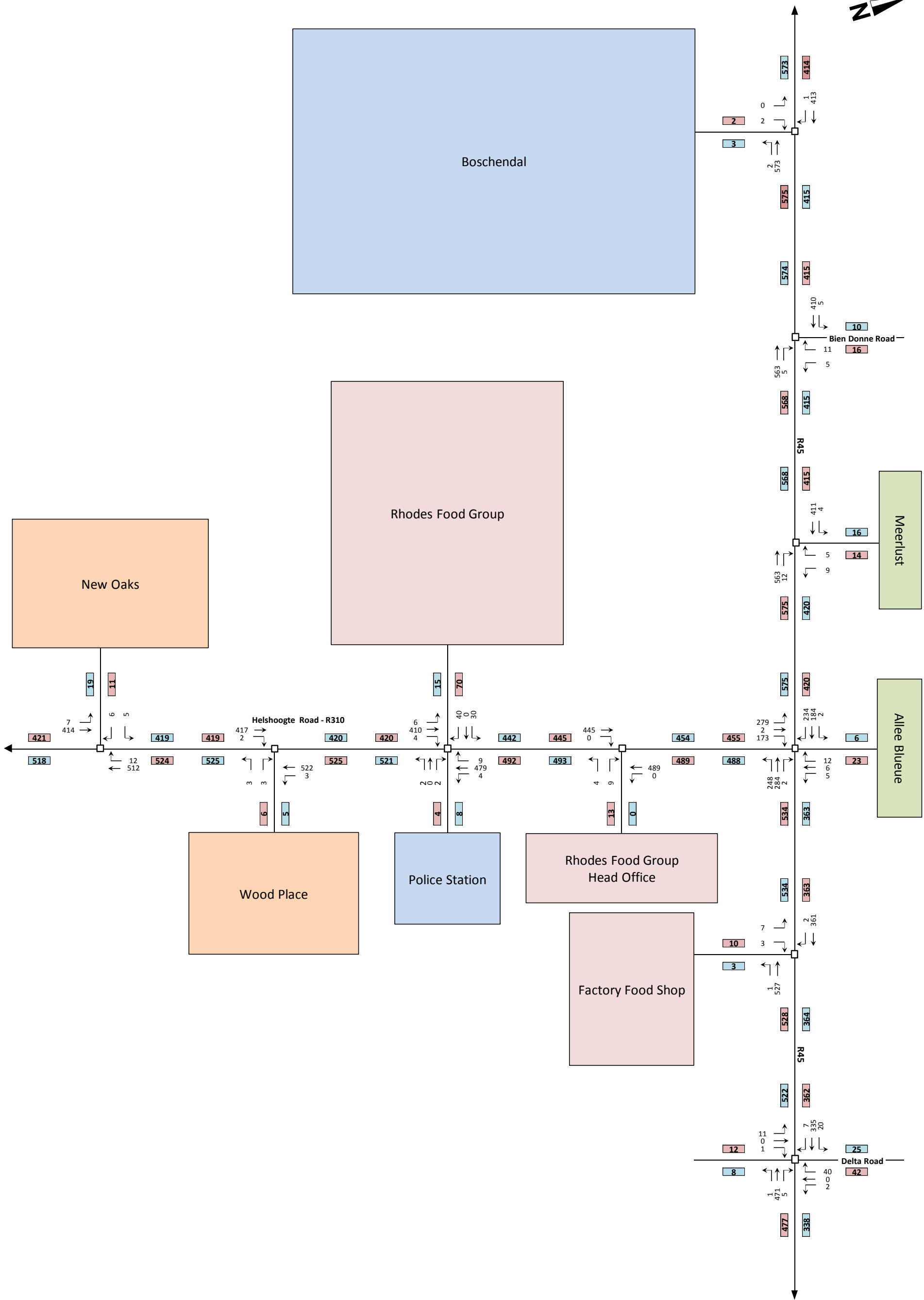





PROJECT Boschendal TIA			DRAWN BY R.Adams	CHECKED BY S.Kiewiet
DETAIL PM Peak Background Traffic - 2014			REVIEWED BY K.Liebenberg	APPROVED BY A.Bulman
SCALE NTS	DATE May-15	PROJECT NO. J34022	DRG NO. Figure 3.3	REV



PROJECT	Boschendal TIA				DRAWN BY	R.Adams	CHECKED BY	S.Kiewiet
	DETAIL	AM Peak Background Traffic - 2019			REVIEWED BY	K.Liebenberg	APPROVED BY	A.Bulman
SCALE		NTS	DATE	May-15	PROJECT NO.	J34022	DRG NO.	Figure 3.4



PROJECT	Boschendal TIA				DRAWN BY	R.Adams	CHECKED BY	S.Kiewiet				
	DETAIL	PM Peak Background Traffic - 2019			REVIEWED BY	K.Liebenberg	APPROVED BY	A.Bulman				
SCALE				NTS	DATE	May-15	PROJECT NO.	J34022	DRG NO.	Figure 3.5	REV	

## 4 Trip Generation

The Committee of Transport Officials' (COTO) *South African Trip Data Manual TMH17 (2012)* was used to estimate the number of vehicle trips generated by the proposed development during the AM and PM peak hours. It should be noted that while the DoT's *South African Trip Generation Rates* trip generation rates were considered, it was decided to use the updated COTO manual's rates since these better reflect current-day operations. The estimated number of vehicle trips generated by the proposed development is summarised in **Table 4.1** below.

**Table 4.1: Estimated Trip Generation for the Proposed Development**

Land Use	Size	Unit	AM Rate	PM Rate	Primary Trips Generated (Incl Size Adjustment Factor)					
					AM Peak			PM Peak		
					In	Out	Total	In	Out	Total
Residential - Low density (High income)	83	units	1.0	1.0	19	57	76	52	22	74
Residential - Medium density (Med income)	135	units	0.85	0.85	25	74	99	68	29	97
Residential - High Density	257	units	0.65	0.65	36	113	149	99	43	142
Hotel	70	room	0.5	0.5	17	11	28	15	13	28
General Retail	5500	100m <sup>2</sup>	0.6	3.4	37	20	57	160	160	320
General offices - Suburban	9000	100m <sup>2</sup>	2.1	2.1	129	23	152	30	121	151
Guest accommodation	30	room	0.45	0.45	6	6	12	6	6	12
Creche / ECD	120	students	1.00	0.80	30	30	60	24	24	48
Clinic	2000	100m <sup>2</sup>	See note*							
Civic / Community Buildings	500	100m <sup>2</sup>								
					<b>299</b>	<b>334</b>	<b>633</b>	<b>454</b>	<b>418</b>	<b>872</b>

Note:

- Public facilities generally generate traffic during the off-peak periods. Trip generation of public facilities were therefore considered negligible during the AM and PM peak hours.
- Trip reduction factors were used as shown in Table 4.2.

According to COTO, "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)". Pedestrian trips are expected to occur between the various land uses and for this reason, the mixed-use reduction factors, shown in **Table 4.2** below, were applied. The reduction factor for crèche land use was increased from 5% (as given in COTO) to 50% (as given in COTO for low car ownership areas) as walking is a prevalent mode of transport within the adjacent communities. A pass-by ratio of 13% and a diverted traffic ratio of 30% were applied to the total trip generation for the retail land use as per the COTO manual.

**Table 4.2: Trip Reduction Factors**

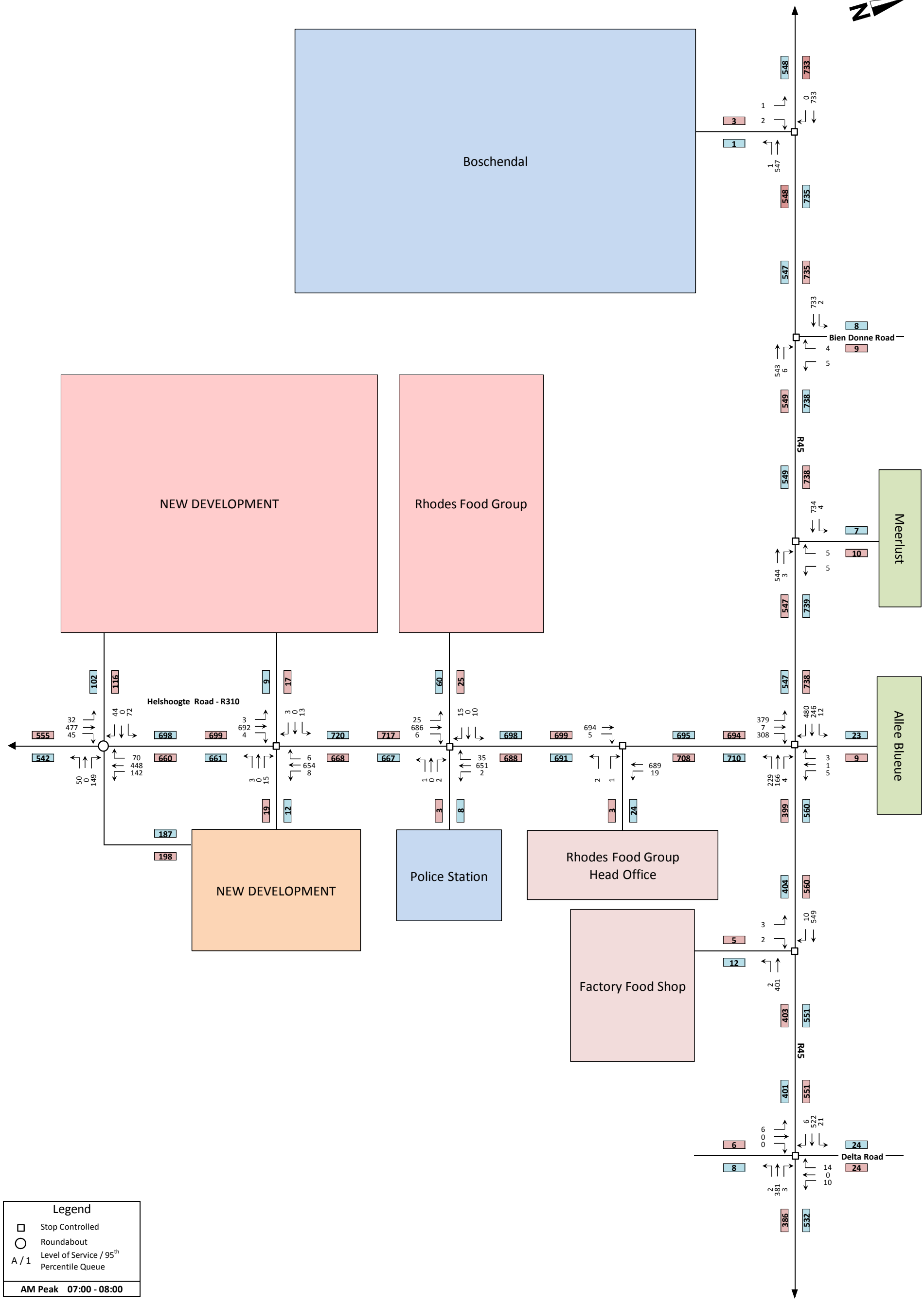
Land use	Trip Reduction Factor
Residential - Low density	10%
Residential - Medium density	15%
Residential - High Density	15%
General Retail	10%
General offices - Suburban	20%
Hotel	20%
Guest accommodation	20%
Crèche / ECD	50%

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## 5 *Trip Distribution*

In order to determine the future impact of the proposed development on the surrounding road network, the generated traffic was distributed onto the existing road network in proportion to the background traffic flows. The development trips for the AM and PM peak hours are shown in **Appendix A**.


**Figures 5.1** and **5.2** shows the 2019 AM and PM Peak Total Traffic scenarios which are the same for both upgrade options 1 and 2.

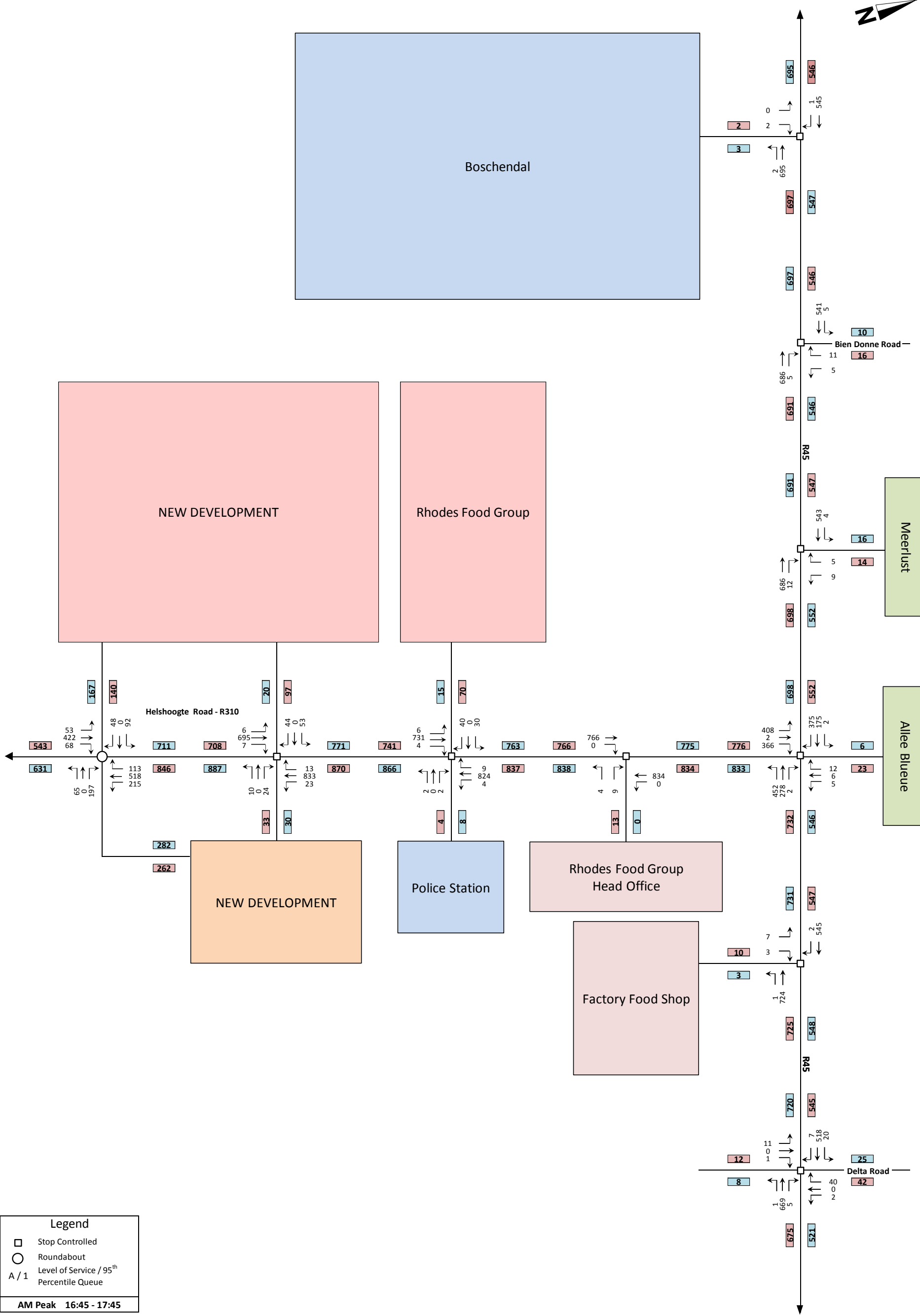


**Legend**

- Stop Controlled
- Roundabout
- A / 1 Level of Service / 95<sup>th</sup> Percentile Queue

**AM Peak 07:00 - 08:00**

PROJECT	Boschendal TIA				DRAWN BY R.Adams	CHECKED BY S.Kiewiet
	DETAIL	AM Total Traffic - 2019		SCALE NTS	DATE Jan-16	PROJECT NO. J34022
					DRG NO. Figure 5.1	REV



Legend	
□	Stop Controlled
○	Roundabout
A / 1	Level of Service / 95 <sup>th</sup> Percentile Queue
<b>AM Peak 16:45 - 17:45</b>	

PROJECT	Boschendal TIA			DRAWN BY	R.Adams	CHECKED BY	S.Kiewiet
	DETAIL	PM Total Traffic - 2019		REVIEWED BY	K.Liebenberg	APPROVED BY	A.Bulman
SCALE		NTS	DATE	Jan-16	PROJECT NO.	J34022	DRG NO.
				REV			

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## 6 Capacity Analysis

The SIDRA Intersection 6.1 computer package was used to analyse the AM and PM peak hour for the following intersections:

- Helshoogte Road (R310) / Minor Road 6/4 (New Oaks Access)
- Helshoogte Road (R310) / Rhodes Food Access / Police Station Access
- Helshoogte Road (R310) / Rhodes Food Offices Access
- Helshoogte Road (R310) / Wood Place Access
- R45 / Bien Donne Road
- R45 / Boschendal Access
- R45 / Delta Road
- R45 / Factory Food Shop Access
- R45 / Helshoogte Road (R310) / Allee Blueue Access
- R45 / Meerlust Access
- Helshoogte Road (R310) / New Access Arrangement

The following scenarios were analysed:

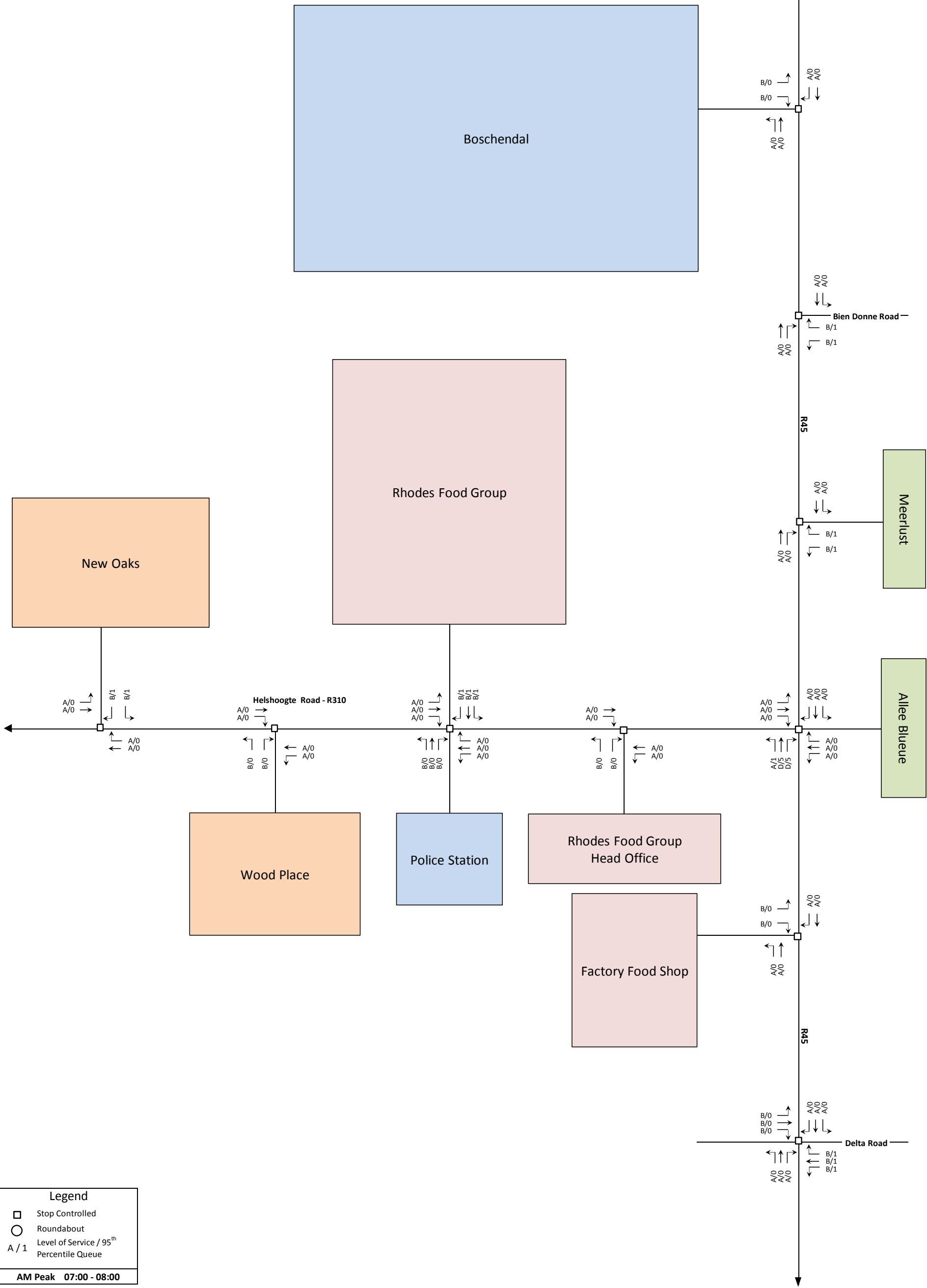
- 2014 Background Traffic
- 2019 Total Traffic

Level of Service (LOS) is a measure used to assess the operation of existing transportation infrastructure as well as the effectiveness of infrastructure improvements. LOS is categorised in letters A to F, with A being the best and F being the worst, based on the average control delay experienced by vehicles at the intersection approaches. Broadly it can be defined as follows:

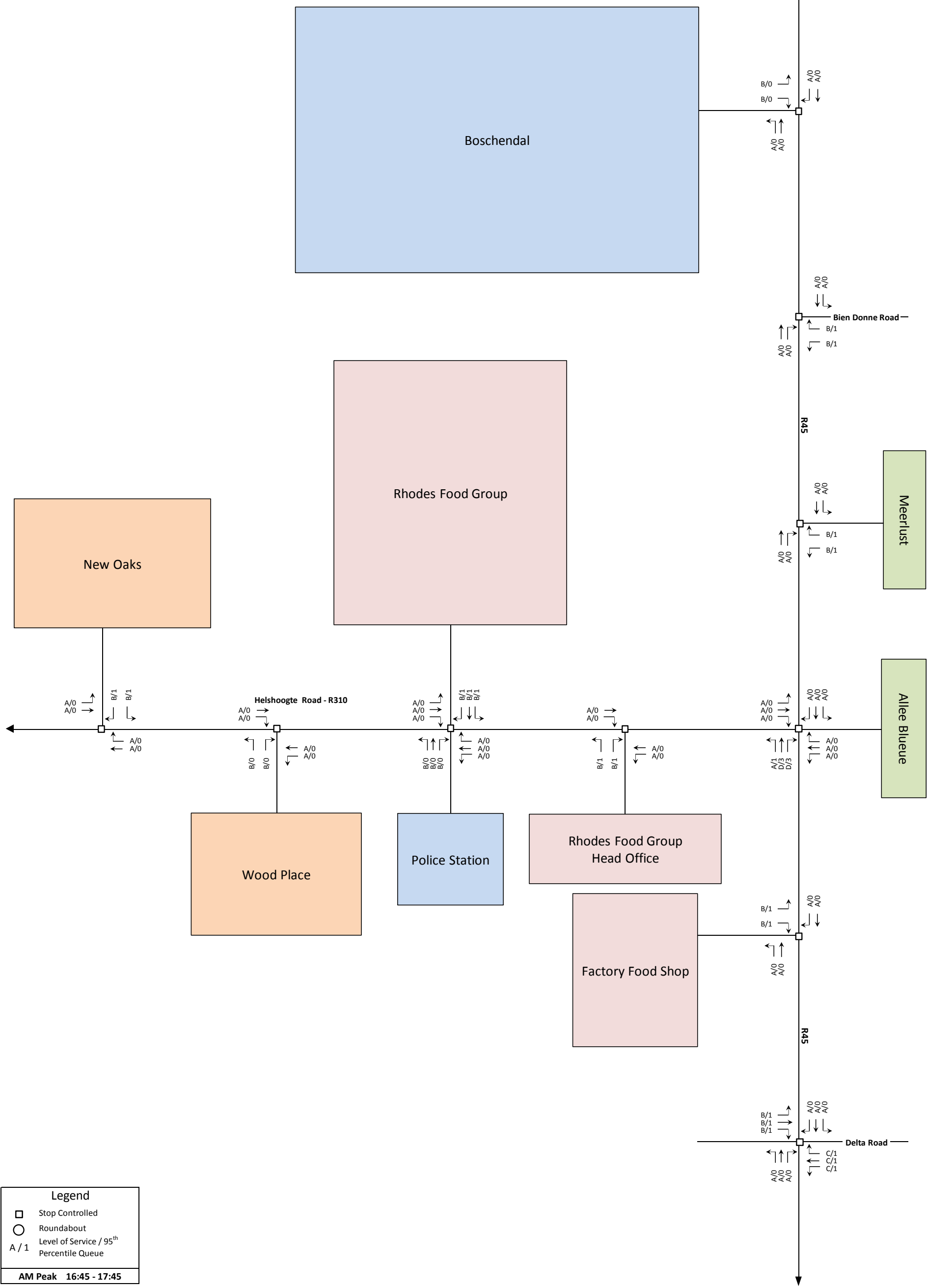
- A = Free flow
- B = Reasonably free flow
- C = Stable flow
- D = Approaching unstable flow
- E = Unstable flow
- F = Forced or breakdown flow

The level of service (LOS) and 95th percentile vehicle queues are shown in **Figures 6.1 to 6.4** and discussed hereafter. Detailed analysis results can be provided on request.



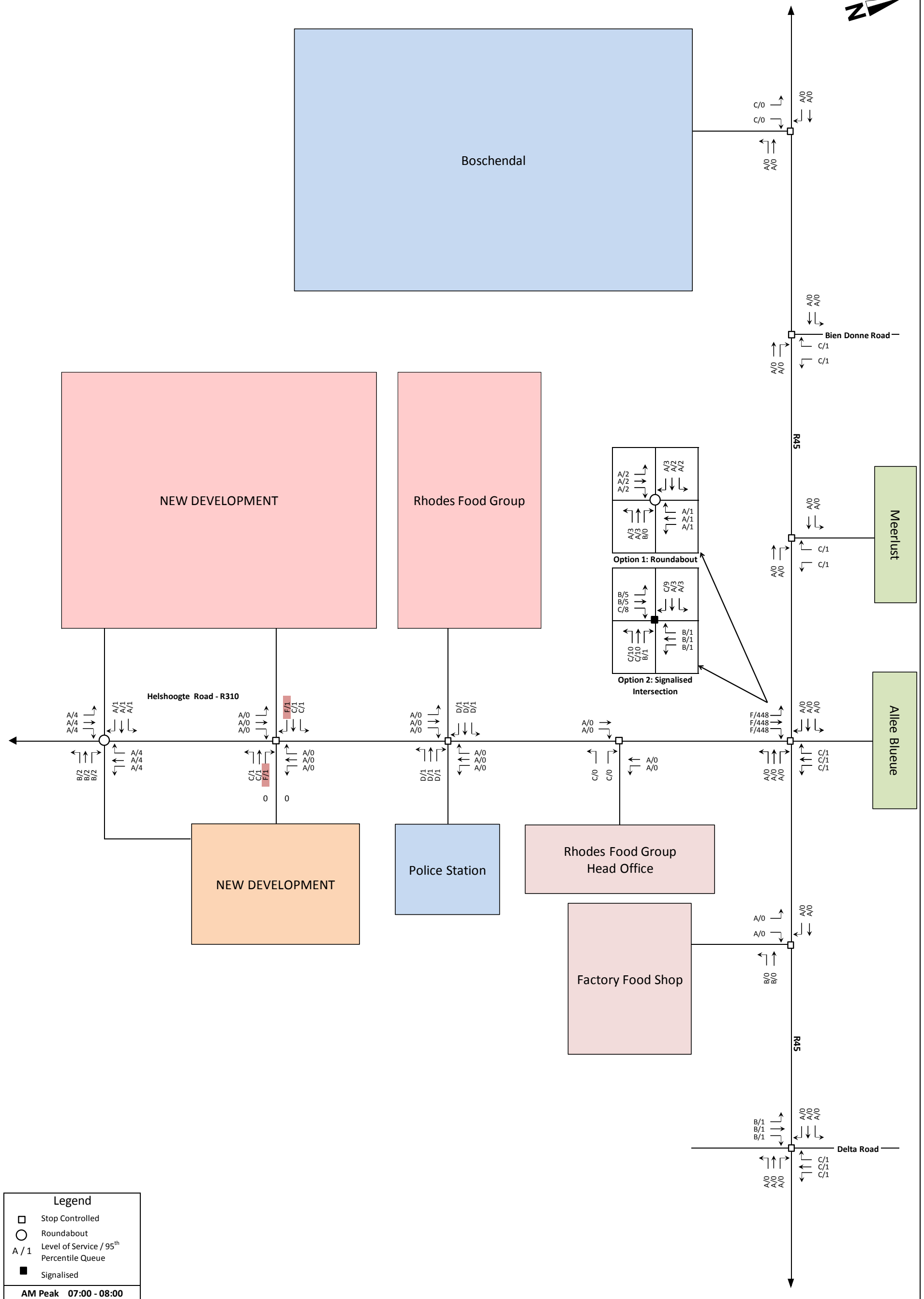


PROJECT	Boschendal TIA			DRAWN BY	R.Adams	CHECKED BY	S.Kiewiet
	DETAIL	LOS AM Background Traffic- 2014		REVIEWED BY	K.Liebenberg	APPROVED BY	A.Bulman
SCALE		NTS	DATE	May-15	PROJECT NO.	J34022	DRG NO.
				REV			



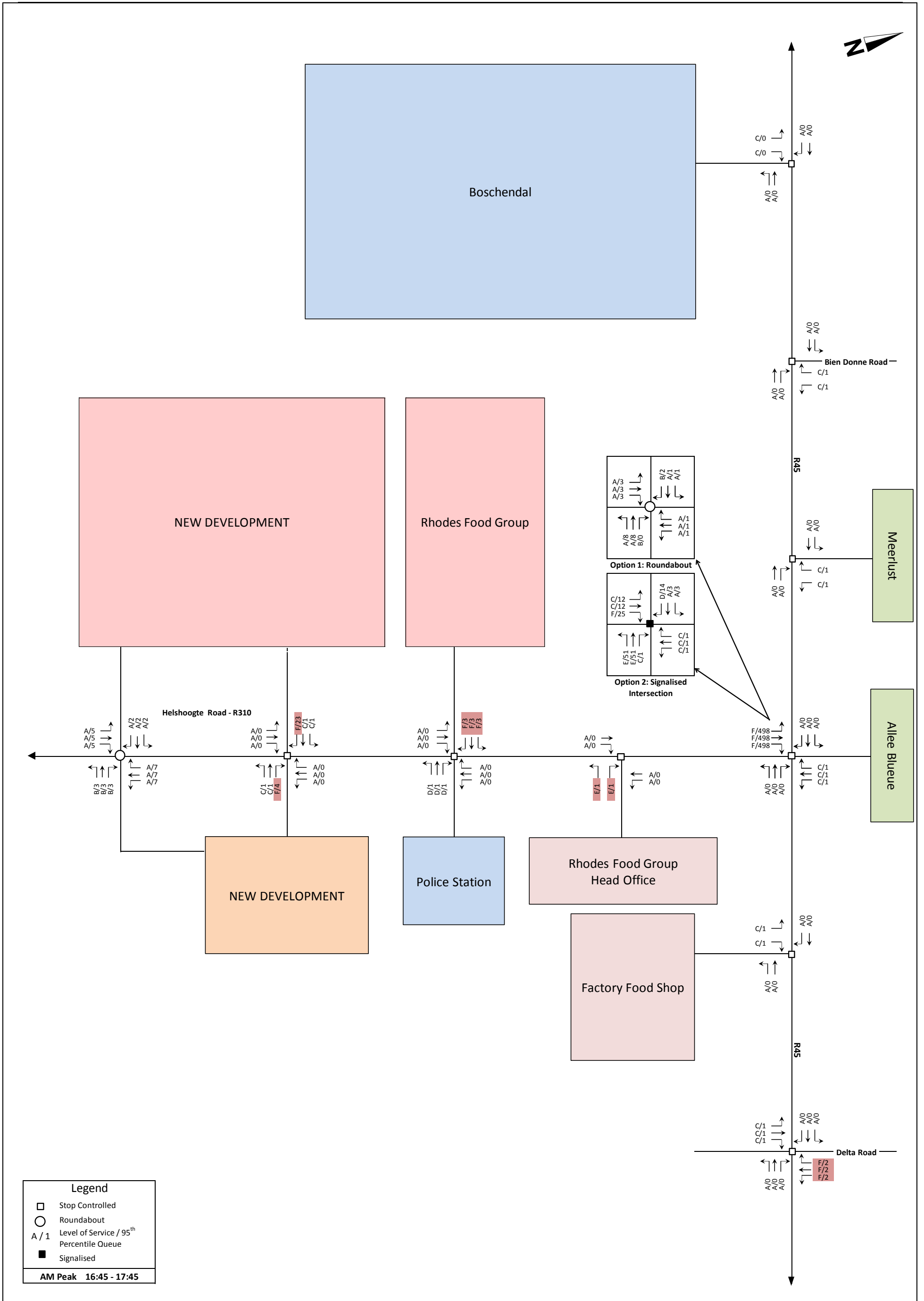
Legend	
□	Stop Controlled
○	Roundabout
A / 1	Level of Service / 95 <sup>th</sup> Percentile Queue
<b>AM Peak 16:45 - 17:45</b>	

PROJECT	Boschendal TIA			DRAWN BY	R.Adams	CHECKED BY	S.Kiewiet
	DETAIL	LOS PM Background Traffic- 2014		REVIEWED BY	K.Liebenberg	APPROVED BY	A.Bulman
SCALE		NTS	DATE	May-15	PROJECT NO.	J34022	DRG NO.



Legend	
□	Stop Controlled
○	Roundabout
A / 1	Level of Service / 95 <sup>th</sup> Percentile Queue
■	Signalised
<b>AM Peak 07:00 - 08:00</b>	

PROJECT	Boschendal TIA			DRAWN BY	R.Adams	CHECKED BY	S.Kiewiet	
	DETAIL	LOS AM Peak Total Traffic - 2019		REVIEWED BY	K.Liebenberg	APPROVED BY	A.Bulman	
SCALE		NTS	DATE	May-15	PROJECT NO.	J34022	DRG NO.	Figure 6.3
							REV	

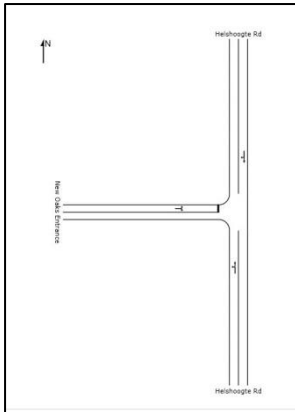


PROJECT	Boschendal TIA				DRAWN BY	R.Adams	CHECKED BY	S.Kiewiet				
	DETAIL	LOS PM Peak Total Traffic - 2019			REVIEWED BY	K.Liebenberg	APPROVED BY	A.Bulman				
SCALE				NTS	DATE	May-15	PROJECT NO.	J34022	DRG NO.	Figure 6.4	REV	

## 6.1 Helshoogte Road (R310) / Minor Road 6/4 (New Oaks Access)

### 6.1.1 Existing Geometry

The existing geometry of the Helshoogte Road (R310) / Minor Road 6/4 (New Oaks Access) intersection is shown in **Figures 6.5 and 6.6**.



**Figure 6.5: Existing geometry**



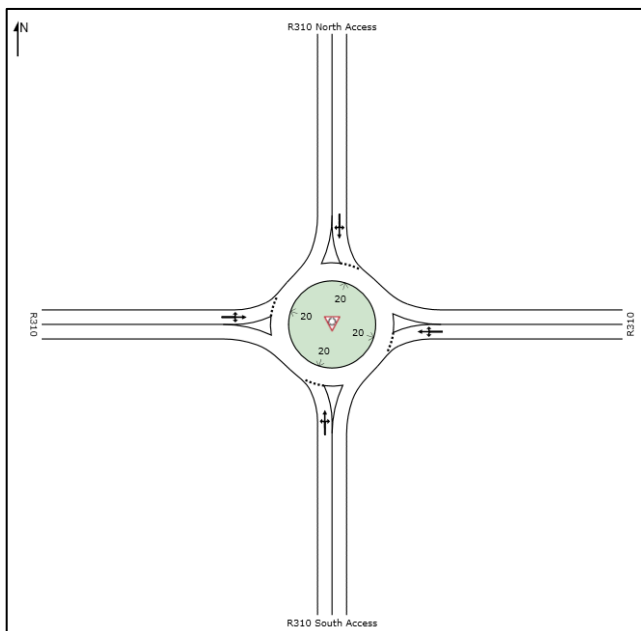
**Figure 6.6: Aerial view of intersection**

### 6.1.2 2014 Existing Traffic

The intersection currently operates well during both the AM and PM peak hours, ranging between LOS A and LOS B, with the 95<sup>th</sup> percentile queues ranging between 1 and 2 vehicles.

### 6.1.3 Proposed Upgrade

A new roundabout will provide access to the north and south sections of the development, as shown in **Figure 6.7**.



**Figure 6.7: Proposed geometry**

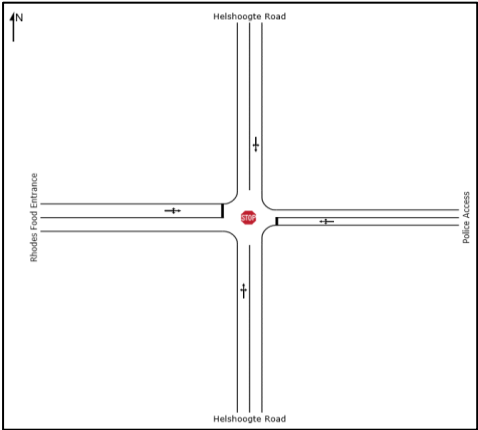
**6.1.4 2019 Total Traffic**

The new roundabout will operate well during both the AM and PM peak hours ranging between LOS A and LOS B, with the 95<sup>th</sup> percentile queues ranging between 1 and 7 vehicles.

**6.2 Helshoogte Road (R310) / Rhodes Food Access / Police Station Access**

**6.2.1 Existing Geometry**

The existing geometry of the Helshoogte Road (R310) / Rhodes Food Access / Police Station Access intersection is shown in **Figures 6.8** and **6.9**.



**Figure 6.8: Existing geometry**



**Figure 6.9: Aerial view of intersection**

**6.2.2 2014 Existing Traffic**

The intersection currently operates well during both the AM and PM peak hours, ranging between LOS A and LOS B, with the 95<sup>th</sup> percentile queue of 1 vehicle.

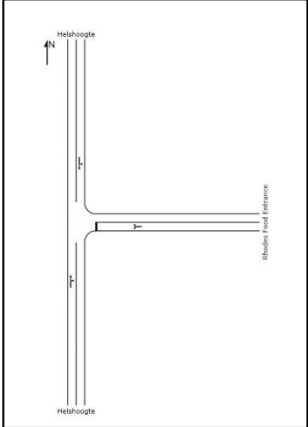
**6.2.3 2019 Total Traffic**

The Helshoogte Road approaches will operate well at LOS A during both the AM and PM peak hours, with no vehicle queues. The Rhodes Food Group access and the police station access will operate poorly at LOS D and LOS F during both the AM and PM peak hours respectively, with the 95<sup>th</sup> percentile queues ranging between 1 and 3 vehicles.

**6.3 Helshoogte Road (R310) / Rhodes Food Offices Access**

**6.3.1 Existing Geometry**

The existing geometry of the Helshoogte Road (R310) / Rhodes Food Offices Access intersection is shown in **Figures 6.10** and **6.11**.



**Figure 6.10: Existing geometry**



**Figure 6.11: Aerial view of intersection**

**6.3.2 2014 Existing Traffic**

The intersection currently operates well during both the AM and PM peak hours, ranging between LOS A and LOS B, with the 95<sup>th</sup> percentile queues not exceeding 1 vehicle.

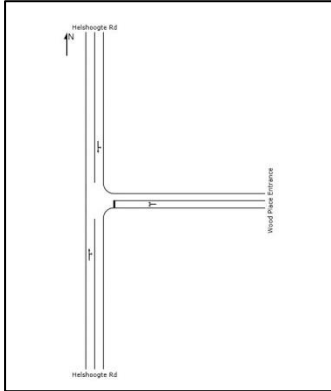
**6.3.3 2019 Total Traffic**

The Helshoogte Road approaches will continue to operate well during both the AM and PM peak hours, with no vehicle queues. The Rhodes Food Office access will operate poorly at LOS C and LOS E during both the AM and PM peak hours, with the 95<sup>th</sup> percentile queues of 1 vehicle. This is due to the long delays caused by the high volumes of through traffic on Helshoogte Road (R310).

**6.4 Helshoogte Road (R310) / Wood Place Access**

**6.4.1 Existing Geometry**

The existing geometry of the Helshoogte Road (R310) / Wood Place Access intersection is shown in **Figures 6.12** and **6.13**.



**Figure 6.12: Existing geometry**



**Figure 6.13: Aerial view of intersection**

#### **6.4.2 2014 Existing Traffic**

The intersection currently operates well during both the AM and PM peak hours, ranging between LOS A and LOS B, with the 95<sup>th</sup> percentile queues ranging between 0 and 2 vehicles.

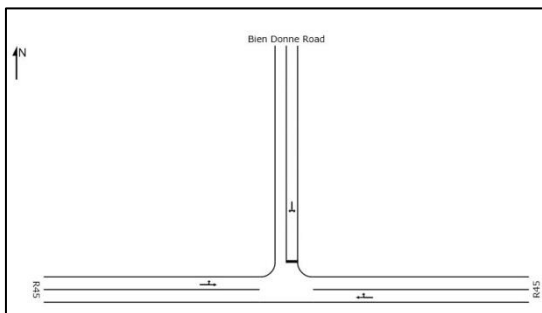
#### **6.4.3 Proposed upgrade**

This access will be closed and future access will be off the Helshoogte Road (R310) / Minor Road 6/4 (New Oaks Access) roundabout as discussed in **Section 6.1**.

### **6.5 R45 / Bien Donne Road**

#### **6.5.1 Existing Geometry**

The existing geometry of the R45 / Bien Donne Road intersection is shown in **Figures 6.14** and **6.15**.



**Figure 6.14: Existing geometry**



**Figure 6.15: Aerial view of intersection**

#### **6.5.2 2014 Existing Traffic**

The intersection currently operates well during both the AM and PM peak hours, ranging between LOS A and LOS B, with the 95<sup>th</sup> percentile queues ranging between 0 and 1 vehicle.

#### **6.5.3 2019 Total Traffic**

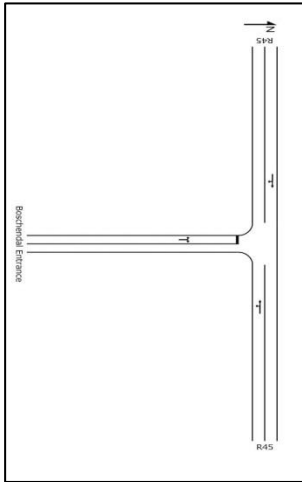
The intersection will operate adequately during both the AM and PM peak hours, ranging between LOS A and LOS C, with the 95<sup>th</sup> percentile queues ranging between 0 and 1 vehicle.



## 6.6 R45 / Boschendal Access

### 6.6.1 Existing Geometry

The existing geometry of the R45 / Boschendal Access intersection is shown in **Figures 6.16** and **6.17**.



**Figure 6.16: Existing geometry**



**Figure 6.17: Aerial view of intersection**

### 6.6.2 Existing Geometry

The intersection currently operates adequately during both the AM and PM peak hours, ranging between LOS A and LOS B and no vehicle queues.

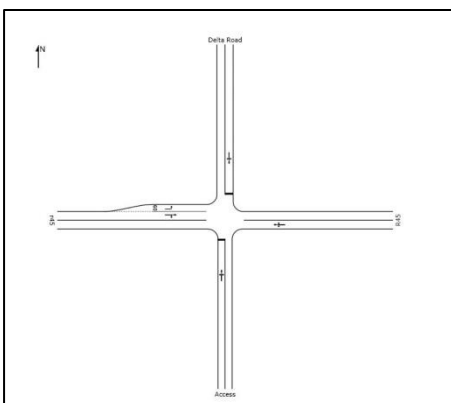
### 6.6.3 2019 Total Traffic

The intersection will operate adequately during both the AM and PM peak hours, ranging between LOS A and LOS C and no vehicle queues.

## 6.7 R45 / Delta Road

### 6.7.1 Existing Geometry

The existing geometry of the R45 / Delta Road intersection is shown in **Figures 6.18** and **6.19**.



**Figure 6.18: Existing geometry**



**Figure 6.19: Aerial view of intersection**

**6.7.2 2014 Existing Traffic**

The intersection currently operates adequately during both the AM and PM peak hours, ranging between LOS A and LOS C, with the 95th percentile queues ranging between 0 and 1 vehicle.

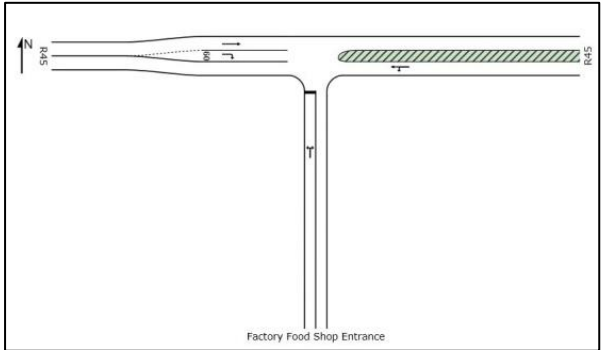
**6.7.3 2019 Total Traffic**

The R45 approaches will operate well at LOS A during both the AM and PM peak hours with no vehicle queues. The Delta Road approaches will deteriorate to operate at LOS C and LOS F during both the AM and PM peak hours, with the 95th percentile queues being 1 and 2 vehicles respectively. This is due to the long delays caused by the high volumes of through traffic on the R45.

**6.8 R45 / Factory Food Shop Access**

**6.8.1 Existing Geometry**

The existing geometry of the R45 / Factory Food Shop Access intersection is shown in **Figure 6.20** and **6.21**.



**Figure 6.20: Existing geometry**



**Figure 6.21: Aerial view of intersection**

**6.8.1 2014 Existing Traffic**

The intersection currently operates well during both the AM and PM peak hours, ranging between LOS A and LOS B, with the 95th percentile queues ranging between 0 and 1 vehicle.

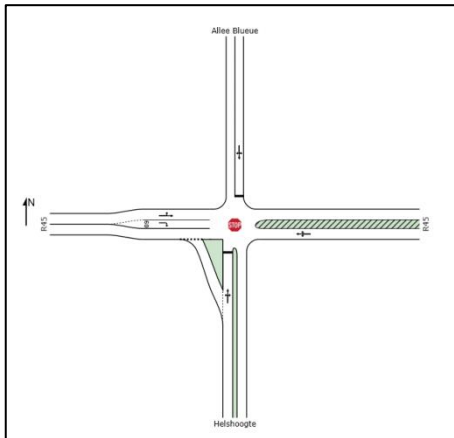
**6.8.2 2019 Total Traffic**

The intersection will continue to operate adequately during both the AM and PM peak hours, ranging between LOS A and LOS C, with the 95th percentile queues ranging between 0 and 1 vehicle.

**6.9 R45 / Helshoogte Road (R310) / Allee Blueue Access**

**6.9.1 Existing Geometry**

The existing geometry of the R45 / Helshoogte Road (R310) / Allee Blueue Access intersection is shown in **Figures 6.22** and **6.23**.



**Figure 6.22: Existing geometry**



**Figure 6.23: Aerial view of intersection**

### 6.9.2 2014 Existing Traffic

The intersection currently operates adequately during both the AM and PM peak hours, ranging between LOS A and LOS D, with the 95<sup>th</sup> percentile queues ranging between 0 and 5 vehicles.

### 6.9.3 2019 Total Traffic

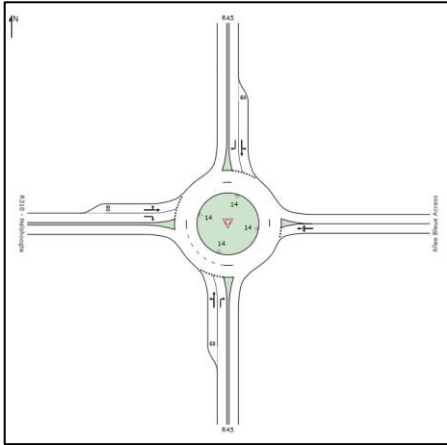
The intersection will operate poorly during both the AM and PM peak hours at LOS F at the Helshoogte Road (R310) approach, with excessive 95<sup>th</sup> percentile queues (over-capacity results). This is due to the large volume of right turning vehicles at the Helshoogte Road (R310) approach.

Due to safety issues and traffic congestion at the R45 / Helshoogte Road (R310) intersection, local authorities expressed an interest in upgrading the intersection to either a roundabout or signalised intersection. Both of these upgrade options have been assessed to determine the most appropriate upgrade option.

### 6.9.4 Proposed upgrade

#### a) Option 1: Roundabout

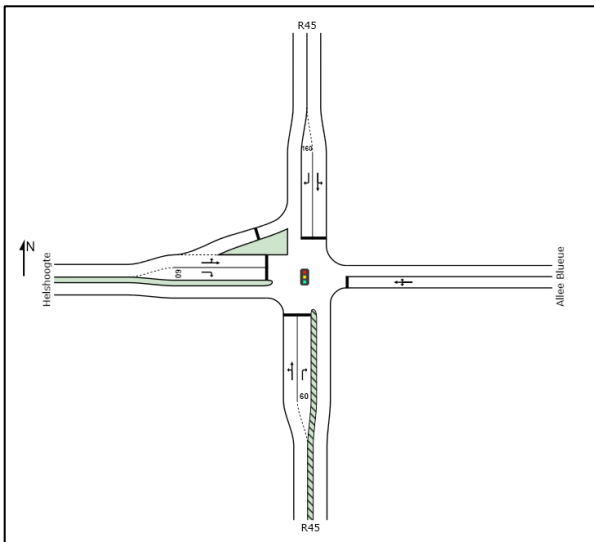
The intersection will operate well as a roundabout during both the AM and PM peak hours at an average LOS A, with the 95<sup>th</sup> percentile queues ranging between 0 and 8 vehicles. The proposed roundabout geometry is shown in **Figure 6.24**.



**Figure 6.24: Proposed geometry**

b) Option 2: Signalised Intersection

The intersection will operate adequately as a signalised intersection during the AM peak and operate poorly at LOS A to LOS F during the PM peak hour, with the 95<sup>th</sup> percentile queues ranging between 1 and 10 vehicles during the AM peak hour and 1 to 51 during the PM peak hour. The proposed geometry for the signalised intersection is shown in **Figure 6.25**.



**Figure 6.25: Proposed geometry**

c) Recommended Upgrade

It is recommended that the intersection be upgraded to a roundabout as the improvement in LOS is superior to that of the signalised intersection upgrade option. The roundabout also has a greater capacity and can therefore better accommodate future traffic growth.

Furthermore, safety will be enhanced in the vicinity of the intersection as motorists will be forced to slow down when approaching the roundabout.

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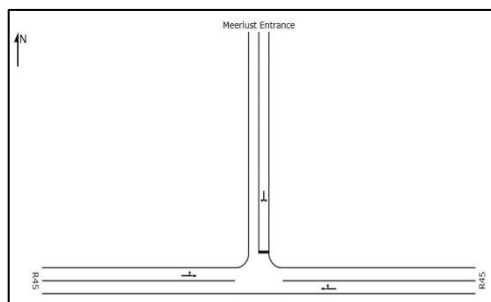
Adequate warning signage should be provided to alert motorists to the presence of the roundabout

A conceptual design of the proposed upgrades and the access spacing is attached in **Section 7**.

## 6.10 R45 / Meerlust Access

### 6.10.1 Existing Geometry

The existing geometry of the R45 / Meerlust Access intersection is shown in **Figure 6.26** and **6.27**.



**Figure 6.26: Existing geometry**



**Figure 6.27: Aerial view of intersection**

### 6.10.2 2014 Existing Traffic

The intersection currently operates well during both the AM and PM peak hours, ranging between LOS A and LOS B, with the 95<sup>th</sup> percentile queues ranging between 0 and 1 vehicle.

### 6.10.3 2019 Total Traffic

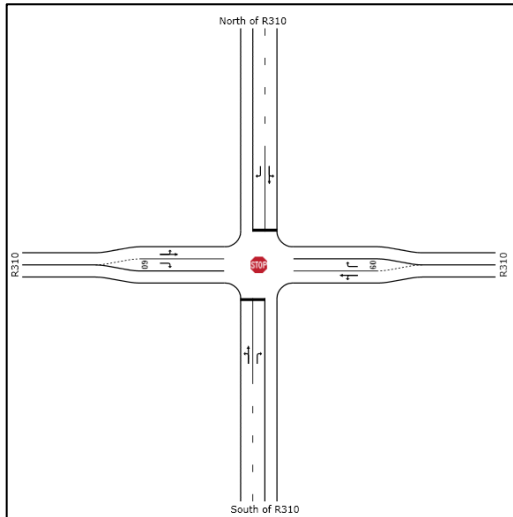
The intersection will operate adequately during both the AM and PM peak hours, ranging between LOS A and LOS C, with the 95<sup>th</sup> percentile queues ranging between 0 and 1 vehicle.

## 6.11 Proposed Access off Helshoogte Road (R310)

A central access to the proposed development is proposed equidistant from the proposed roundabouts mentioned in **Sections 6.1** and **6.9**.

### 6.11.1 Proposed Geometry

A full access arrangement with opposing right-turn lanes (on Helshoogte Road (R310)) entering the site and stop controls on the side roads with separate right and left-turn lanes is proposed, as shown in **Figure 6.28**.



**Figure 6.28: Proposed geometry**

### **6.11.2 2019 Total Traffic**

The north and south approach right-turn movements will operate at LOS F during both the AM and PM peak hours. The poor LOS is due to the high volume of through traffic along Helshoogte Road (R310).

However, the relatively few motorists experiencing these poor conditions during peak periods will naturally divert to the adjacent Minor Road 6/4 (New Oaks Access) roundabout which has ample spare capacity during peak hours.

It is important that these right-turn exits are retained in order to provide maximum flexibility of movement during off-peak periods and weekends.

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## 7 Construction Phase Traffic

During the construction phase there is a potential for temporary impacts on the local traffic and pedestrians. The construction phase will generate traffic onto the surrounding road network through delivery of materials/equipment to the site and the construction workforce travelling to and from the site on a daily basis. The impact of construction vehicles, construction staff transport and visitors to the site and the impact on pedestrians are discussed hereafter.

### 7.1 Construction Vehicles

It is assumed that an average of 10 construction vehicles (heavy vehicles/trucks) will access the site during the peak periods, however, the impact of the trucks during the peak periods is considered to be minimal and negligible. Construction vehicles may at times affect the flow of local traffic, but the vehicles will only make use of the R310 and the R45 to access/exit the site. Construction vehicles will operate within the boundary of the site, making use of the service roads situated parallel to the R310 and the internal roads of the proposed development. In addition, vehicles will also be able to access the site via the Rhodes entrance off Lanquedoc Road. Traffic management procedures should be implemented to ensure that the impacts of the construction vehicles are minimised and safety and protection measures are implemented to reduce the risks of collisions.

### 7.2 Construction Staff Transport and Visitors to the site

It is assumed that the Contractor will provide transport for unskilled workers to and from the site (common practice), while the skilled workers will travel to the site by private vehicles. It is not expected for the trips generated by vehicles transporting the labourers, skilled staff and visitors to the site to exceed 25 vehicles during the AM and PM peak periods. The existing road network has sufficient capacity to accommodate these vehicles and the impact of these vehicles on the overall operation of the road network is therefore considered to be minimal and negligible. Given the distance from the site to the residential areas, it is unlikely that any of the workers will commute to work on foot.

### 7.3 Pedestrians

The construction is expected to generate minimal pedestrians. The existing sidewalks along the existing road network, however, will be able to accommodate existing and additional pedestrians if required. Although no mitigation or remedial measures will be required with regards to pedestrians, it is necessary for the Contractor to ensure that safety and protection measures are implemented where pedestrians are within the construction site boundary.

---

## 8 Proposed Access Spacing

The proposed access points for the development have been assessed in accordance with the *WCG Access Management Guidelines (2016)*.

In terms of these guidelines, equivalent side roads should be spaced 400m and left-in / left-out side roads should be spaced at 200m.

Access to the internal road network will be via a proposed roundabout at Minor Road 6/4 (New Oaks Access) and a proposed central access located equidistant (approximately 330m) between the R45 / Helshoogte Road (R310) intersection and the proposed roundabout at Minor Road 6/4 (New Oaks Access) as shown in **Figure 8.1**.

While the central access is slightly sub-standard in terms of the required spacing, it is appropriate in the context of this being a rural village with a density closer to suburban than semi-rural.

The access to Wood Place will be closed as this area will be redeveloped as part of the proposed development.

The Rhodes Food Group access points are sub-standard in terms of the required access spacing. The Rhodes Food Group Factory access, however, can be considered to be temporary as the Rhodes Food Group is planning to develop their property in the near future.

This development has no right to compel the Rhodes Food Group to relocate their access at this stage, however, when the Rhodes Food Group decides to develop, the WCG should request that they relocate their current access to take access off Minor Road 6/4, connecting to the Helshoogte Road (R310) at the proposed roundabout.

The minor driveway access to the police station will also remain at this stage for strategic and operational reasons.





PROJECT  
Boschendal TIA

Approved By  
ABulman

Drawn By      Designed By      Reviewed By  
K.Liebenberg



DETAIL  
Proposed Access Spacing

Scale      Date  
1 : 2 000 @ A3      July 2016

Project No.      Drg No.      Rev.  
J34022 / **Figure 8.1** /

This drawing is not to be used in whole, or part, other than for the intended purpose and project as defined on this drawing.

Refer to the contract for full terms and conditions.

## 9 Parking

The Land-Use Planning Ordinance (LUPO) Section 8 Scheme regulations were used to determine the number of off-street parking bays required by the various land uses in the proposed development. The proposed development comprises residential, retail, accommodation and offices, as shown in **Table 9.1** below.

**Table 9.1: Parking Requirements**

Land Use	Size	Unit	LUPO Section 8	
			Ratio	Bays
Residential - Low density	83	units	2	166
Residential - Medium density	135	units	2	270
Residential - High Density + Visitors <sup>1</sup>	257	units	1.25	322
Hotel	70	room	0.7 + 20 additional bays	69
General Retail	5500	100m <sup>2</sup>	4	220
General offices - Suburban	9000	100m <sup>2</sup>	4	360
Guest accommodation	30	room	0.7	21
Civic/Community building <sup>2</sup>	500	m <sup>2</sup>	1/12	42
Clinic <sup>3</sup>	3	rooms	3	9
Crèche	4/120	Classes/ Students	4 + 8 additional bays	12
<b>Total Parking Requirement</b>				<b>1 491</b>

Notes:

1. Parking ratio originally includes an additional 0.25 bays/unit for visitors. Visitors can however use office parking after hours (shared parking).
2. Calculated at 1 bay/8 fixed seats or persons (calculated at 1.5m<sup>2</sup> per person for occupy –able area.)
3. Reduced by 50% due to sharing with other parking.

It is therefore recommended that a minimum of 1 491 bays be provided for the development.

It should be noted that the proposed development is mixed use in nature and therefore a degree of shared parking is likely to take place. The sharing of off-street parking is expected to occur between office visitors and shop customers. After hours, office off-street parking can be used by visitors to the flats. It is also expected that visitors will walk to the clinic due to adequate pedestrian facilities and the close proximity of the clinic to the rest of the development.

### 9.1 Refuse Embayment

A refuse embayment will be constructed on Helshoogte Road (R310) adjacent to the existing Clinic. As a minimum requirement, the embayment shall measure not less than 3 m by 12 m.

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## 10 Public Transport and Non-Motorised Transport

### 10.1 Public Transport

The acceptable walking distance to public transport facilities according to the DoT's *Pedestrian and Bicycle Facility Guidelines (2003)* is 500m. The access point of the proposed development is located approximately 400m away from the nearest bus and mini-bus taxi facilities. Although the access points will be within reasonable walking distance of public transport facilities, the development footprint is extensive and pedestrians will be forced to walk even further distances to/from within the development.

It is therefore recommended that new public transport facilities in the form of taxi embayments be provided along Helshoogte Road (R310) adjacent to the proposed central access to the development on either side of the road (after the intersection in each direction). A pedestrian crossing should be provided linking the two public transport facilities and advanced warning signs should be provided to notify motorists of the pedestrian crossing.

### 10.2 Non-Motorised Transport

Helshoogte Road (R310) has a pedestrian walkway located on the eastern side of the road, linking to pedestrian sidewalks provided along both sides of the R310 closer to the intersection with the R45. Pedestrian walkways are also provided along the southern side of the R45, east of the intersection with Helshoogte Road (R310) and along the northern side of the R45, west of the intersection. No pedestrian crossing facilities are provided at the R45 / Helshoogte Road (R310) intersection.

Surfaced sidewalks, with widths no less than 1.5m, as specified by DoT's *NMT Facility Guideline (2015)*, and with barrier kerbs protecting pedestrians from through traffic and preventing motor vehicles from parking on sidewalks, should be provided on Helshoogte Road (R310) along the frontage of the development. The new sidewalks should be linked seamlessly to the existing pedestrian facilities as well as the development's internal pedestrian network. The proposed locations of pedestrian crossings are shown in **Figure 8.1**.

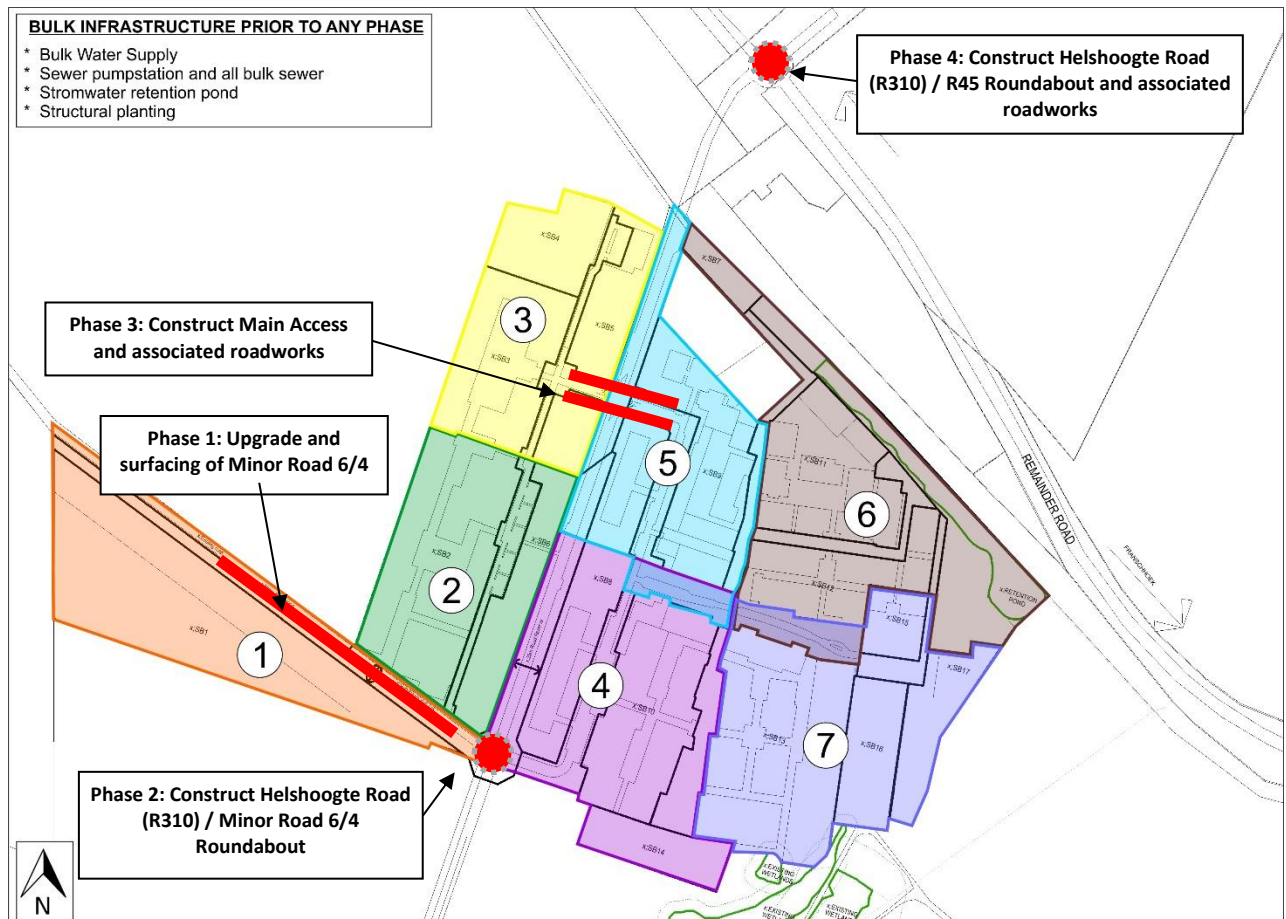
Provision has been made for cyclists along Helshoogte Road (R45) in the form of a wide colourised shoulder as well as the provision of pedal cycle warning signs.

The shoulder along Helshoogte Road (R310) should be maintained along the frontage of the development unless it is linked to an off-road facility for safety purposes. The safety of cyclists will be dependent on the type of access control implemented at the R45 / Helshoogte Road (R310) intersection, eg should a roundabout be introduced, an off-road cycle facility would be more beneficial.

All NMT facilities located along Helshoogte Road (R310) should be designed to the satisfaction of the relevant roads and other authorities.

## 11 Phasing of Road Infrastructure

The extent of the proposed development necessitates the upgrade of two intersections, the upgrading of Minor Road 6/4 and the construction of a new intersection. These road infrastructure upgrades are linked to seven overall phases of the development for planning approval and subdivision clearance purposes, as shown in **Figure 11.1**. The proposed road infrastructure upgrades must be considered in the precinct plans and precinct level heritage assessments for the approval of Heritage Western Cape.



**Figure 11.1: Phasing diagram**

It is proposed that the upgrades to the road network are phased and linked to the completion of specific phases of the development as follows:

### 11.1 Phase 1

This phase comprises low density residential and will have minimal impact on the existing road network. It is therefore proposed that the upgrade and surfacing of Minor Road 6/4, from the Helshoogte Road to the development entrance is upgraded. The intersection with the Helshoogte Road can remain as a stop-controlled intersection.

### 11.2 Phase 2

This phase comprises predominantly medium density residential. In order to provide acceptable access, the proposed roundabout at Helshoogte Road (R310) and Minor Road 6/4 should be

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constructed as part of this phase. The proposed roundabout will also provide access to the Phase 4 development on the other side of Helshoogte Road (R310).

### **11.3 Phase 3**

This phase comprises predominantly offices and retail facilities with a higher traffic impact. In order to provide acceptable access, the Main Access with associated roadworks should be constructed as part of this phase.

### **11.4 Phase 4**

This is one of the larger phases and the combined traffic impact of Phases 1, 2, 3 and 4 will necessitate the construction of the main roundabout at the Helshoogte Road (R310) R45 intersection and the associated roadworks.

### **11.5 Phases 5, 6 & 7**

No further external roadworks will be required as part of these phases.

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## 12 Conclusions

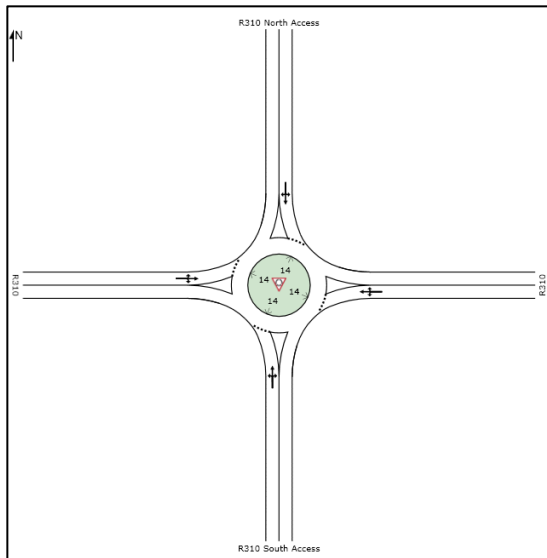
The following can therefore be concluded:

- The proposed development will comprise approximately 450 residential units, shops, offices and guest accommodation.
- The access points at Rhodes Food Group Offices, Rhodes Food Group Factory and a farm access (Wood Place) currently do not meet the minimum access spacing requirements.
- The intersections in the study area are currently operating adequately, with the exception of the Helshoogte Road (R310) / R45 intersection which is starting to approach capacity in the peak periods.
- A single-lane roundabout is proposed on Helshoogte Road (R310) at the Minor Road 6/4 (New Oaks Access) intersection.
- A double-lane roundabout is proposed at the intersection of the Helshoogte Road (R310) and the R45. This is preferred to a signalised intersection due to the traffic calming characteristics of the roundabout.
- A full central access is proposed with opposing right-turn lanes (on Helshoogte Road (R310)) entering the site and stop controls on the side roads with separate right and left-turn lanes.
- The proposed roundabouts will operate well during both AM and PM peak hours.
- The proposed central access right-turn movements will operate poorly during both the AM and PM peak hours. The sub-standard delays experienced are caused by the high volumes of through traffic along Helshoogte Road (R310).
- This type of access is still preferred due to the flexibility it offers during off-peak periods and weekends. Vehicles wishing to exit via right-turn movement can utilise the alternative roundabout during peak periods.
- The existing road network has sufficient capacity to accommodate the traffic generated during the construction phase and the impact of the construction vehicles on the overall operation of the road network is therefore considered to be minimal and negligible.
- The provision of public transport to the area is good, but additional facilities should be provided in the form of additional taxi / bus embayments on both sides of the road in the vicinity of the central access. These should be linked by a pedestrian crossing.
- Pedestrian facilities are currently provided along Helshoogte Road (R310) and the R45, with colourised shoulders providing for cyclists along Helshoogte Road.
- The total parking requirement amounts to 1 491 bays; however, it should be noted that the proposed development is mixed-use in nature and therefore a degree of shared parking is likely to take place.
- A refuse embayment will be constructed on Helshoogte Road (R310) adjacent to the existing Clinic.
- The road upgrades should be constructed in phases as the development is constructed.

## 13 Recommendations

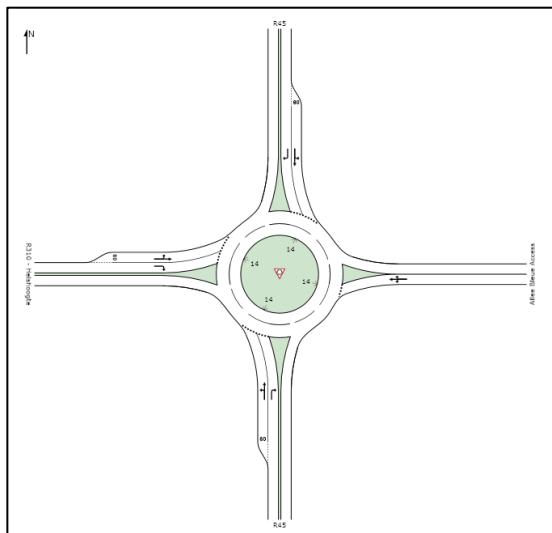
It is therefore recommended that:

- The geometry of the roundabout at Helshoogte Road (R310) / Minor Road 6/4 (New Oaks Access) intersection be constructed as shown in **Figure 13.1** below.



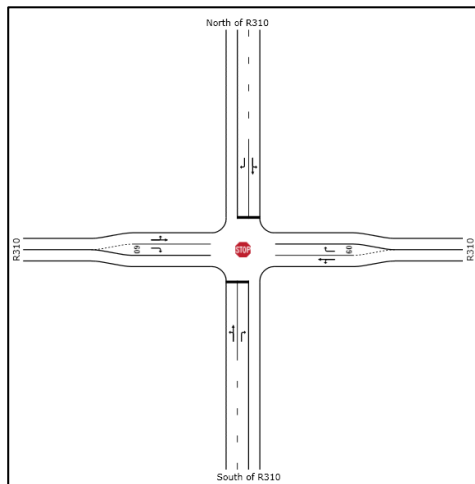
**Figure 13.1: Roundabout at R310 / Minor Road 6/4 (New Oaks Access)**

- The geometry of the roundabout at the R45 / Helshoogte Road (R310) be constructed as shown in **Figure 13.2** below.



**Figure 13.2: Roundabout at R45 / Helshoogte Road (R310)**

- The geometry of the central access is constructed as shown in **Figure 13.3**. Although the analysis results indicate that the right-turn exiting movements will operate poorly in the peak periods, the few motorists experiencing these poor conditions can divert to the adjacent Minor Road 6/4 (New Oaks Access) roundabout, which has ample spare capacity during peak periods.



**Figure 13.3: New Central Access**

- The concept design for the proposed external road geometry is provided in **Figure 8.1**.
- The Rhodes Food Group factory and retail facility entrances remain temporarily until these sites are developed. The PGWC can, at this stage, request that these access points are regularised in terms of the applicable road access spacing guidelines.
- The Police station access remain as a minor driveway access for strategic and operational reasons.
- During construction, traffic management procedures be implemented to ensure that the impacts of the construction vehicles are minimised and safety and protection measures are implemented to reduce the risks of collisions.
- New public transport facilities are provided along Helshoogte Road (R310) in the form of taxi embayments adjacent to the proposed central access on either side of the road (downstream). A pedestrian crossing should be provided linking the two public transport facilities and advanced warning signs should be provided to notify motorists of the pedestrian crossing
- Sidewalks are provided along both sides of the Helshoogte Road (R310) along the frontage of the development and along the R45 in the vicinity of the roundabout. These sidewalks should be minimum 1.5m wide and should link seamlessly to the existing pedestrian facilities as well as the internal pedestrian network.
- The shoulder along Helshoogte Road (R310) be maintained along the frontage of the development unless it is linked to an off-road cycle facility for safety purposes.
- During the construction phase, ensure that safety and protection measures are implemented where pedestrians are within the construction site boundary.



- The following parking ratios, as per LUPO Section 8 Scheme regulations, should be applied:

○ Residential - Low density	:	2 bays / unit
○ Residential - Medium density:	:	2 bays / unit
○ Residential - High Density:	:	1.25 bays / unit
○ Hotel	:	0.7 bays / room + 20 additional bays
○ General Retail	:	4 bays / 100m <sup>2</sup> GLA
○ General offices - Suburban	:	4 bays / 100m <sup>2</sup> GLA
○ Guest accommodation	:	0.7 bays / room
○ Civic / Community Building	:	1 bay/8 fixed seats or persons
○ Clinic	:	3 bays/consulting room
○ Crèche / ECD	:	1 bay/classroom + 1 bay/15 students

The parking ratio for the Residential High Density land use originally includes an additional 0.25 bays/unit for visitors. It is, however, proposed that visitors use the parking provided for offices after hours.

Furthermore, the number of parking bays required for the clinic can be reduced by 50% to account for the sharing of parking between land-uses.

- A refuse embayment measuring not less than 3m by 12m should be provided on the Helshoogte Road adjacent to the proposed refuse facility (at the old clinic site).
- The road infrastructure upgrades required for the proposed development should be implemented in the following phasing sequence:

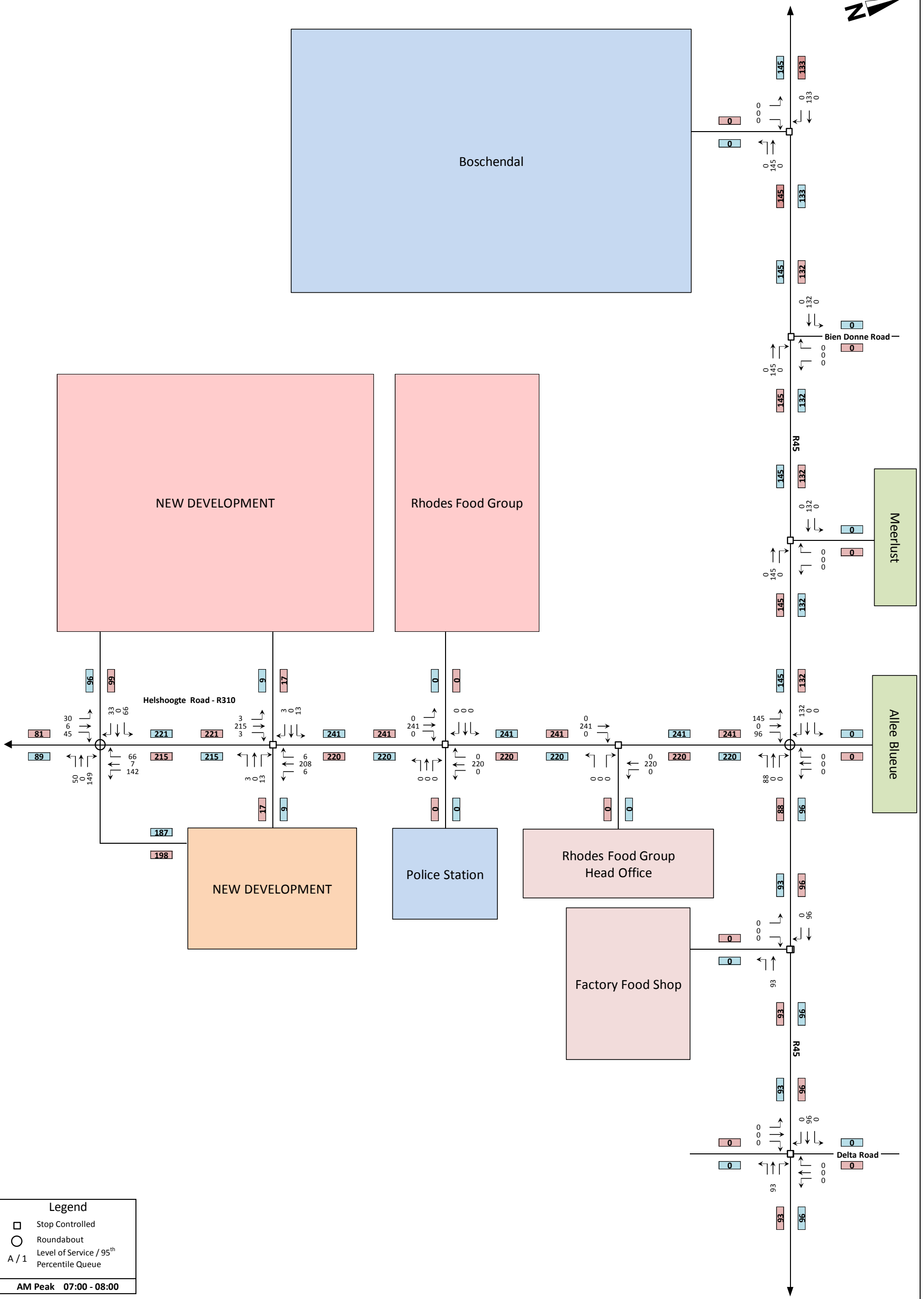
	<b>Phase 1</b>	<b>Phase 2</b>	<b>Phase 3</b>	<b>Phase 4</b>	<b>Phase 5</b>	<b>Phase 6</b>	<b>Phase 7</b>
<b>External Road Upgrades</b>	Upgrade and surfacing of Minor Road 6/4	Construct Helshoogte Road (R310) / Minor Road 6/4 Roundabout	Construct Main Access and associated roadworks	Construct Helshoogte Road (R310) / R45 Roundabout and associated roadworks	No external roadworks	No external roadworks	No external roadworks

- The proposed road infrastructure upgrades must be considered in the precinct plans and precinct level heritage assessments for the approval of Heritage Western Cape.

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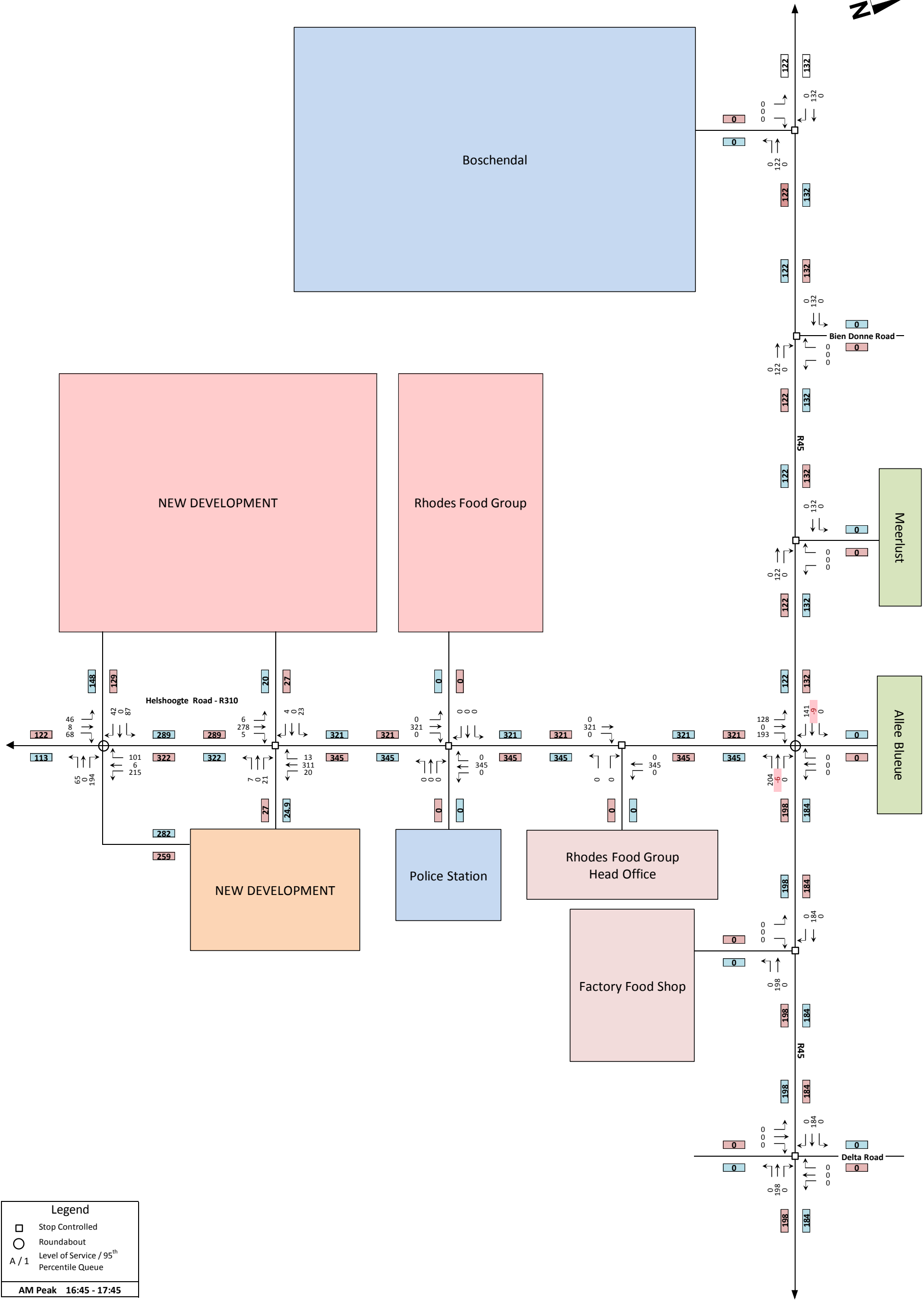
## Appendix A

### Development Trips




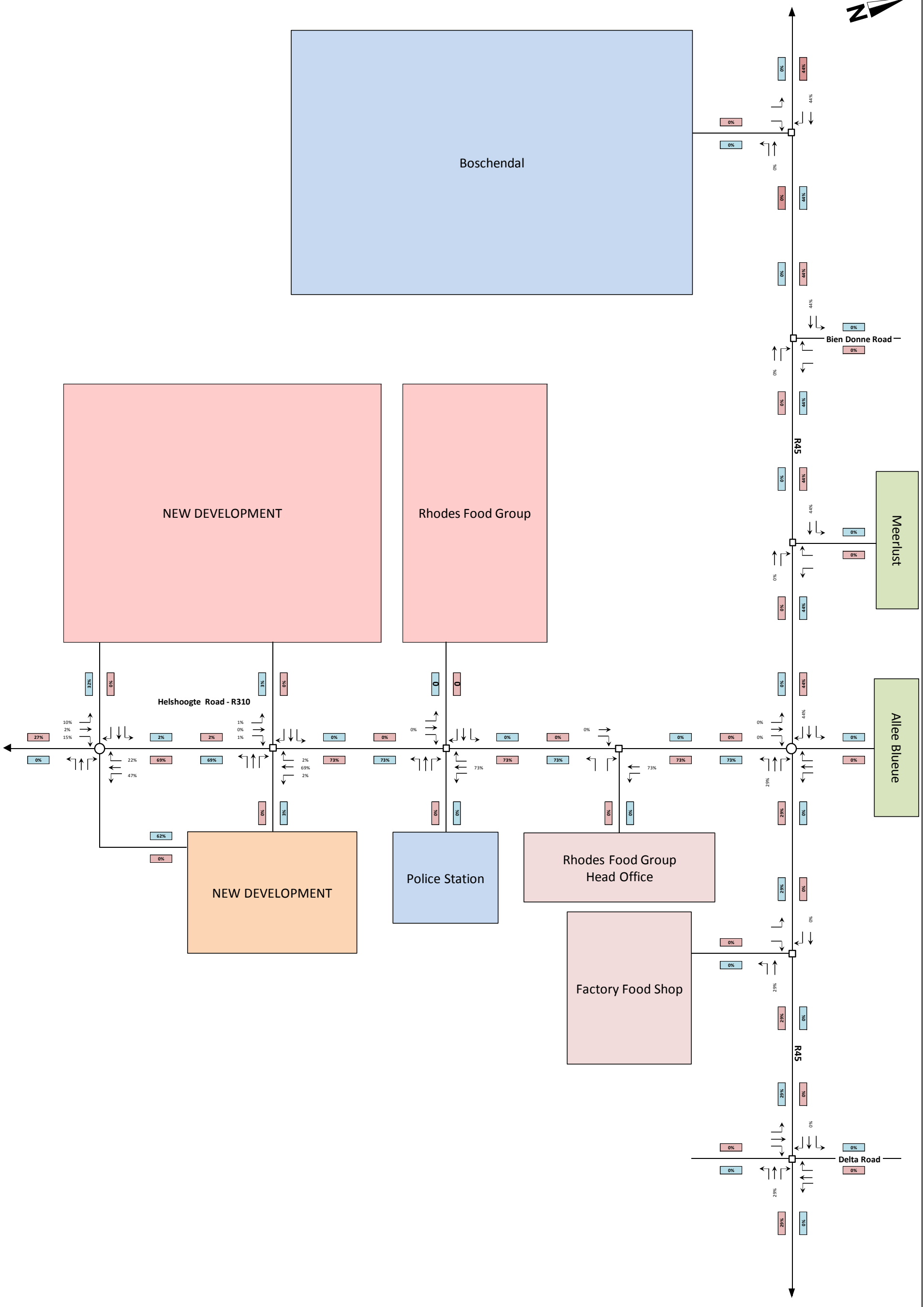
Legend	
□	Stop Controlled
○	Roundabout
A / 1	Level of Service / 95 <sup>th</sup> Percentile Queue
<b>AM Peak 07:00 - 08:00</b>	

PROJECT	Boschendal TIA			DRAWN BY	R.Adams	CHECKED BY	S.Kiewiet
	DETAIL	AM Peak Generated Traffic - 2019		REVIEWED BY	K.Liebenberg	APPROVED BY	A.Bulman
SCALE		NTS	DATE	May-15	PROJECT NO.	J34022	DRG NO.
				REV			

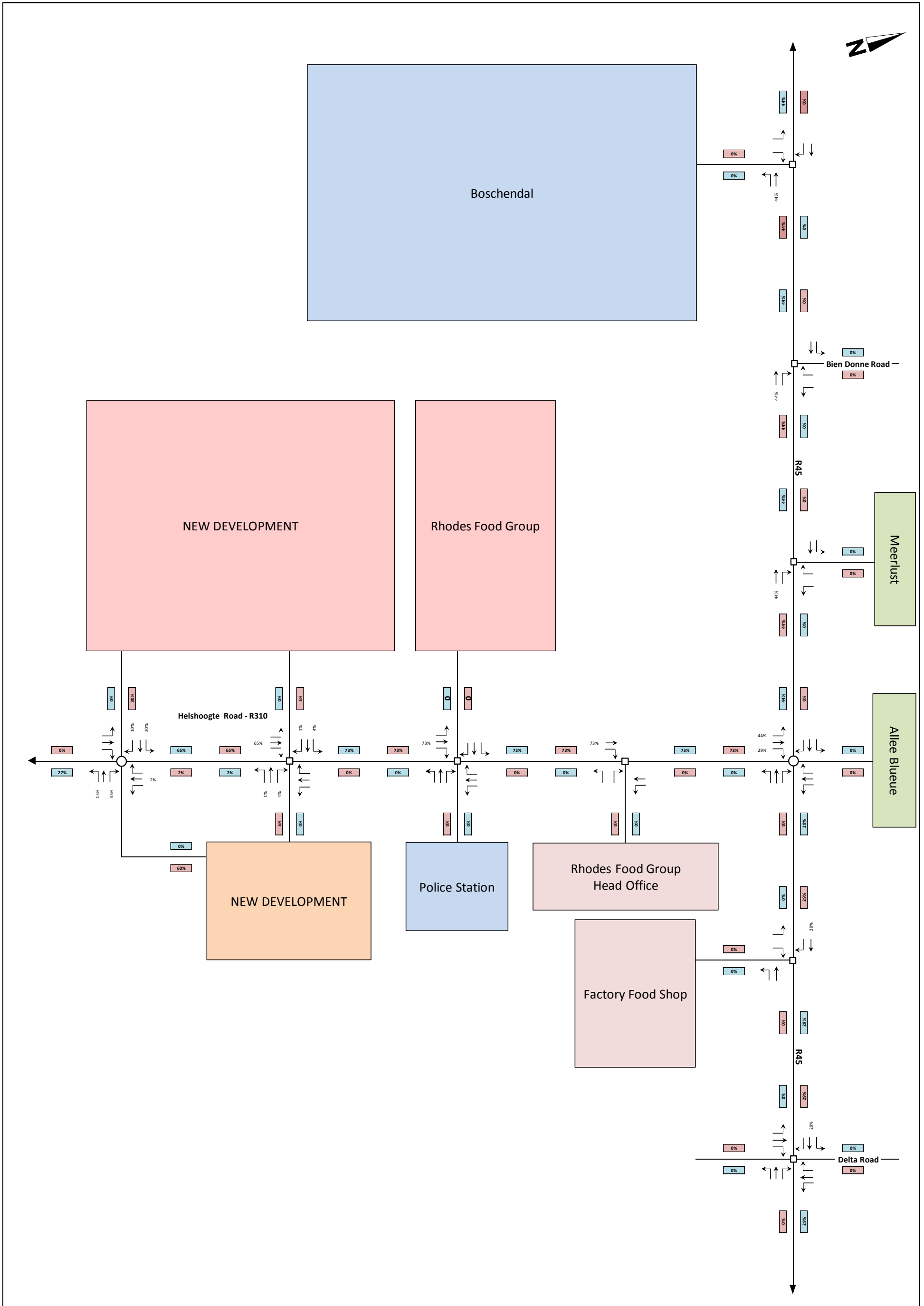


Legend	
□	Stop Controlled
○	Roundabout
A / 1	Level of Service / 95 <sup>th</sup> Percentile Queue
AM Peak 16:45 - 17:45	

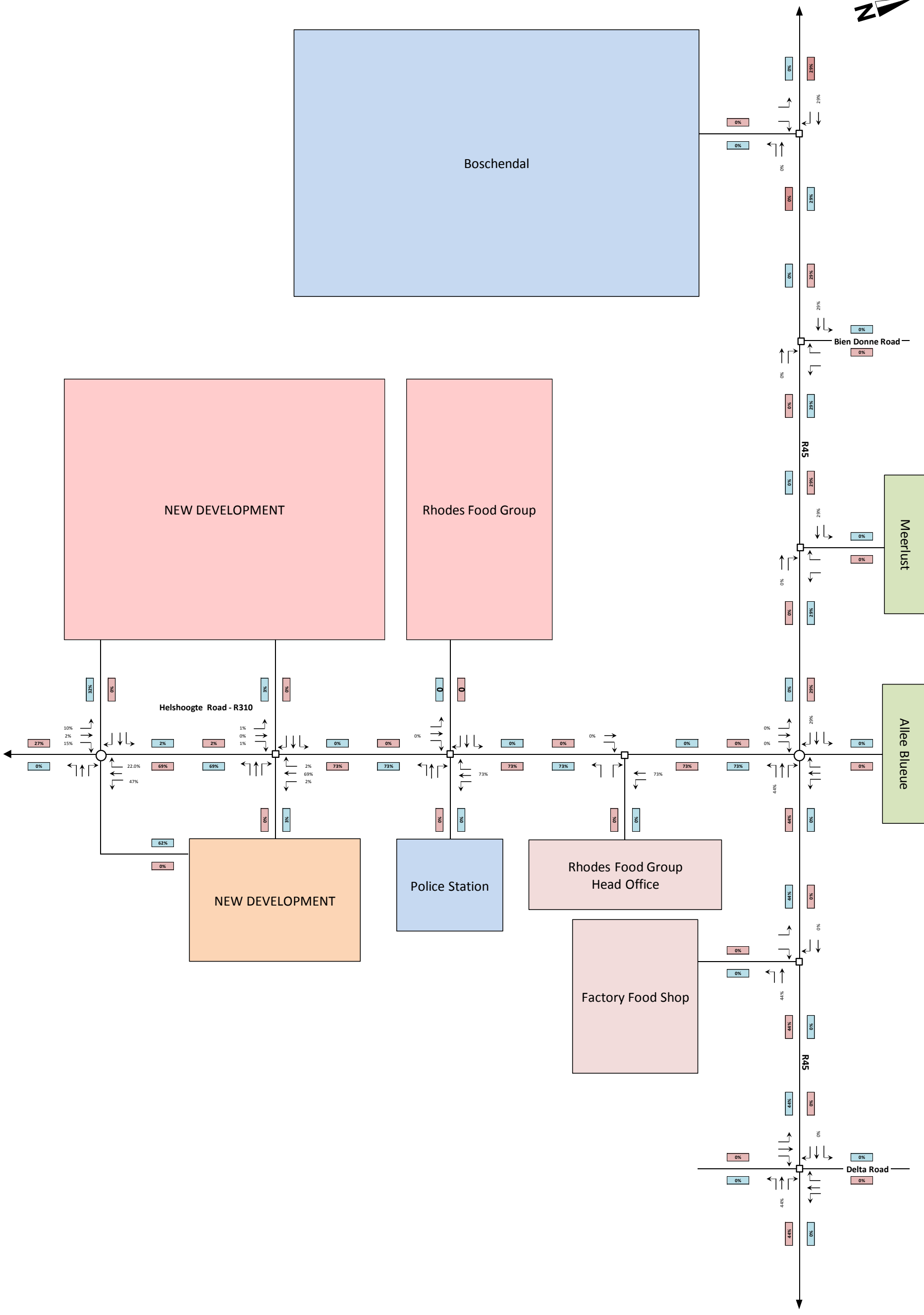
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	DETAIL	PM Peak Generated Traffic - 2019		SCALE NTS	DATE May-15	PROJECT NO. J34022
				REVIEWED BY K.Liebenberg	APPROVED BY A.Bulman	REV




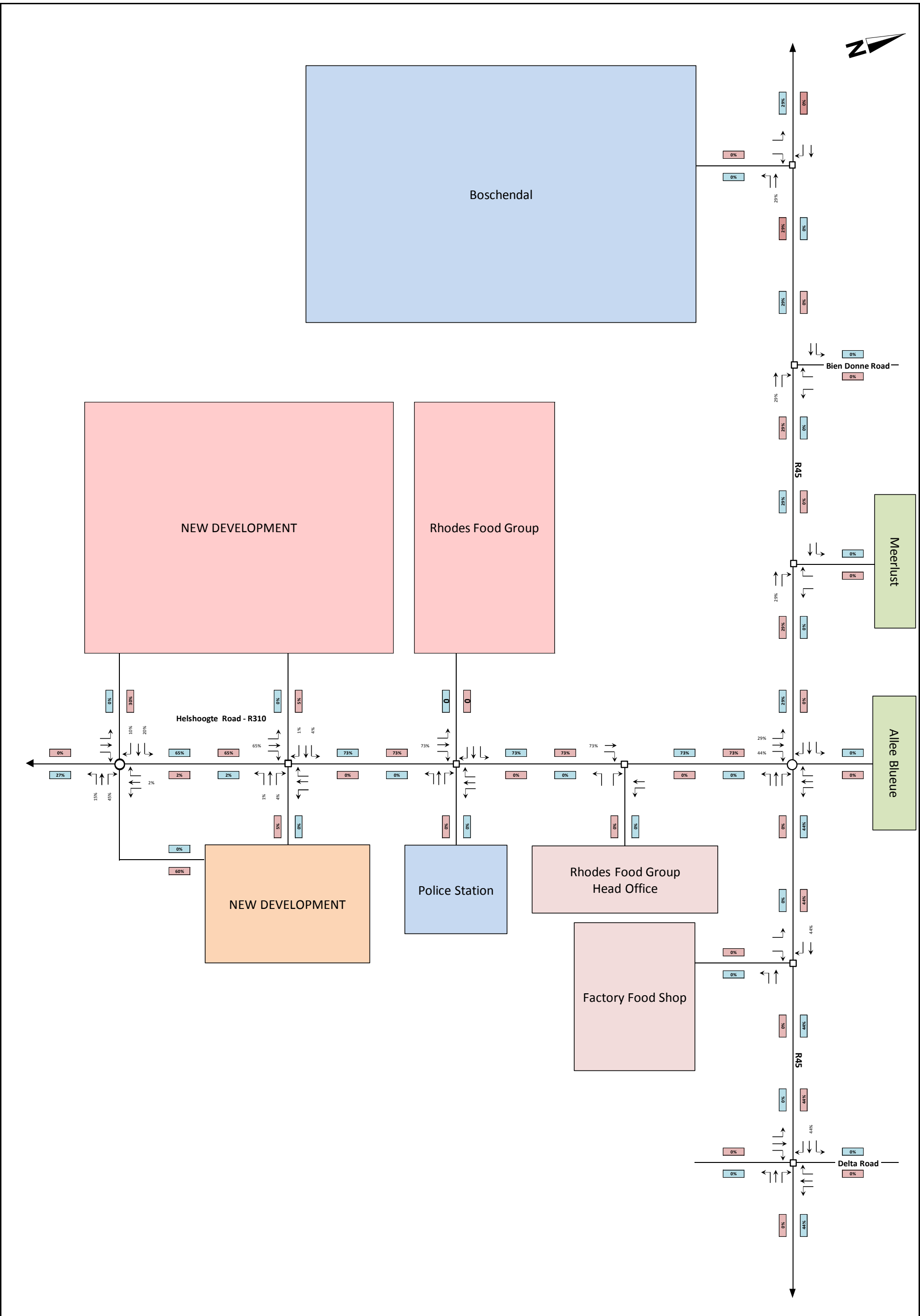
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					R.Adams	S.Kiewiet
DETAIL	AM Distribution - In		SCALE	DATE	REVIEWED BY	APPROVED BY
			NTS	May-15	K.Liebenberg	A.Bulman
			PROJECT NO.	DRG NO.	REV	
			J34022	App A.1.3		




PROJECT	Boschendal TIA				DRAWN BY		CHECKED BY	
					R.Adams		S.Kiewiet	
DETAIL	AM Distribution - Out		SCALE		DATE		PROJECT NO.	
			NTS		May-15		J34022	
					DRG NO.		REV	
					App A.1.4			

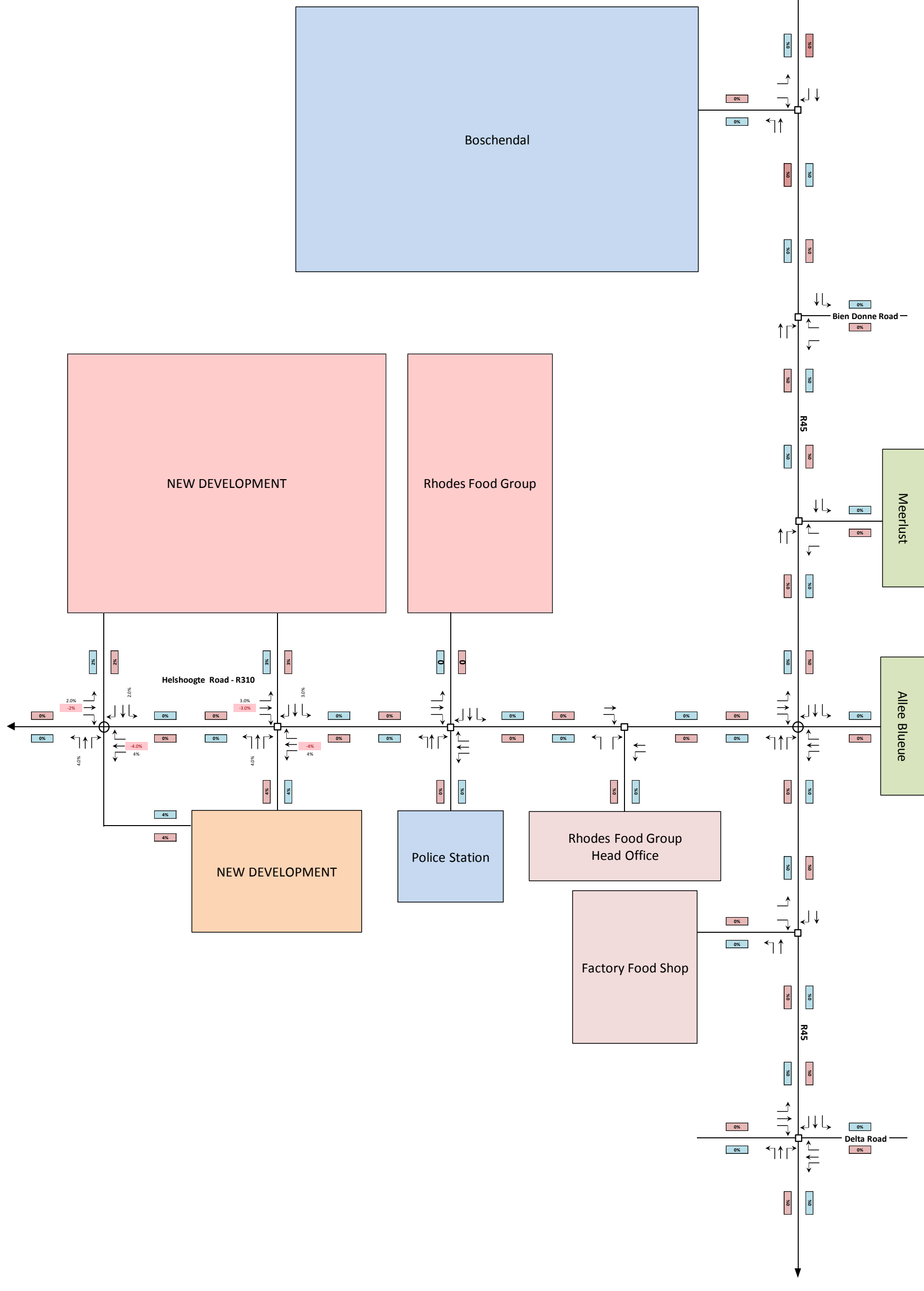



PROJECT	Boschendal TIA		DRAWN BY	R.Adams	CHECKED BY	S.Kiewiet					
			REVIEWED BY	K.Liebenberg	APPROVED BY	A.Bulman					
DETAIL	PM Distribution - In	SCALE	NTS	DATE	May-15	PROJECT NO.	J34022	DRG NO.	App A.1.5	REV	

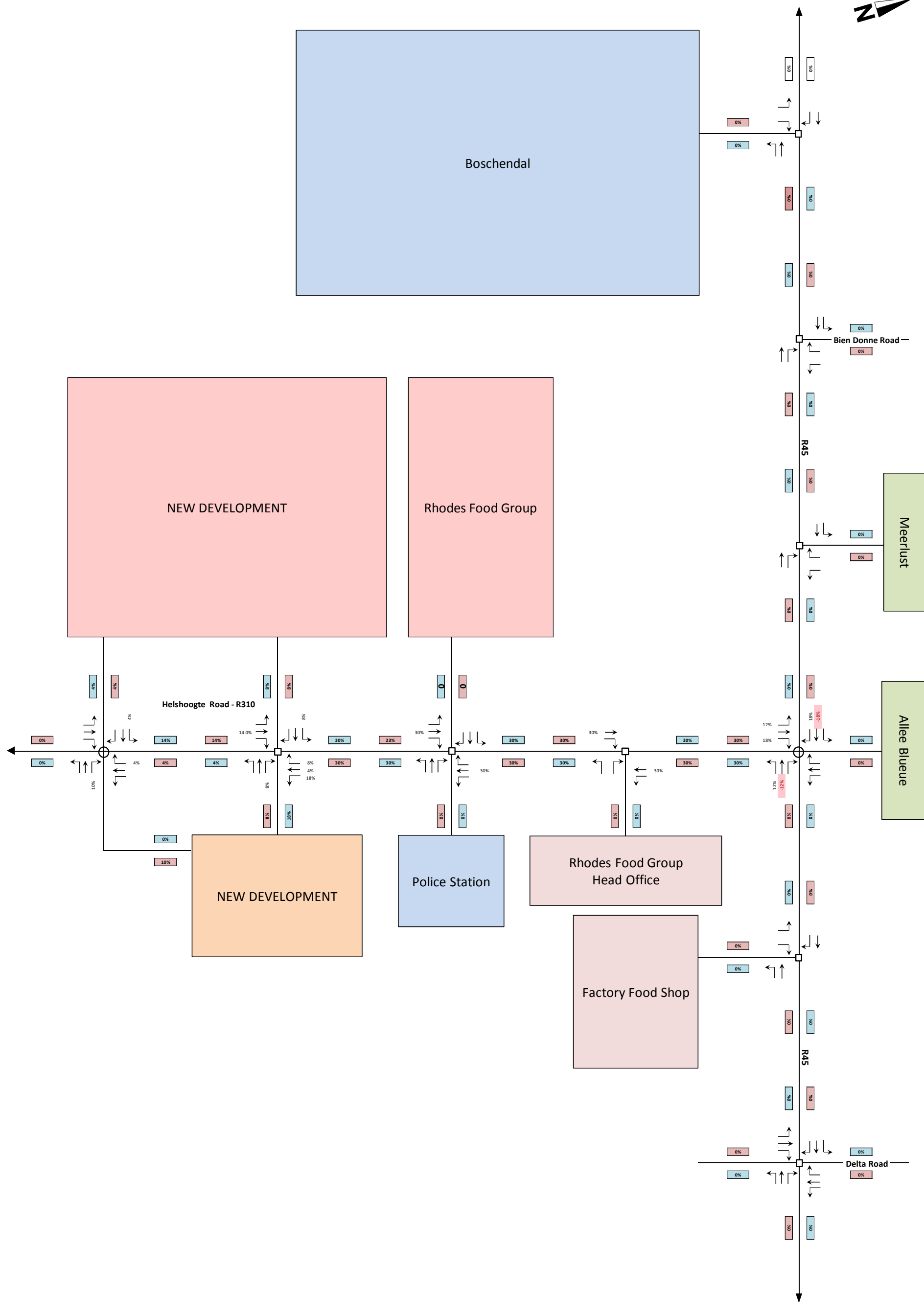



PROJECT	Boschendal TIA			DRAWN BY R.Adams	CHECKED BY S.Kiewiet	
	DETAIL	PM Distribution - Out		REVIEWED BY K.Liebenberg	APPROVED BY A.Bulman	
SCALE		NTS	DATE	May-15	PROJECT NO. J34022	DRG NO. App A.1.6





PROJECT	Boschendal TIA				DRAWN BY	R.Adams	CHECKED BY	S.Kiewiet
	DETAIL	Pass-by Distribution - 2014			REVIEWED BY	K.Liebenberg	APPROVED BY	A.Bulman
SCALE		NTS	DATE	May-15	PROJECT NO.	J34022	DRG NO.	App A.1.7






PROJECT	Boschendal TIA				DRAWN BY	R.Adams	CHECKED BY	S.Kiewiet				
	DETAIL	Diverted Distribution - 2014			REVIEWED BY	K.Liebenberg	APPROVED BY	A.Bulman				
SCALE				NTS	DATE	May-15	PROJECT NO.	J34022	DRG NO.	App A.1.8	REV	



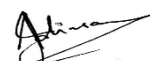
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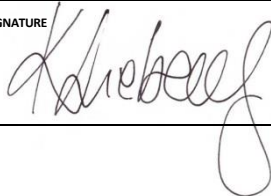




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 PROJECT NAME : TIA for Boschendal PROJECT No. : J34022  
 TITLE OF DOCUMENT : Transport Impact Assessment for Boschendal  
 ELECTRONIC LOCATION : P:\J34022 (Boschendal TIA)\G\_Outgoing Reports\6th submission - incl Heritage recommendation\Boschendal TIA - Rev 5 - 20170801.docx


	Approved By	Reviewed By	Prepared By
<b>ORIGINAL</b>	NAME <b>Andrew Bulman</b>	NAME <b>Sergei Kiewiet</b>	NAME <b>Adrian Johnson</b>
DATE <b>29 January 2016</b>	SIGNATURE 	SIGNATURE 	SIGNATURE 

	Approved by	Reviewed By	Prepared By
<b>REVISION 1</b>	NAME <b>Andrew Bulman</b>	NAME <b>Andrew Bulman</b>	NAME <b>Adrian Johnson</b>
DATE <b>18 July 2016</b>	SIGNATURE 	SIGNATURE 	SIGNATURE 

	Approved By	Reviewed By	Prepared By
<b>REVISION 2</b>	NAME <b>Andrew Bulman</b>	NAME <b>Andrew Bulman</b>	NAME <b>Adrian Johnson</b>
DATE <b>17 August 2016</b>	SIGNATURE 	SIGNATURE 	SIGNATURE 

	Approved By	Reviewed By	Prepared By
<b>REVISION 3</b>	NAME <b>Karin Liebenberg</b>	NAME <b>Andrew Bulman</b>	NAME <b>Sergei Kiewiet</b>
DATE <b>03 February 2017</b>	SIGNATURE 	SIGNATURE 	SIGNATURE 

	Approved By	Reviewed By	Prepared By
<b>REVISION 4</b>	NAME <b>Karin Liebenberg</b>	NAME <b>Karin Liebenberg</b>	NAME <b>Sergei Kiewiet</b>
DATE <b>07 February 2017</b>	SIGNATURE 	SIGNATURE 	SIGNATURE 

	Approved By	Reviewed By	Prepared By
<b>REVISION 5</b>	NAME <b>Karin Liebenberg</b>	NAME <b>Karin Liebenberg</b>	NAME <b>Sergei Kiewiet</b>
DATE <b>01 August 2017</b>	SIGNATURE 	SIGNATURE 	SIGNATURE 

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**GIBB (Pty) Ltd**

Postal Address : P.O. Box 3965, Cape Town,  
8000

Contact Person : Karin Liebenberg

Telephone No. : 021 469 9100

Website : [www.gibb.co.za](http://www.gibb.co.za)

Physical Address : 14 Kloof Street, Cape Town,  
8001

Email Address : [kliebenberg@gibb.co.za](mailto:kliebenberg@gibb.co.za)

Fax No. : 021 424 5571