APRIL 2023

TRAFFIC IMPACT ASSESSMENT REPORT

FOR THE

PROPOSED INKOSI PHALANE SHOPPING CENTRE, ON PORTION 1 OF ERF 11497, RICHARDS BAY, FARM RUTH NO.: 16833 UMHLATHUZE LOCAL MUNICIPALITY

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

1.1 Background and brief description of the development and location

AG Traffic and Transportation Consultants (Pty) Ltd were in October 2022 appointed by TK Investment Holdings to undertake this Traffic Impact Assessment study for a development of the Proposed Inkosi Phalane Shopping Centre Development to be situated on Portion 1 of Erf 11497, Richards Bay, Farm Ruth No.: 16833, in the Esikhawini area. The proposed development will be located to the west of the Esikhawini area within the uMhlathuze Local Municipality in the King Cetshwayo District Municipal area in the KwaZulu Natal province.

The proposed shopping centre will be located on a site area that is 27 ha in extent. The development site is currently zoned "Environmental" and is intended to be rezoned to "Core Mixed Use". The project's aim is to develop a shopping centre on site located along P106 at Ruth Farm in Richards Bay. This proposed development is a greenfield development, on land currently leased by Mondi for forestry purposes, on a site owned by the Mkhwanazi community in Empangeni. The proposed development will service the Esikhawini area, Port Dunford, KwaDlangezwa, Umthunzini and other surrounding areas because of the site strategic position.

The proposed development is situated in the Esikhawini area, along the National Route 2 (N2) between Durban/Umhlanga in the south and Richards Bay in the north. The development site is at a radius of approximately 18.00 and 12.00 kilometres, respectively, to the south of the Richards Bay and Empangeni towns which are two Primary Nodes and primary economic hubs near the proposed development site.

Figure 1 below shows the location of the development site.

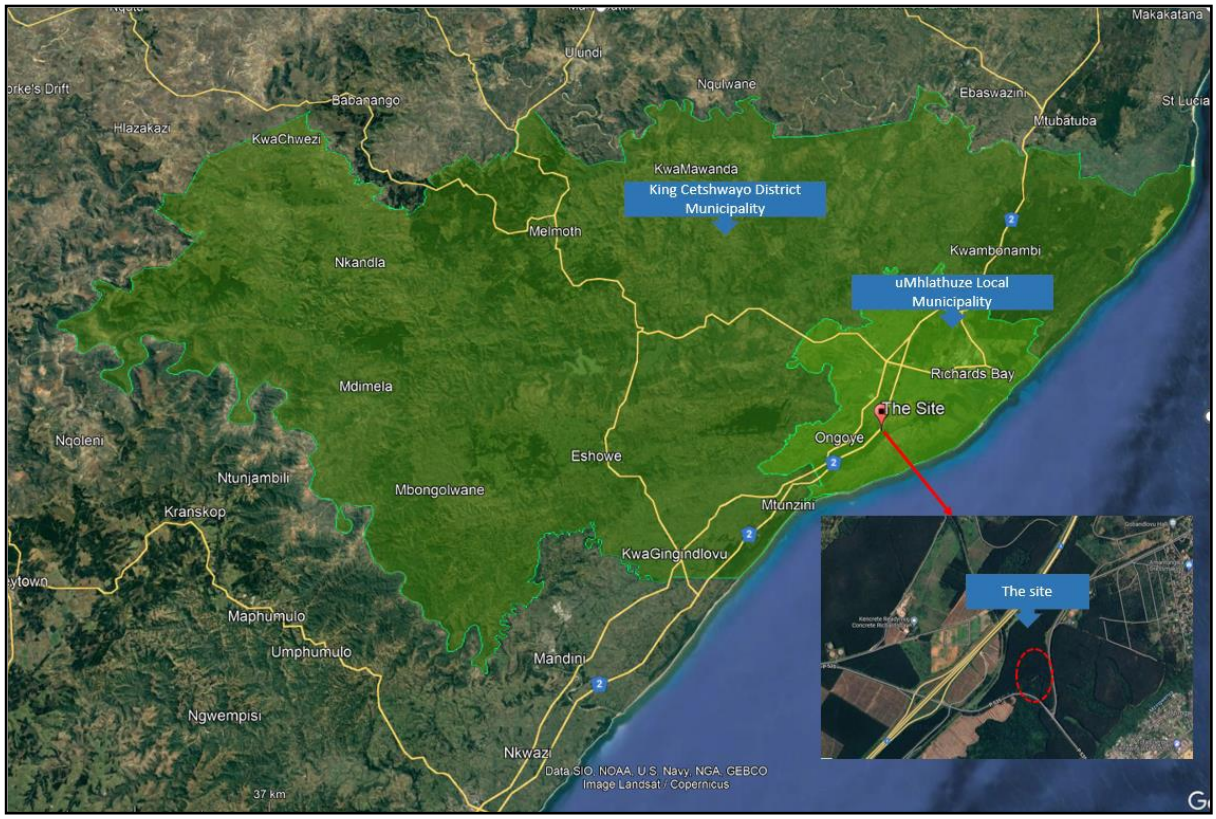

Figure 1: Location of the Development Site.

The motivation for the study stems from an understanding that the area is currently under serviced by retail amenities. From South of Durban to North of Zululand, there is no shopping centre within the eye of N2 with the existing Empangeni and Richards Bay Shopping centres requiring customers to

exit and drive another 5 to 10 kilometres to gain access. Therefore, the proposed development will provide convenience to the immediate surrounding communities as well as the transient market travelling along the N2. It is understood that the retail centre is the first phase of the overall development plan. Other ancillary developments will be phased out in the future, such as a hotel.

The proposed development site is situated within uMhlathuze Municipality, located in the King Cetshwayo District Municipality in the North-Eastern part of KwaZulu-Natal. The uMhlathuze Local Municipality is bordered by uMfolozi, Mthonjaneni and uMlalazi Local Municipalities.

The municipality has vast areas of commercial farmlands as well as a number of areas that are significant from an environmental perspective. The municipal area includes the formal towns of Empangeni, Richards Bay, eSikhawini, Ngwelezane, eNseleni, Vulindlela and Felixton. Rural settlements include Buchanana, Luwamba, Makwela, Mambuka, Hluma, Matshana and Mabuyela.

Richards Bay and Empangeni are the most significant economic centres in the Local and District Municipalities. Richards Bay, as a harbour and industrial town, attracts people from surrounding towns, rural settlements and from beyond the district. Empangeni's role is mainly as a commercial and service centre to the settlements of Esikhawini, Eshowe, Nkandla, Buchanana and other rural settlements and it attracts many people to the range of higher order services available in the town.

The proposed development falls within a proposed expansion area identified by uMhlathuze municipality for future municipal development projects such as housing. The site is within proximity to two secondary nodes, namely Esikhawini node and Vulindlela node. Which is intersected by the primary corridor, the N2 highway. There are two other nodes within the market area, and these include Port Dunford which is an emerging tertiary node and Mabuyeni which is a rural node. All these nodes are under supplied with retail activities which is what the proposed retail centre aims to address.

Acquiring land in rural and underdeveloped areas for development is possible and an alternative for developers to consider as opposed to development in established developed urban areas. The client has chosen Esikhawini area to be the home of their retail property development project – A shopping centre that will impact the economy and the livelihood of the community of Esikhawini.

Rural and tribal areas have, for the large part, remained underdeveloped and are still experiencing a shortage of basic retail services. Thus there is a need for private investors and developers to provide the necessary services to the people. Development in these areas will in return create a wealth of local economic spinoffs that can greatly enhance a community's quality of life.

Retaining income within communities and the economic benefits that a retail centre development can provide to an underdeveloped area could assist in creating a sustainable economic environment for the residents of the surrounding communities. The land is available, the people are there, a product is required which is aesthetically pleasing, economically viable, and suitable for its intended purpose.

The project is set to bring about sustainable development in the area and the community needs the shopping centre. Specific development in areas around the proposed project area is much needed to set a high standard for the appearance of the shopping centre around the vicinity.

The proposed development could be some economic hub in this area. It will serve a number of rural settlements within the municipal area. The area on which the proposed development is situated is largely rural populated.

The proposed shopping centre is expected to attract a number of pedestrians, particularly within the development site, as it is traditional case in rural areas. Many people within the development site are expected to continue to travel to other areas for various goods and services. Even though the proposed development might not probably provide all the services that the local people are travelling to other areas for, however, it is anticipated that there will be a reduction in the number of trips in the direction of other areas. That ultimately reduces travel costs.

It is envisaged that the proposed development is to benefit the municipality and its community since the proposed development is situated in an area where there are no similar developments.

The proposed development is envisaged to benefit the municipality and the local communities of the uMhlathuze Local Municipality. It is to benefit the municipality from a rates collection point of view and formalisation of activities in the area by setting a precedence.

The proposed shopping centre development will play an important role to strengthen the Municipality's economic and social perspective. The proposed development intends to also strengthen municipality's image.

The aim of this study is to investigate the traffic impact of the development on the existing road network and to identify the most appropriate upgrades, if necessary, to alleviate such an impact.

This Traffic Impact Assessment Report is submitted in support of the Proposed Inkosi Phalane Shopping Centre Development to be situated on Portion 1 of Erf 11497, Richards Bay, Farm Ruth No.: 16833, in the Esikhawini area. The proposed development will be located to the west of the Esikhawini area within the uMhlathuze Local Municipality in the King Cetshwayo District Municipal area in the KwaZulu Natal province.

1.2 Scope of the report

This report evaluates the traffic impact on the existing road network in the vicinity of the development site, as a result of the change in land use.

The scope of the TIA, *inter alia*, includes the following traffic related aspects:

- Manual traffic counts at the affected intersections;
- aaSidra performance analysis of the affected intersections;
- Determine the ability of the surrounding road network to accommodate the anticipated traffic volumes during the weekday and weekend Friday PM and Saturday AM peak hours;
- Propose road upgrades, if required;
- Site access requirements; and
- Parking.

2. EXISTING CONDITIONS

2.1 Existing road network

The proposed development site is highly accessible, as shown in **Figure 2**, overleaf.

On a wider scale the development site is located along the National Route 2 (N2) between the towns of Richards Bay/Empangeni located in the north and Durban/Umhlanga located in the south. The N2 is a Class 1 Principal Arterial road that has two lanes in each direction that are 3.7 metres in width and surfaced shoulders that are 2.5 metres in width.

The N2 runs in somewhat north-south directions in the direct vicinity of the development site. There is a posted 120 km/h speed limit in the direct vicinity of the development site. The site can be accessed from the N2 highway on Exit 315 on northbound and southbound of the N2. The N2 is located to the west of the development site.

On a local scale there is P535, located to the south of the development site. P535 which is a Class 3 Minor Arterial provincial road that has one lane in each direction in the direct vicinity of the development. P535 links the development site with areas such as Esikhawini located to the east of the development and KwaDlangezwa located to the west of the development site across the N2.

P535 intersects with N2 western and eastern terminals and forms a diamond interchange and in that way provides access from the north and south to the vicinity of the development site. Near the vicinity of the development site, P535, intersects with P106 and forms a three-legged intersection. P535 has dedicated turning lanes into P106.

There is also P106, a Class 4 Collector Road provincial road that has one lane in each direction. P106 is where direct access points will be located. P106 is an alternative route that provides access to and from Richards Bay/Empangeni apart from the N2 as it links up with R34 in the north. It also links up the areas such as Gobandlovu, Madlanghala, etc., with the development site.

Within the built up areas of Gobandlovu, etc., there is a 60 km/h posted speed limit along the route and traffic calming measures such as speed humps are located along the route and that ensures that speeds within these areas are as low as possible.

Figure 2: Location of the Development Site along the N2, P535 and P106.

2.2 Existing traffic operations

In order to determine the likely traffic impact that the proposed development would have on the surrounding road network, it was necessary to ascertain the current traffic performance of the traffic system within the vicinity of the development site.

Manual traffic counts were undertaken on Friday and Saturday, 14 and 15 April 2023, respectively.

These traffic counts were undertaken at the three intersections that would be directly affected by the proposed development and considering the trips to be generated by the proposed development.

The three intersections to be directly affected are:

- National Route 2 / P535 (Western Terminal);
- National Route 2 / P535 (Eastern Terminal); and
- P535 / P106.

From these traffic counts, the Friday PM and Saturday AM peak hours were determined to be:

- Friday PM Peak Hour - 16h30 to 17h30
- Saturday AM Peak hour – 10h30 to 11h30

The traffic counts were used to determine the current level of traffic in the direct vicinity of the development site.

The 2023 Friday PM and Saturday AM peak hour background traffic volumes are shown in **Figures 3** and **4**, respectively, overleaf.

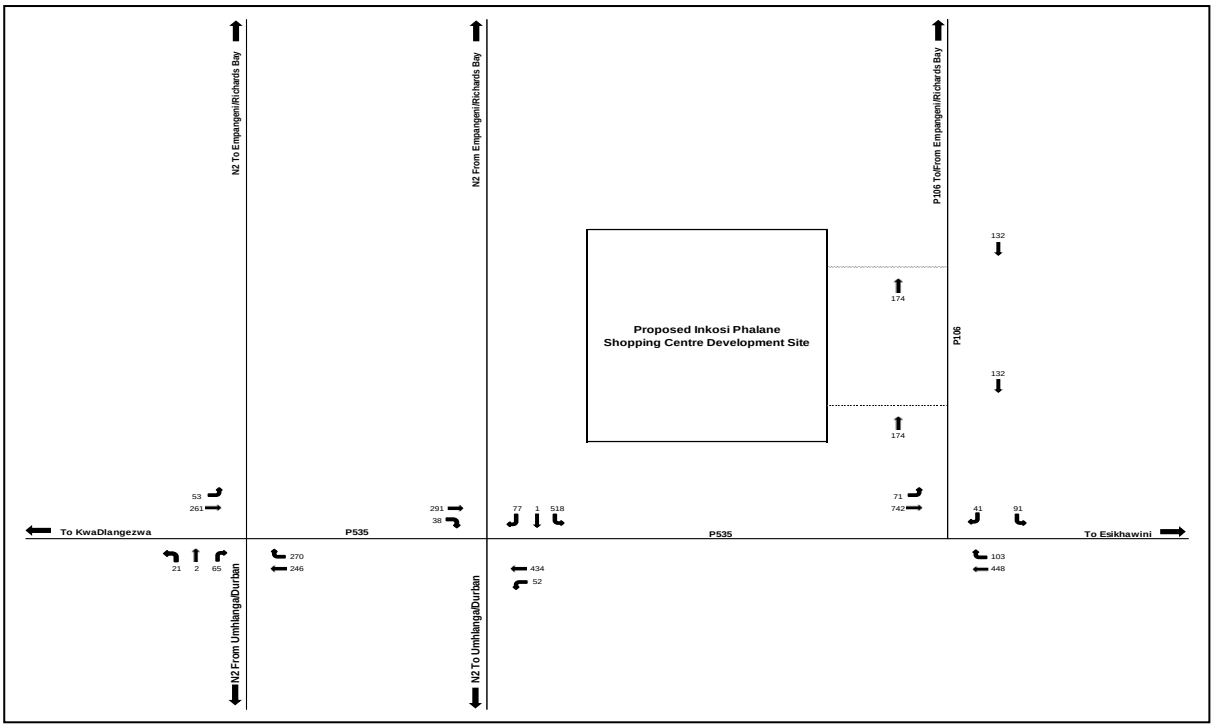

Figure 3: 2023 Friday PM Peak Hour Background Traffic Volumes.

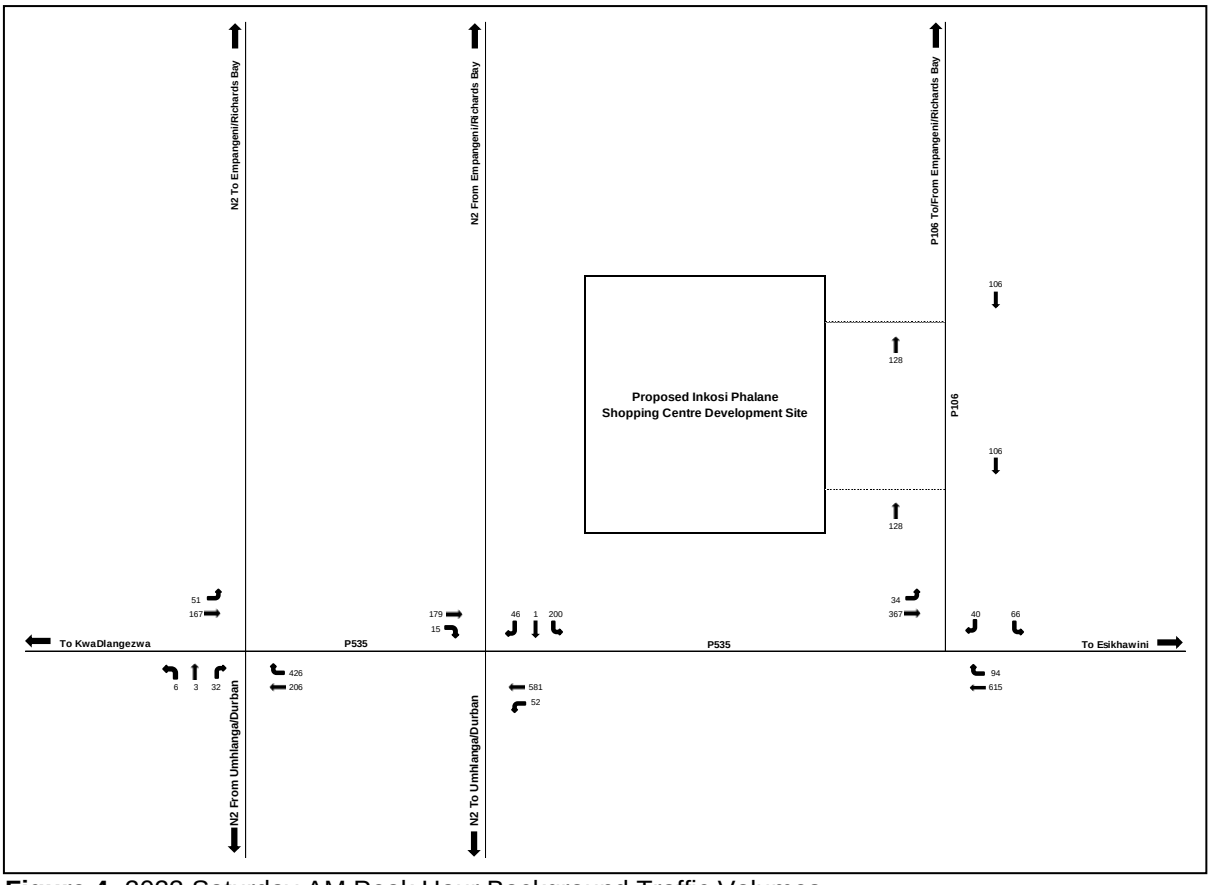

Figure 4: 2023 Saturday AM Peak Hour Background Traffic Volumes.

2.3 Future traffic volumes

It is assumed that the development will be completed within the next five years and therefore a 5-year horizon was used, i.e. 2028. The proposed development is situated in an area where there is low vehicle ownership. Accordingly, traffic volumes in this area are not expected to increase substantially over the next five years, therefore a growth rate of 3.0% per annum was assumed to be sufficient.

The 2023 background traffic volumes were escalated at this assumed rate to estimate background traffic in 2028. The estimated 2028 background traffic volumes for the Friday PM and Saturday AM peak hours are shown in **Figures 4** and **5**, below.

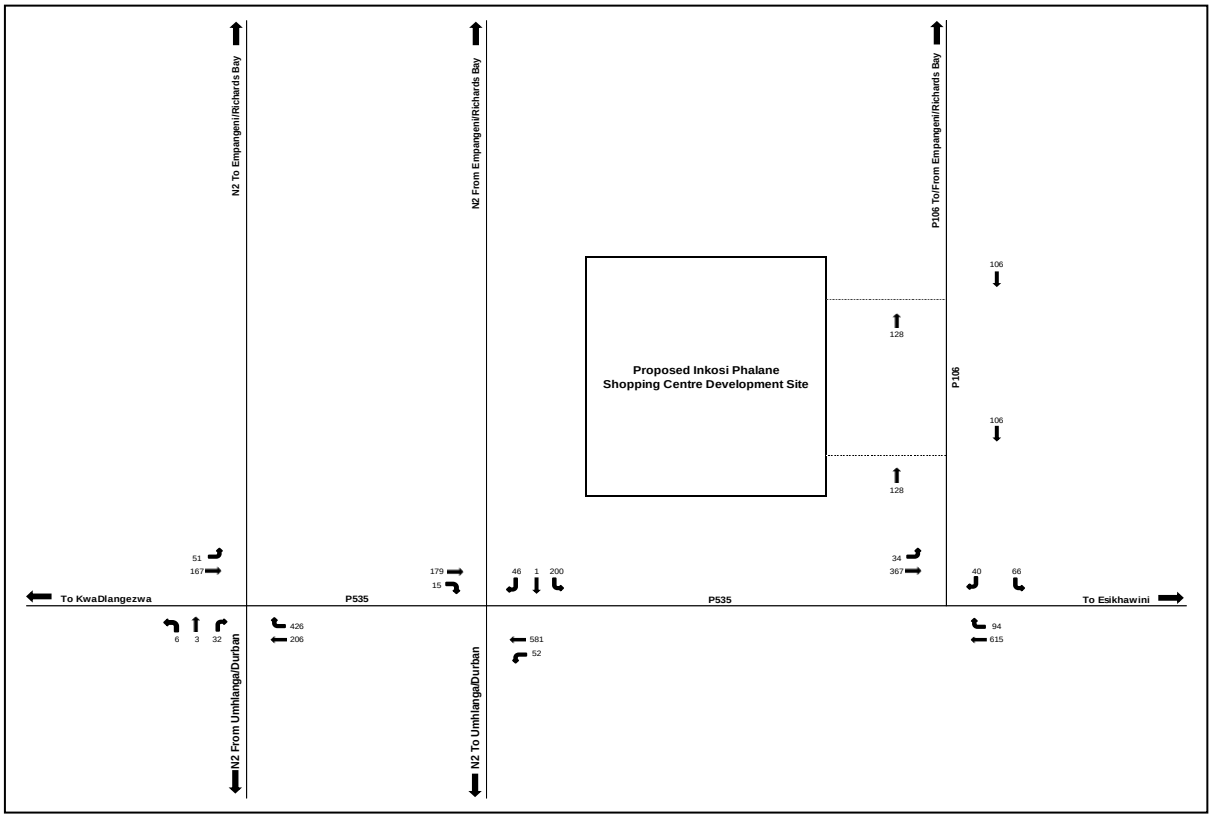

Figure 5: 2028 Friday PM Peak Hour Background Traffic Volumes.

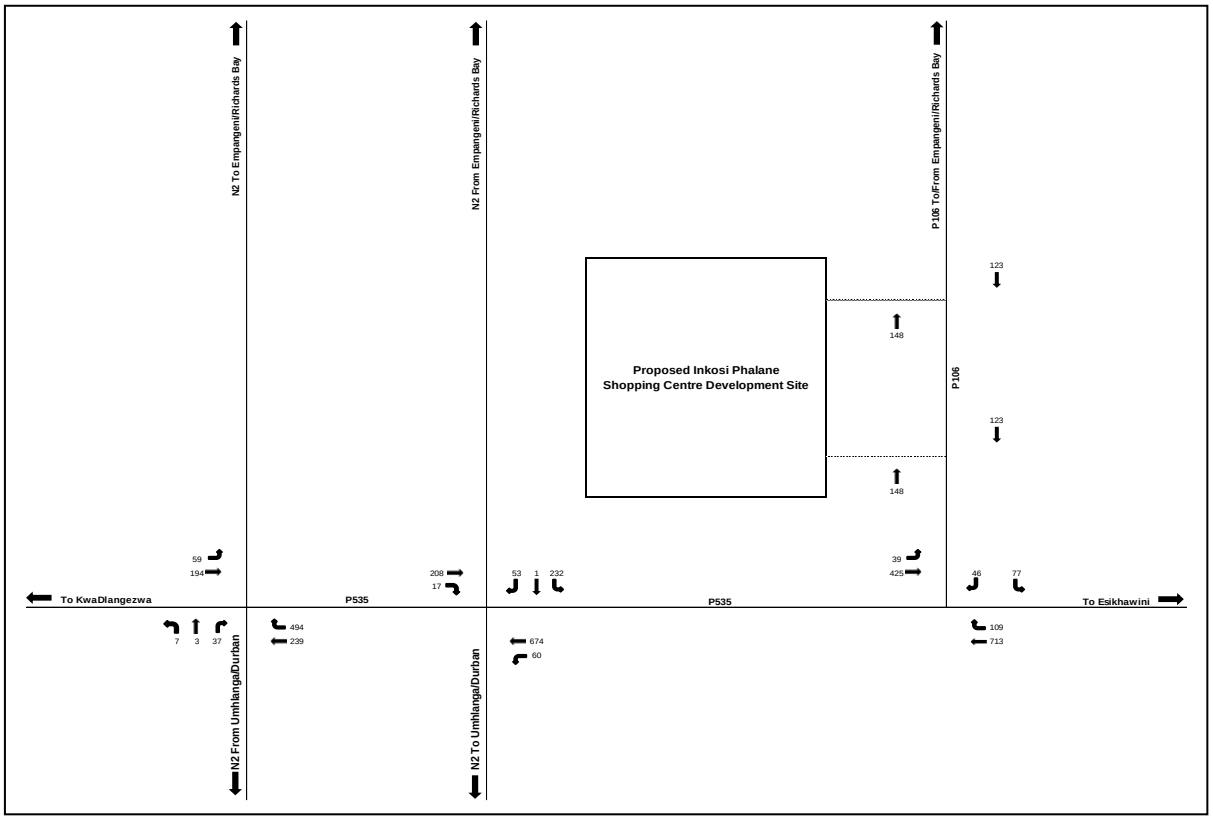

Figure 6: 2028 Saturday AM Peak Hour Background Traffic Volumes.

3. PROPOSED DEVELOPMENT

The proposed development comprises of a Shopping Centre of approximately 60 000 m^2 on a site that is 27 hectares in extent.

The development site is situated in the Esikhawini area, in the KwaZulu Natal province, as shown in **Figure 1**, below.

4. DEVELOPMENT TRAFFIC

4.1 Trip Generation

The document "South African Trip Data Manual, TMH 17, Volume 1, Version 1.0, September 2012" published by the Committee of Transport Officials (COTO) was used to estimate the number of trips that will be generated by the proposed development.

The Trip Generation Rate Manual suggests that a Shopping Centre development attracts primary trips (48%), passer-by trips (13%) and diverted trips (29%) during a Friday PM peak hour and attracts primary trips (40%), passer-by trips (12%) and diverted trips (38%) during a Saturday AM peak hour.

The primary trips are new trips to the development site area, however, the passer-by and diverted trips are existing vehicular road users who now decide to enter the development and are therefore not new trips to the area.

Table 1 below shows the anticipated trips that are to be generated by the proposed development.

Table 1: Trip Generation for the Proposed Inkosi Phalane Shopping Centre Development

Land Use Type	Size	Unit	Trip Gen Rate Friday PM	Trip Gen Rate Saturday Midday	Total Trips Generated					
					PM Peak			AM Peak		
					In	Out	Total	In	Out	Total
Shopping Centre	60000	100 m^2	4.52	6.65	1357	1357	2714	1996	1996	3992
TOTAL					**1357**	**1357**	**2714**	**1996**	**1996**	**3992**

The Friday PM and Saturday AM peak hour directional split for the Shopping Centre is 50:50 (50 entering the development and 50 leaving the development).

It is anticipated that the proposed development will generate a total of 2,714 trips during the Friday PM peak hour and 3,992 trips during the Saturday AM peak hour.

Even though that Trip Generation Rate manual suggests that Shopping Centres attract passer-by and diverted trips, as the worst case scenario all the trips were taken as primary trips and added and analysed accordingly.

Furthermore, the COTO South African Trip Data Manual of September 2012 suggests that in the areas where there is low vehicle ownership, majority of households do not own a vehicle and heavily relies on public transport and non-motorised transport for transportation as it is the case in the rural areas.

Moreover, there is a fully fledged public transport facility currently operating at Esikhawini in close proximity to the development site and also public transport facility is proposed within the development site.

The development site is surrounded by residential properties which makes non-motorised transport as one of the preferred mode of transport. This is prevalent in rural areas. It is suggested in the COTO Manual that a reduction of between 30% and 60% for a shopping centre may apply.

Based on the development site being accessible to the nearby public transport facility and being situated within walking distance from the Gobandlovu in the north and Esikhawini in the east which makes it within acceptable walking distance and having access to the public transport system in the area and to be more conservative, it was considered to reduce the Trip Generation Rates by 30% for the shopping centre.

Table 2 below shows the revised trips to be generated by the proposed development.

Table 2: Newly estimated trips to be generated by the Proposed Inkosi Phalane Shopping Centre Development

Land Use Type	Size	Unit	Trip Gen Rate Friday PM	Trip Gen Rate Saturday Midday	Total Trips Generated					
					PM Peak			AM Peak		
					In	Out	Total	In	Out	Total
Shopping Centre	60000	100 m^2	3.17	4.66	950	950	1900	1397	1397	2794
TOTAL					**950**	**950**	**1900**	**1397**	**1397**	**2794**

It is therefore anticipated that in total, the proposed development will generate a total of 1,900 trips during the Friday PM peak hour and 2,794 trips during the Saturday AM peak hour with in/out split as mentioned here above.

4.2 Trip Distribution

In order to determine the traffic impact of the proposed development on the surrounding road network, the attracted trips were distributed onto the existing road network.

As a result of the location of the proposed development on the road network, the traffic generated by the Proposed Inkosi Phalane Shopping Centre Development was distributed based on the distribution pattern as the 2023 background traffic flows. The detailed Friday PM and Saturday AM peak hour distribution percentages are shown in **Figures 7** and **8**, below and overleaf.

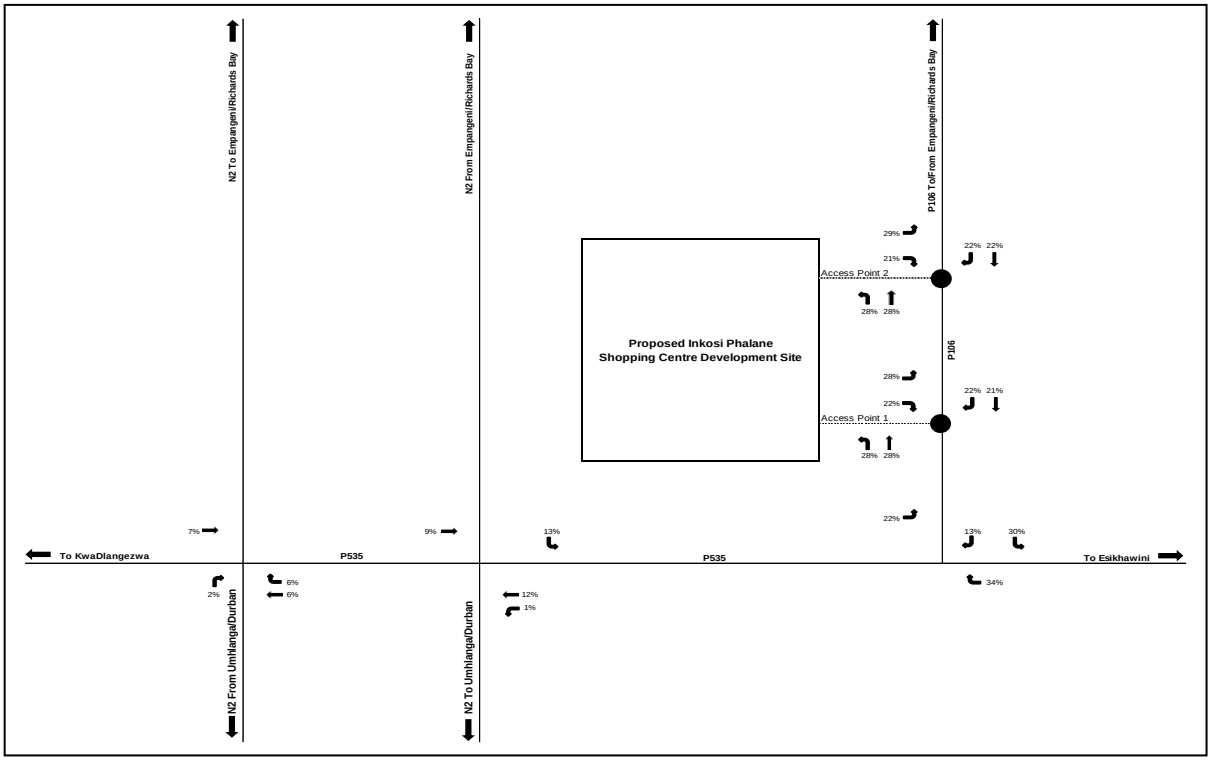

Figure 7: Friday PM Peak Hour Distribution.

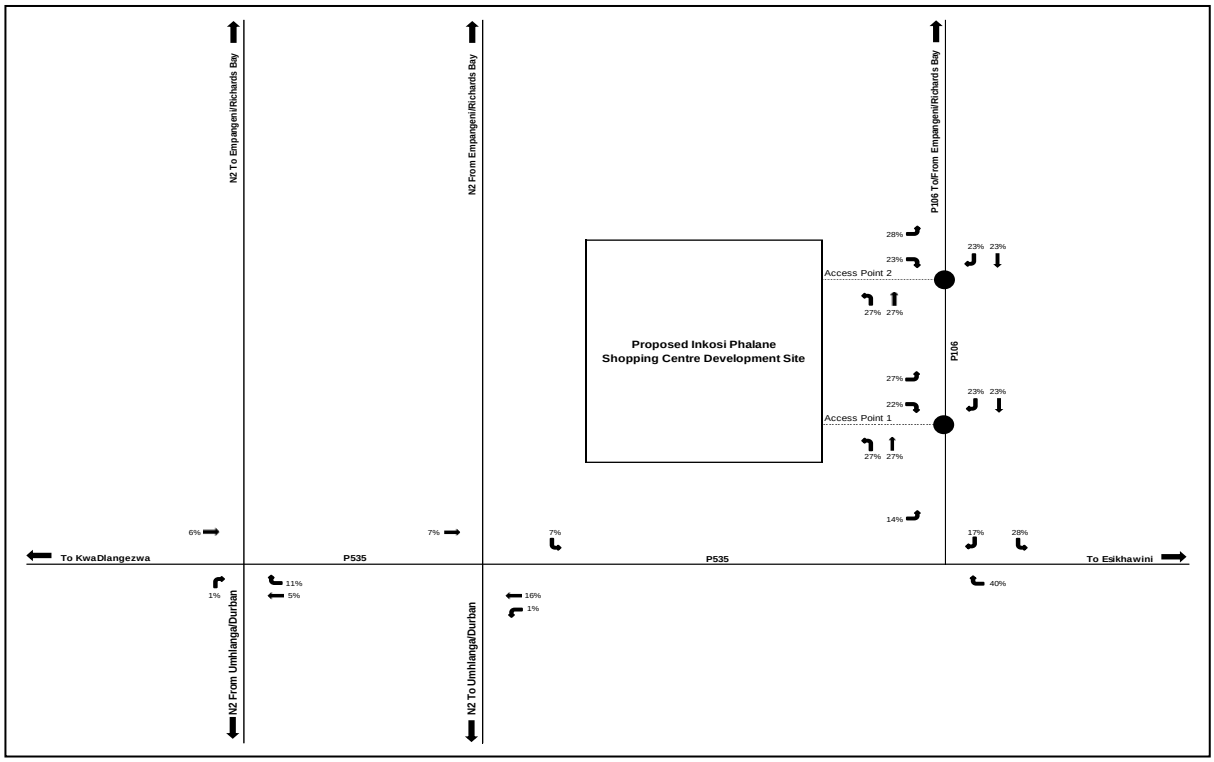

Figure 8: Saturday AM Peak Hour Distribution.

The anticipated traffic volumes to be generated by the proposed development for the Friday PM and Saturday AM peak hours were assigned according to the trip distribution percentages and are shown in **Figures 9** and **10**, below and overleaf.

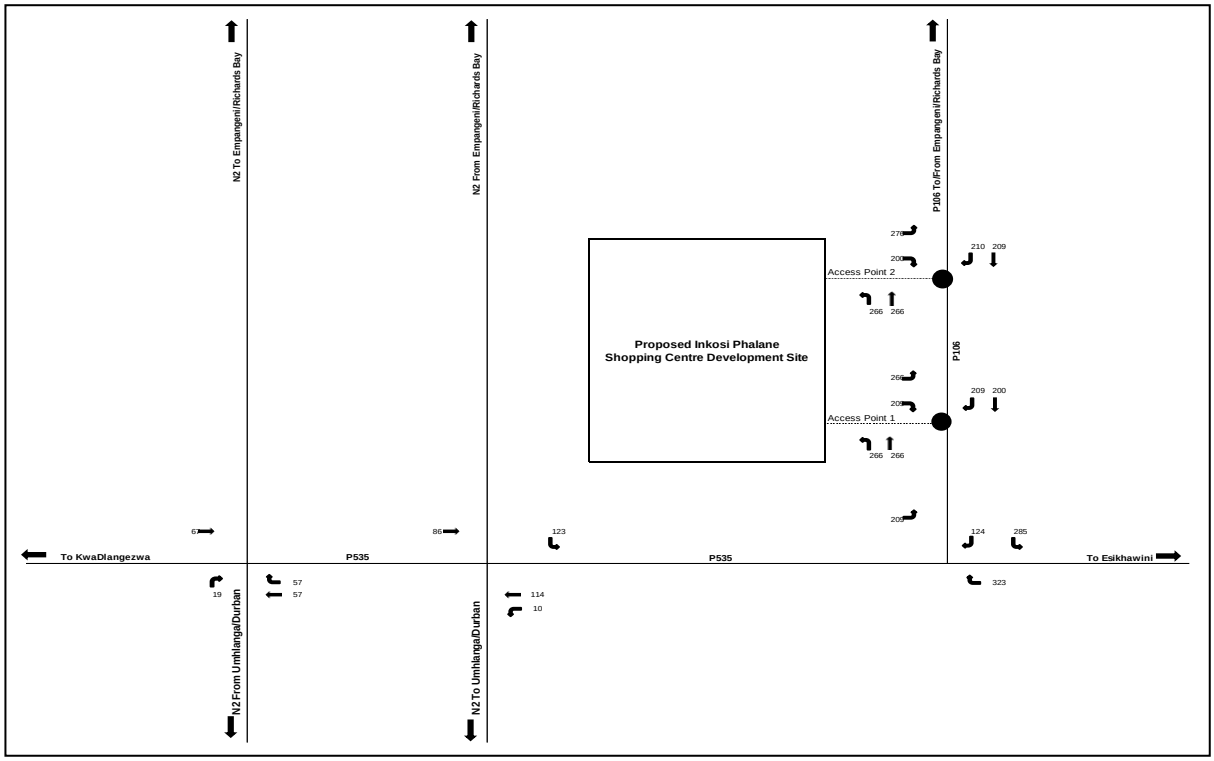

Figure 9: 2023 Friday PM Development Generated Traffic.

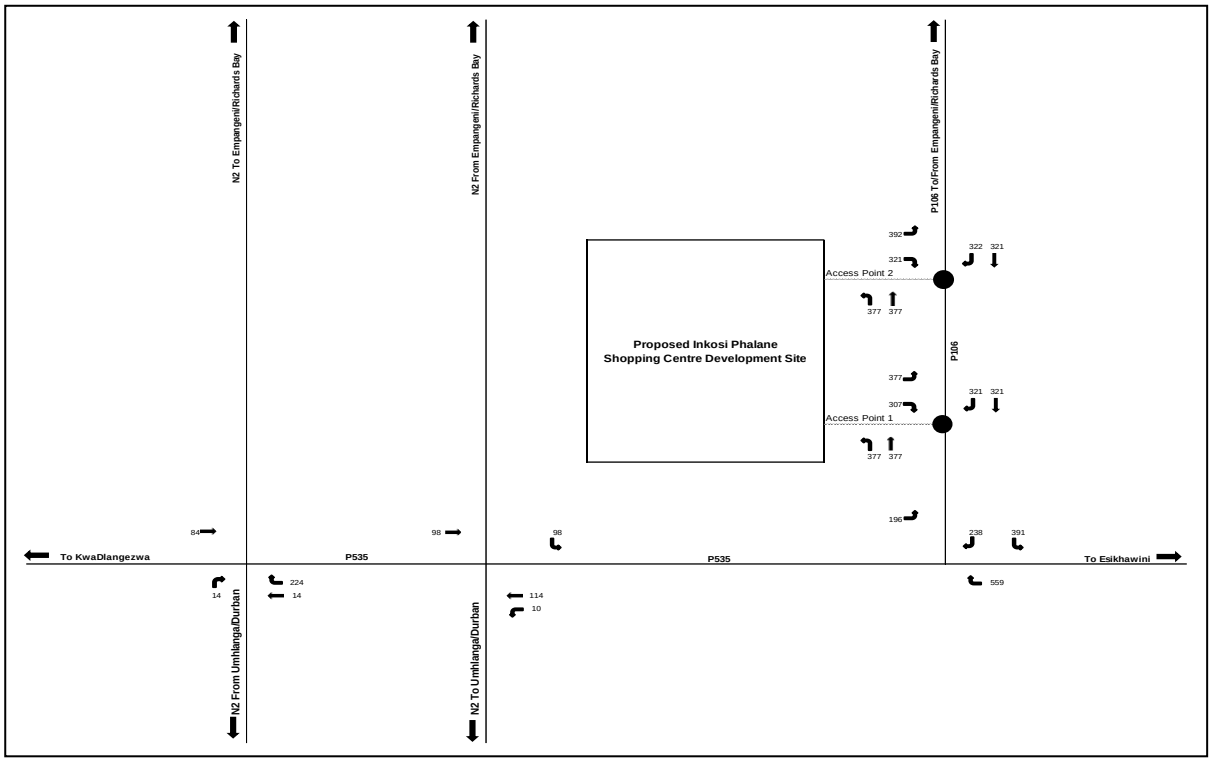

Figure 10: 2023 Saturday AM Development Generated Traffic.

The development-generated traffic was then combined with the 2023 and 2028 background traffic volumes for the Friday PM and Saturday AM peak hours. The results of the combined traffic volumes for 2023 are shown in **Figures 11** and **12**, below and overleaf.

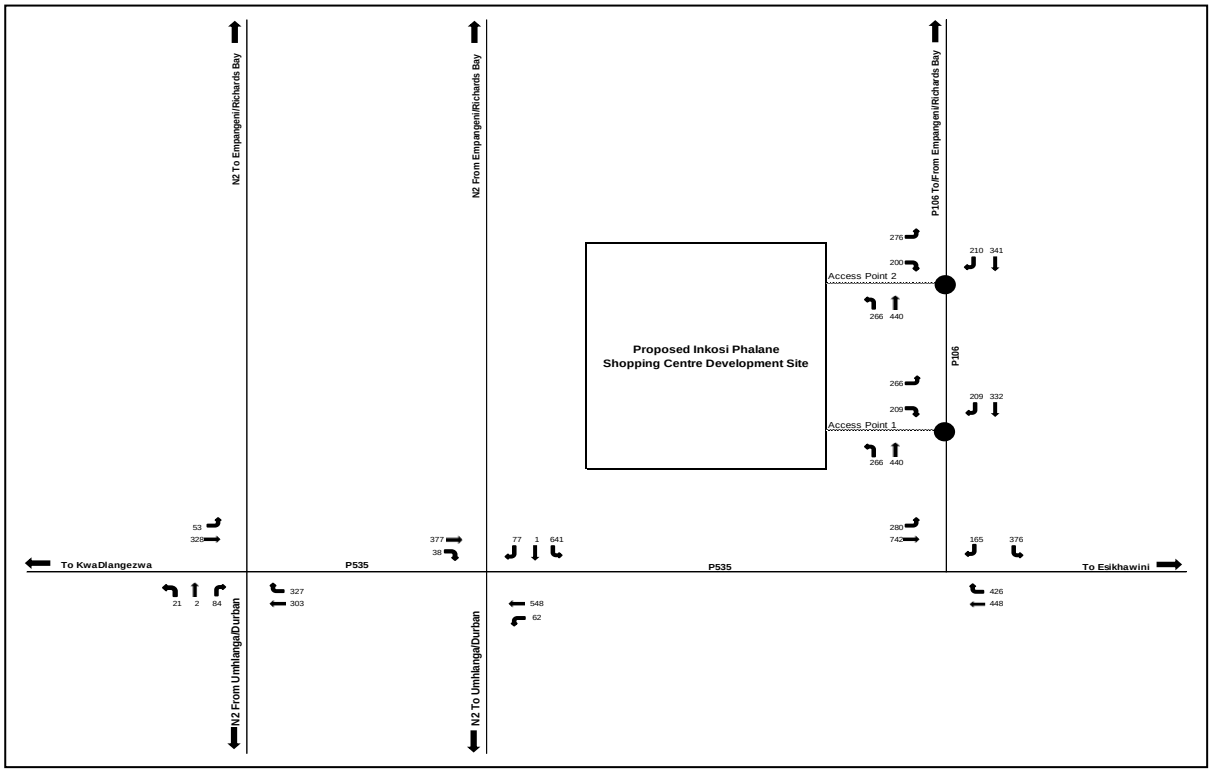

Figure 11: 2023 Friday PM Background Traffic Volumes plus Development Generated Traffic.

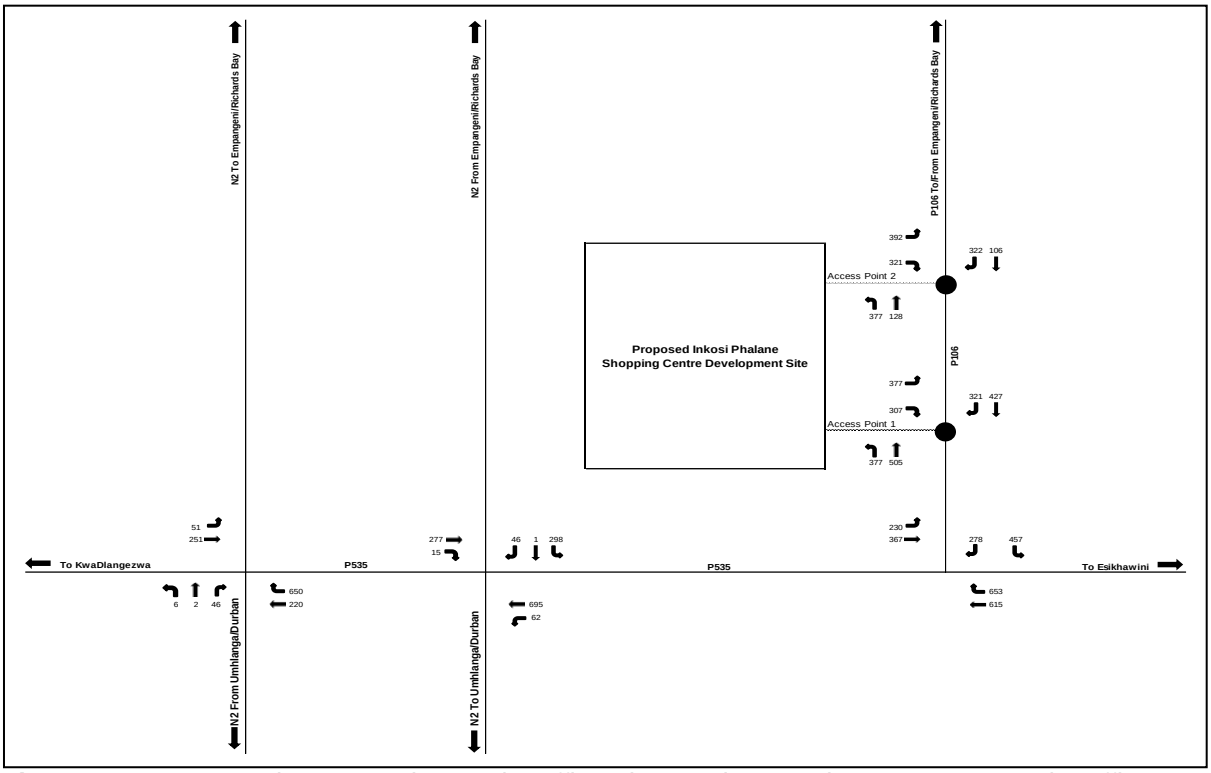

Figure 12: 2023 Saturday AM Background Traffic Volumes plus Development Generated Traffic.

The results of the combined traffic volumes for 2028 are shown in **Figures 13** and **14**, below and overleaf.

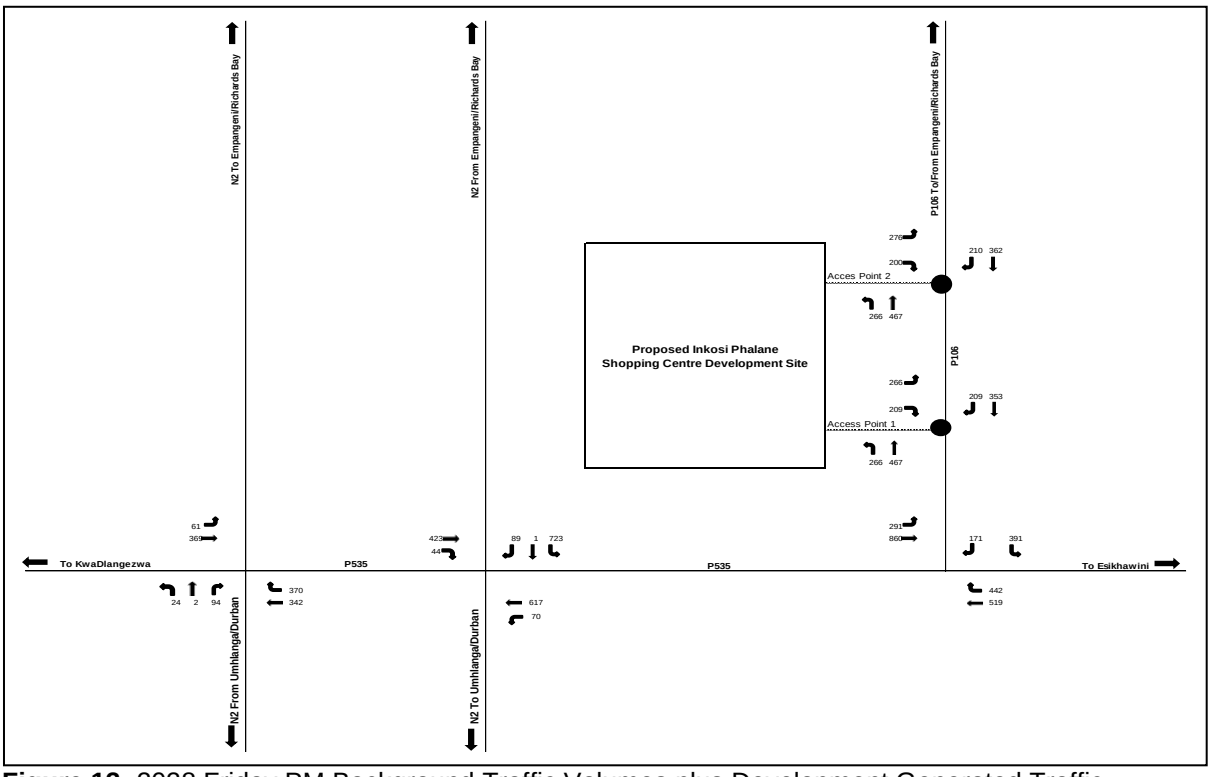

Figure 13: 2028 Friday PM Background Traffic Volumes plus Development Generated Traffic.

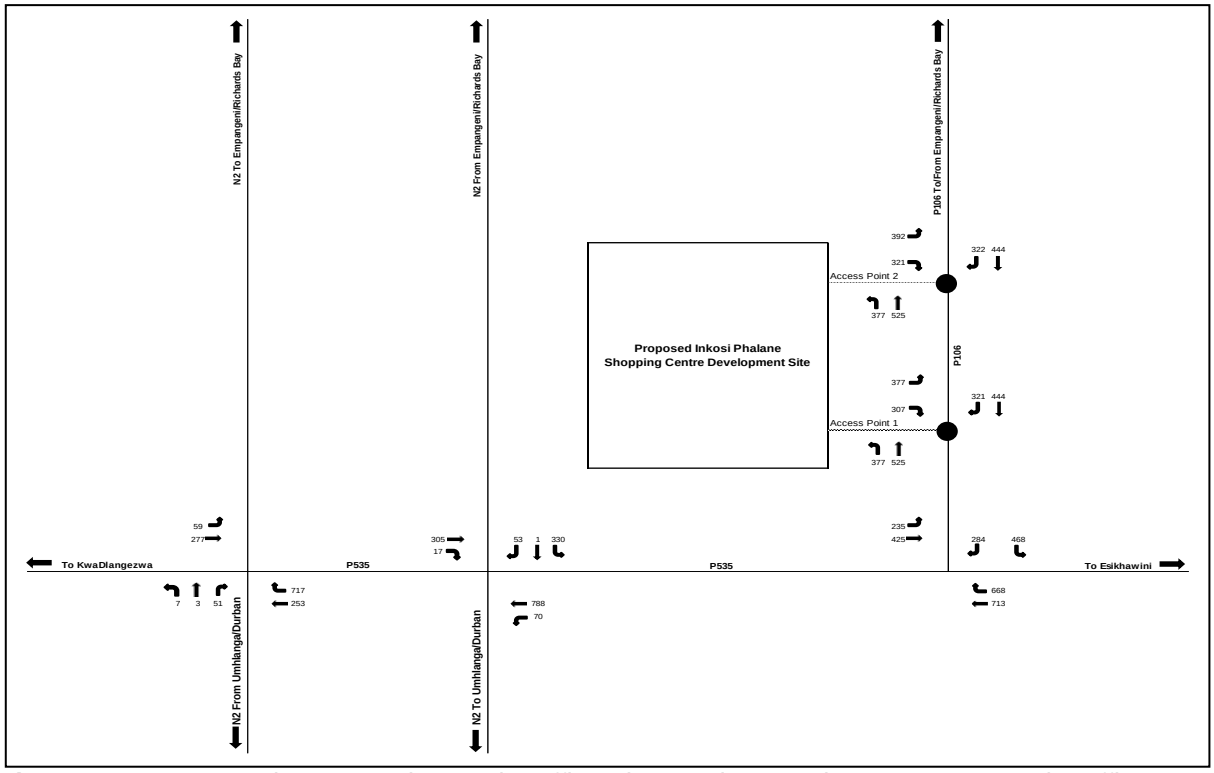

Figure 14: 2028 Saturday AM Background Traffic Volumes plus Development Generated Traffic.

4.3 Trip Assignment

The following scenarios were analysed:

- **Scenario 1:** Present traffic flows (2023) and (2028) without the development generated traffic.

The purpose of this scenario is to determine the existing operating capacity of the intersections.

Traffic volumes for both the Friday PM and Saturday AM peak hours are shown in **Figures 3** to **6**.

- **Scenario 2:** Present traffic flows (2023) and (2028) with the development generated traffic.

The purpose of this scenario is to determine the change in the existing operating capacity of the intersections with the traffic impact of the proposed development.

Traffic volumes for both the Friday PM and Saturday AM peak hours are shown in **Figures 11** to **14**.

5. INTERSECTION CAPACITY AND ANALYSIS

Intersection analysis was performed using aaSidra computer software in order to determine the Volume / Capacity (v/c), Delay in Seconds and Level of Service (LOS) at the affected intersections in the vicinity of the development site.

The summary of the capacity analysis results for both the 2023 and 2028 Friday PM and Saturday AM peak hours is shown in **Table 3**, overleaf.

5.1 Scenarios 1 and 2: 2023 and 2028 Background Traffic plus Development Generated Traffic Analysis Results

Table 3: 2023 and 2028 Background Traffic plus Development Generated Traffic Analysis Results

N2 / P535 (Western Terminal) Intersection												
	2023 Peak Hour Traffic Volumes						2023 Peak Hour Traffic Volumes plus Attracted Traffic					
	Friday PM Peak Hour			Saturday AM Peak Hour			Friday PM Peak Hour			Saturday AM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
South	0.107	11.5	B	0.056	12.0	B	0.168	13.4	B	0.125	16.5	C
East	0.175	3.5	A	0.249	4.3	A	0.229	3.7	A	0.417	5.2	A
West	0.142	1.1	A	0.107	2.1	A	0.177	1.0	A	0.158	2.2	A
Overall	0.175	3.4	A	0.249	4.1	A	0.229	3.7	A	0.417	4.9	A
	2028 Peak Hour Traffic Volumes						2028 Peak Hour Traffic Volumes plus Attracted Traffic					
	Friday PM Peak Hour			Saturday AM Peak Hour			Friday PM Peak Hour			Saturday AM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
South	0.143	12.6	B	0.077	13.3	B	0.222	14.9	B	0.174	19.1	C
East	0.213	3.6	A	0.298	4.4	A	0.273	3.8	A	0.474	5.6	A
West	0.166	1.2	A	0.129	2.4	A	0.020	1.0	A	0.186	2.9	A
Overall	0.213	3.6	A	0.298	4.3	A	0.273	3.9	A	0.474	5.5	A
N2 / P535 (Eastern Terminal) Intersection												
	2023 Peak Hour Traffic Volumes						2023 Peak Hour Traffic Volumes plus Attracted Traffic					
	Friday PM Peak Hour			Saturday AM Peak Hour			Friday PM Peak Hour			Saturday AM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
East	0.132	0.6	A	0.172	0.5	A	0.165	0.6	A	0.205	0.5	A
North	0.283	6.7	A	0.109	7.1	A	0.351	6.9	A	0.163	7.2	A
West	0.158	0.9	A	0.097	0.7	A	0.205	0.8	A	0.151	0.5	A
Overall	0.283	3.2	A	0.172	2.0	A	0.351	3.2	A	0.205	2.1	A
	2028 Peak Hour Traffic Volumes						2028 Peak Hour Traffic Volumes plus Attracted Traffic					
	Friday PM Peak Hour			Saturday AM Peak Hour			Friday PM Peak Hour			Saturday AM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
East	0.153	0.6	A	0.199	0.5	A	0.186	0.6	A	0.233	0.5	A
North	0.329	6.9	A	0.127	7.5	A	0.395	7.3	A	0.180	7.6	A
West	0.183	1.0	A	0.113	0.7	A	0.230	0.9	A	0.166	0.6	A
Overall	0.329	4.3	A	0.199	2.1	A	0.395	3.4	A	0.233	2.2	A
P535 / P106 Intersection												
	2023 Peak Hour Traffic Volumes						2023 Peak Hour Traffic Volumes plus Attracted Traffic					
	Friday PM Peak Hour			Saturday AM Peak Hour			Friday PM Peak Hour			Saturday AM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
East	0.244	1.8	A	0.335	0.9	A	0.548	6.5	A	0.480	4.3	A
North	0.364	24.1	C	0.181	15.1	C	2.684	792.4	F	3.656	1229.3	F
West	0.401	0.6	A	0.198	0.5	A	0.401	2.1	A	0.216	3.5	A
Overall	0.401	3.1	A	0.335	2.0	A	2.684	179.1	F	3.656	350.4	F
	2028 Peak Hour Traffic Volumes						2028 Peak Hour Traffic Volumes plus Attracted Traffic					
	Friday PM Peak Hour			Saturday AM Peak Hour			Friday PM Peak Hour			Saturday AM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
East	0.283	2.2	A	0.387	1.0	A	0.716	8.8	A	0.529	4.5	A
North	0.663	49.3	E	0.284	19.4	C	4.820	1754.6	F	5.544	2080.5	F
West	0.464	0.6	A	0.229	0.5	A	0.464	2.0	A	0.229	3.3	A
Overall	0.663	5.5	A	0.387	2.4	A	4.820	372.8	F	5.544	563.2	F
P106 / Development Access Point 1 Intersection												
	2023 Peak Hour Traffic Volumes plus Attracted Traffic						2028 Peak Hour Traffic Volumes plus Attracted Traffic					
	Friday PM Peak Hour			Saturday AM Peak Hour			Friday PM Peak Hour			Saturday AM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
South	0.361	5.3	A	0.476	5.7	A	0.384	5.3	A	0.495	5.7	A
North	0.516	7.7	A	0.796	13.5	B	0.537	7.7	A	0.814	14.1	B
West	0.267	8.4	A	0.415	9.1	A	0.275	8.5	A	0.424	9.3	A
Overall	0.516	6.9	A	0.796	9.2	A	0.537	6.9	A	0.814	9.5	A
P106 / Development Access Point 2 Intersection												
	2023 Peak Hour Traffic Volumes plus Attracted Traffic						2028 Peak Hour Traffic Volumes plus Attracted Traffic					
	Friday PM Peak Hour			Saturday AM Peak Hour			Friday PM Peak Hour			Saturday AM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
South	0.361	5.3	A	0.206	4.7	A	0.384	5.3	A	0.496	5.7	A
North	0.519	7.6	A	0.464	9.7	A	0.539	7.6	A	0.829	15.0	B
West	0.277	8.3	A	0.295	6.7	A	0.285	8.5	A	0.441	9.3	A
Overall	0.519	6.9	A	0.464	6.9	A	0.539	6.9	A	0.829	9.8	A

5.1.1 National Route 2 / P535 (Western Terminal) Intersection

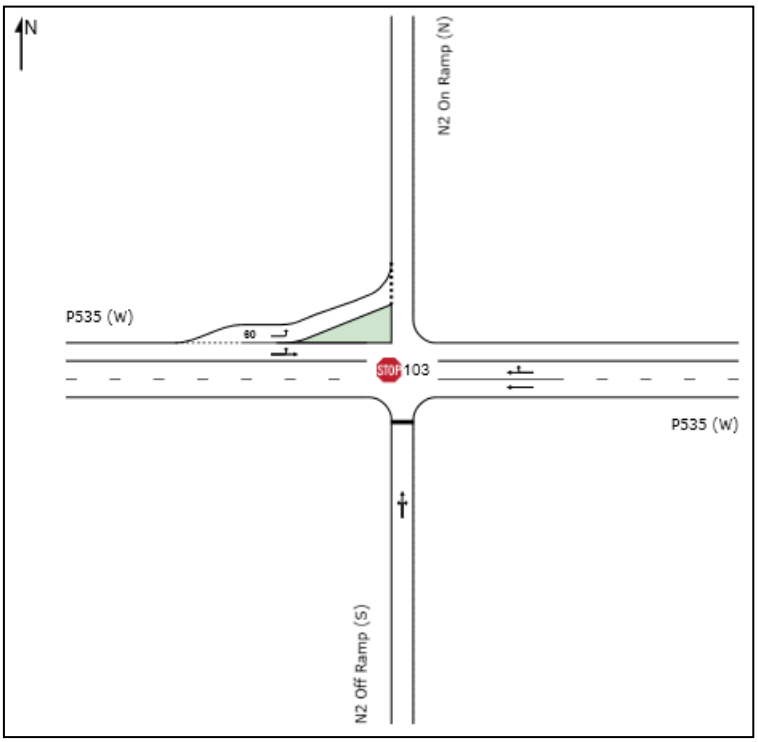

Figure 15: National Route 2 / P535 (Western Terminal) Intersection Existing Geometry.

The site observations as well as the analysis results as shown in **Table 3** above show that this intersection is currently operating satisfactorily with no approach worse than LOS B during both the 2023 and 2028 Friday PM and Saturday AM peak hours. There are acceptable delays and plenty of spare road capacity available.

5.1.2 National Route 2 / P535 (Eastern Terminal) Intersection

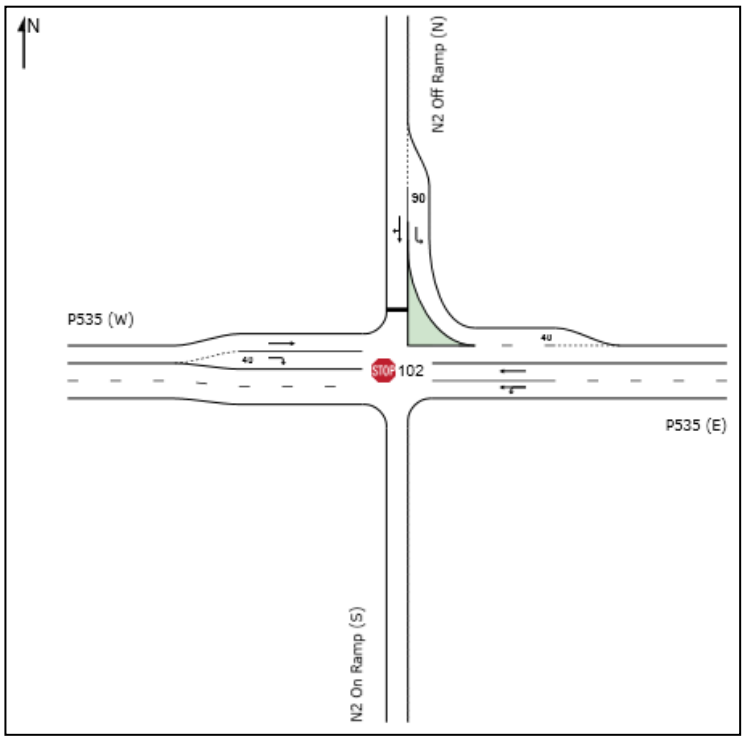

Figure 16: National Route 2 / P535 (Eastern Terminal) Intersection Existing Geometry.

The site observations as well as the analysis results as shown in **Table 3** above show that this intersection is currently operating satisfactorily with no approach worse than LOS A during both the 2023 and 2028 Friday PM and Saturday AM peak hours.

There are acceptable delays and plenty of spare road capacity available.

5.1.3 P535 / P106 Intersection

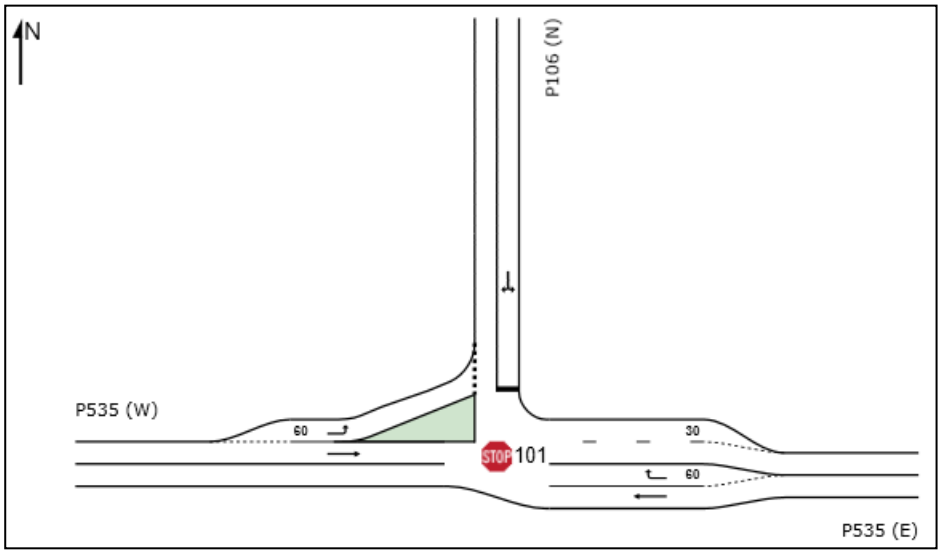

Figure 17: P535 / P106 Intersection Existing Geometry.

The site observations as well as the analysis results as shown in **Table 3** above show that this intersection is currently operating satisfactorily with no approach worse than LOS C during both the 2023 and 2028 Friday PM and Saturday AM peak hours. There are acceptable delays and plenty of spare road capacity available.

Nonetheless, during the 2028 Friday PM peak hour, the north approach will operate at an unacceptable LOS E with significant delays.

5.2 Proposed Road Upgrades

5.2.1 National Route 2 / P535 (Western Terminal) Intersection

The analysis results in **Table 3** above show that after the development generated traffic has been added to the 2023 and 2028 background traffic, the intersection of National Route 2 with P535 (Western Terminal) will continue to operate satisfactory with no approach worse than LOS B and C, respectively, during both the Friday PM and Saturday AM peak hours, with minor increase in delays and still plenty of spare road capacity available.

This intersection will operate this way up to 2028 and beyond.

Therefore, there are no capacity road upgrades required as a result of the proposed development.

5.2.2 National Route 2 / P535 (Eastern Terminal) Intersection

The analysis results in **Table 3** above show that after the development generated traffic has been added to the 2023 and 2028 background traffic, the intersection of National Route 2 with P535 (Eastern Terminal) will continue to operate satisfactory with still no approach worse than LOS A during both the Friday PM and Saturday AM peak hours, with negligible increase in delays and still plenty of spare road capacity available.

This intersection will operate this way up to 2028 and beyond. Therefore, there are no capacity road upgrades required as a result of the proposed development.

5.2.3 P535 / P106 Intersection

The analysis results in **Table 3** above show that after the development generated traffic has been added to the 2023 and 2028 background traffic, the intersection of P535 with P106 will continue to operate satisfactory with still no approach worse than LOS A during both the Friday PM and Saturday AM peak hours, with negligible increase in delays and still plenty of spare road capacity available.

However, the north approach, which is P106 will operate at an unacceptable LOS F with significant delays and overcapacity. This will nonetheless affect the entire intersection functionality where it will operate at a poor LOS F.

Furthermore, in order to improve the functionality of the approach that will operate at a poor LOS F with significant delays and overcapacity, there are adjustments that need to be undertaken in order to facilitate the accessibility of the development site by the development generated traffic as well as facilitate traffic circulation and movement in the area. **Figure 17** shows the existing intersection geometry and **Figure 18** shows the proposed intersection geometry.

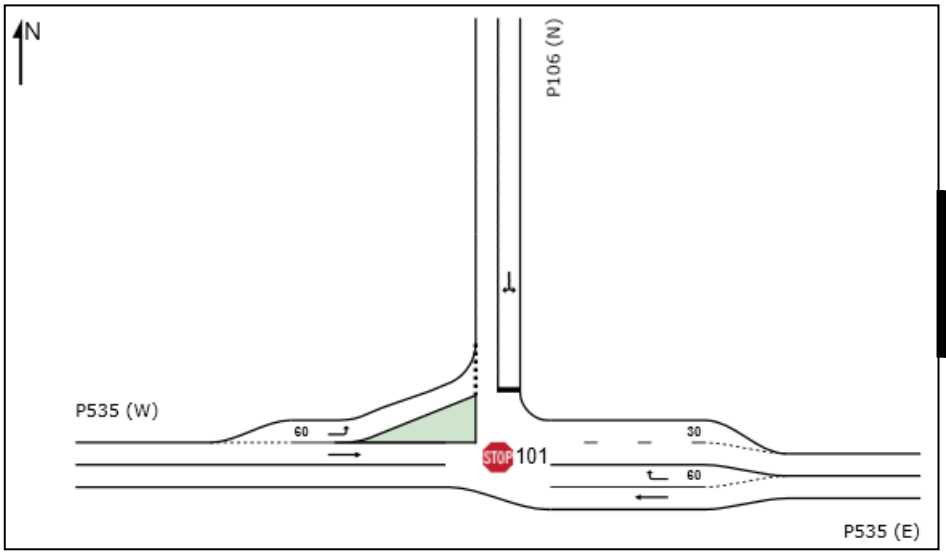

Figure 17: P535 / P106 Intersection Existing Geometry.

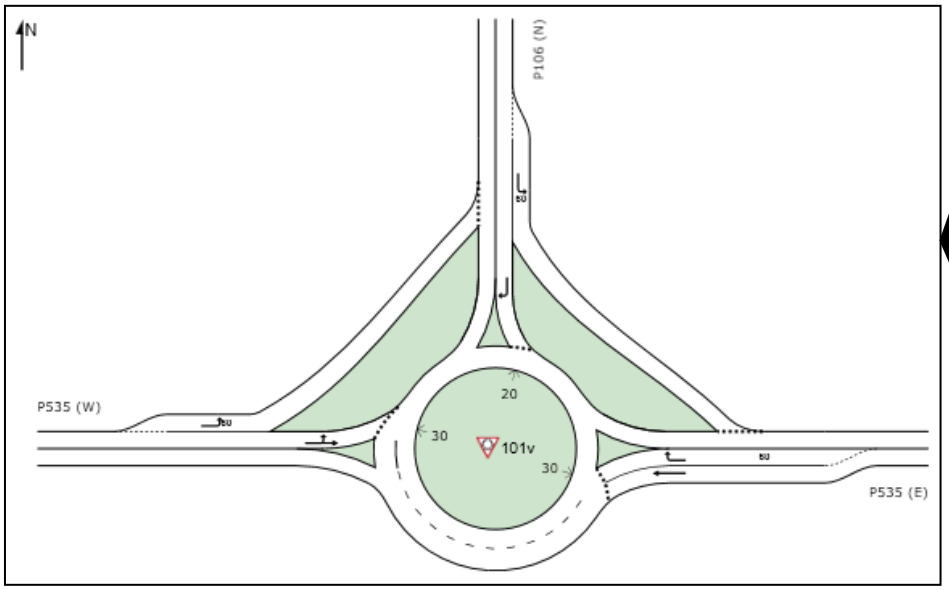

Figure 18: P535 / P106 Intersection Proposed Geometry.

Table 4 overleaf indicate the analysis results after this intersection has been converted into a roundabout intersection.

Table 4: 2023 and 2028 Background Traffic Volumes plus Development Generated Traffic Analysis Results of the Roundabout - P535 / P106 Intersection

P535 / P106 Intersection												
	2023 Peak Hour Traffic Volumes						2023 Peak Hour Traffic Volumes plus Attracted Traffic					
	Friday PM Peak Hour			Saturday AM Peak Hour			Friday PM Peak Hour			Saturday AM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
East							0.374	7.2	A	0.570	8.5	A
North							0.567	12.6	B	0.428	7.9	A
West							0.841	12.3	B	0.637	10.9	B
Overall							0.841	10.6	B	0.637	8.9	A
	2028 Peak Hour Traffic Volumes						2028 Peak Hour Traffic Volumes plus Attracted Traffic					
	Friday PM Peak Hour			Saturday AM Peak Hour			Friday PM Peak Hour			Saturday AM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
East	0.311	4.8	A	0.421	4.5	A	0.374	7.2	A	0.626	8.7	A
North	0.152	11.2	B	0.070	7.7	A	0.715	19.8	B	0.468	8.4	A
West	0.611	4.6	A	0.306	4.3	A	0.960	22.1	C	0.742	13.8	B
Overall	0.611	5.3	A	0.421	4.7	A	0.960	16.3	B	0.742	9.8	A

Table 4 shows that should the intersection of P535 and P106 be converted from a two-way stop controlled intersection, as shown in **Figure 17** into a roundabout intersection, as shown **Figure 18**, this intersection will function satisfactorily with no approach worse than LOS B during both the 2023 and 2028 Friday PM and Saturday AM peak hours with acceptable delays. There will be plenty of spare road capacity available.

This intersection will operate this way up to 2028 and beyond.

5.2.4 P106 / Development Access Point 1 Intersection

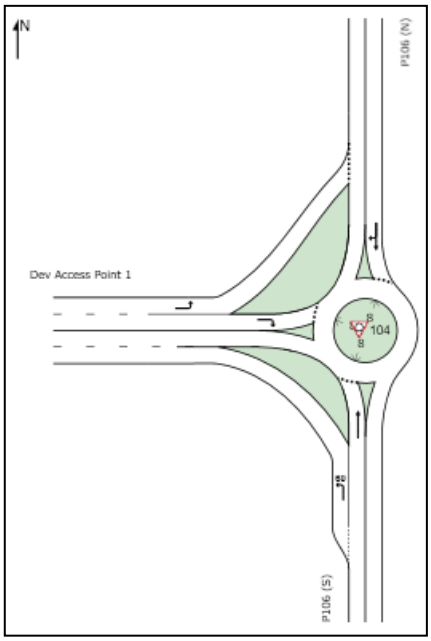

Figure 19: P106 / Development Access Point 1 Intersection Proposed Geometry.

Figure 19 shows the proposed Development Access Point 1 intersection configuration that is intended to serve the development site.

The analysis results in **Table 3** show that after the development generated traffic has been added to the 2023 and 2028 background traffic, the intersection of P106 with Development Access Point 1 will operate satisfactorily with no approach worse than LOS A and B during both the Friday PM and Saturday AM peak hours, respectively, with negligible delays and some spare road capacity available.

This intersection will operate this way up to 2028 and beyond.

5.2.5 P106 / Development Access Point 2 Intersection

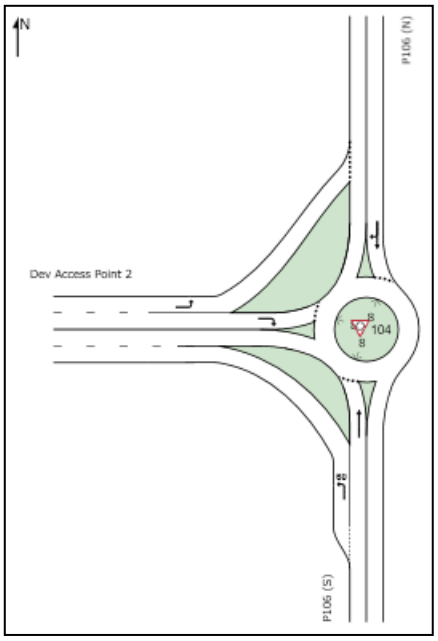

Figure 20: P106 / Development Access Point 2 Intersection Proposed Geometry.

Figure 20 shows the proposed Development Access Point 2 intersection configuration that is also intended to serve the development site.

The analysis results in **Table 3** show that after the development generated traffic has been added to the 2023 and 2028 background traffic, the intersection of P106 with Development Access Point 2 will operate satisfactorily with no approach worse than LOS A during both the 2023 Friday PM and Saturday AM peak hours, with negligible delays and plenty of spare road capacity available.

However, during 2028 this intersection will operate satisfactorily with no approach worse than LOS A and B during both the Friday PM and Saturday AM peak hours, with minor delays and some spare road capacity available.

This intersection will operate this way up to 2028 and beyond.

There are no further capacity road or external intersection upgrades required as a result of the proposed development, other than the P535 and P106 and the proposed development access points, as discussed here above.

6. SITE ACCESS

6.1 Site Access Requirements

The proposed development will be served by two ingress/egress points as discussed below. Access to the development site will not be taken off the National Route 2 or P535.

- Instead one access point (Development Access Point 1) will be taken off the P106. This access point will be at a distance of not less than 150 metres from the centre of P535 with P106, or as agreed with the responsible roads' authority.

- Another access point (Development Access Point 2) will be taken off the P106. This access point will be at a distance of not less than 150 metres from the centre of P106 with Development Access Point 1, or as agreed with the responsible roads' authority.

The location of the proposed development access point will have no significant negative impact on the functionality of the traffic operating along the P106.

All road improvements, accesses and exits are to be designed and dimensioned according to the responsible road authority's standards and requirements.

The access to the development site should be designed to allow for easy movement of heavy vehicles, emergency and service vehicles.

7. INTERSECTION SIGHT DISTANCE

7.1 Intersection Sight Distance Requirements

Shoulder Sight Distances for Yield Condition are determined in terms of the "TRH 17, 1988, Geometric Design of Rural Roads" document. According to this document, it is the sight distance required by drivers entering the intersection from a yield controlled point to enable them to establish that it is safe to do so and then to carry out the manoeuvres necessary either to join or to cross the opposing traffic stream in a safe manner.

The posted speed limit along the P106 is 60 km/h and there are traffic calming measures such as speed humps located along it. For road safety reasons it is anticipated that this speed limit will continue to operate in the direct vicinity of the development site as well.

The recommended shoulder sight distance for a yield condition for a 60 km/h speed limit is approximately 122 metres.

For the Development Access Point 1 measurements on-site indicate that the available shoulder sight distance in the southern direction towards P106 is approximately 330 metres which is well in excess of the recommended 122 metres sight distance.

However, in the northern direction towards Gobandlovu the available sight distance is in excess of 160 metres which is more than the recommended sight distance.

The available sight distances to the south and north of the proposed Development Access Point 1 are shown in **Figure 21** and **Figure 22**, below.

Figure 21: View to the right (south towards P106) from the Development Access Point 1.

Figure 22: View to the left (north towards Development Access Point 2) from the Development Access Point 1.

For the Development Access Point 2 measurements on-site indicate that the available shoulder sight distance in the southern direction towards Development Access Point 1 is in excess of 160 metres which is well in excess of the recommended 122 metres sight distance.

Furthermore, in the northern direction towards Gobandlovu the available sight distance is also in excess of 160 metres which is more than the recommended sight distance.

The available sight distances to the east and west of the proposed main development site access point are shown in **Figures 23** and **Figure 24**, below.

Figure 23: View to the right (south towards Development Access Point 1) from the Development Access Point 2.

Figure 24: View to the left (north towards Gobandlovu) from the Development Access Point 2.

8. PARKING

8.1 Parking Requirements

The document "uMhlathuze Land Use Scheme Regulations – Land Use Scheme Regulations – 25 September 2019" was used to determine the number of parking bays required to meet the parking demand that will be generated by the Proposed Inkosi Phalane Shopping Centre Development.

The Parking Standards suggest that the parking rate that is applicable is: 4 parking bays/100 m^2 for the entire Shopping Centre.

However, the development site is situated in an area where there is low vehicle ownership and where many people rely on public transport, non-motorised transport, etc. Furthermore, there is a proposed public transport facility within the development site that will accommodate 57 minibus taxis.

Additionally, there is a fully fledged public transport facility located Esikhawini at a radius of approximately 1.50 kilometres to the east of the development site. This facility will play a very critical role in ensuring that those who do not have direct access to a private vehicle can also easily access the proposed development site.

It was therefore assumed that an applicable rate of 2.0 parking bays/100 m^2 for the entire Shopping Centre be applied in this scenario.

Applying the assumed rates, it is therefore required that in total a minimum of 1,200 parking bays be provided on site to meet the parking demand as a result of the proposed development.

These parking bays will have to be provided along with all the required infrastructure to facilitate the accessibility of the establishment by the disabled persons as well.

9. PUBLIC TRANSPORT AND PEDESTRIANS

9.1 Rail

There is no commuter train service in the area and therefore rail does not seem to be the used mode of public transport in the vicinity of the development site.

9.2 Bus and Taxi

The development site is not an end destination on the public transport network but rather a stop on the existing N2, P535 and P106 routes.

There are no formal public transport lay-bys provided in the direct vicinity of the development site.

The traffic counts and site observations revealed that both buses and minibus taxis were operating within the development site. However, during the on-site information gathering both buses and minibus taxis were observed travelling along both the P535 and P106 past the development site in both directions. Furthermore, minibus taxis were also observed travelling along both the P535 and P106 looking for passengers. However, no minibus taxis were observed picking up or dropping off passengers in the direct vicinity of the development site.

There is an existing fully fledged public transport facility in the Esikhawini that will also play a role in bringing public transport passenger to the development site.

There is a reasonable number of people expected to visit the development site using public transport such as taxis. Therefore, in anticipation of the new public transport users that will be yielded by the proposed development, it is recommended that public transport facility that will accommodate about 56 minibus taxis be provided on site to meet the public transport demand. This facility will comprise of 44 parking bays and 12 loading bays. This public transport facility will ensure that the proposed development will be accessible to all people including those who do not have access to a private vehicle.

In addition, public transport lay-bys are recommended to be provided downstream of the intersection of P106 with Development Access Point 1 and Development Access Point 2 intersections downstream of the intersection on both sides of the road.

The number of additional transport users is not expected to result in an increase in the number of buses and minibus taxis operating along the P535 and P106. These new public transport users can be accommodated in the existing service.

9.3 Pedestrians

A reasonable number of pedestrians, from the immediate community, is expected to walk to this development. During on-site information gathering a few pedestrians were observed walking along P106 in the direction of Gobandlovu. Gobandlovu is situated to the north of the development site at a distance of approximately 1.30 kilometres which is considered an acceptable walking distance. Furthermore, Esikhawini is at a distance of approximately 1.20 kilometres which is also considered an acceptable distance and therefore, pedestrians from these communities are more likely to walk to the development site.

Pedestrian facilities such as sidewalks are recommended to be provided on the property frontage of the development site to encourage and facilitate accessibility of the development site by pedestrians. These sidewalks should be linked to the public transport lay-by proposed to be provided at the entrance to the development site.

Furthermore, raised pedestrian crossings are also proposed to be provided at both access points on either side of the intersection. These pedestrians crossings should be linked to the public transport lay-bys and will also play a role of being traffic calming measures.

10. CONCLUSIONS

The objective of this report was to determine the traffic impact of the Proposed Inkosi Phalane Shopping Centre Development on the existing road network and to identify the most appropriate upgrades, if required, to alleviate such an impact.

It is, therefore, concluded that:

- This Traffic Impact Assessment Report analyses the traffic impact that the Proposed Inkosi Phalane Shopping Centre Development will have on the surrounding road network;

- The proposed shopping centre will be located on a site area that is 27 ha in extent. The development site is currently zoned “Environmental” and is intended to be rezoned to “Core Mixed Use”. The project’s aim is to develop a shopping centre on site located along P106 at Ruth Farm in Richards Bay. This proposed development is a greenfield development, on land currently leased by Mondi for forestry purposes, on a site owned by the Mkhwanazi community in Empangeni. The proposed development will service the Esikhawini area, Port Dunford, KwaDlangezwa, Umthunzini and other surrounding areas because of the site strategic position;

- The proposed development is situated in the Esikhawini area, along the National Route 2 (N2) between Durban/Umhlanga in the south and Richards Bay in the north. The development site is at a radius of approximately 18.00 and 12.00 kilometres, respectively, to the south of the Richards Bay and Empangeni towns which are two Primary Nodes and primary economic hubs near the proposed development site;

- The motivation for the study stems from an understanding that the area is currently under serviced by retail amenities. From South of Durban to North of Zululand, there is no shopping centre within the eye of N2 with the existing Empangeni and Richards Bay Shopping centres requiring customers to exit and drive another 5 to 10 kilometres to gain access. Therefore, the proposed development will provide convenience to the immediate surrounding communities as well as the transient market travelling along the N2. It is understood that the retail centre is the first phase of the overall development plan. Other ancillary developments will be phased out in the future, such as a hotel;

- The proposed development site is situated within uMhlathuze Municipality, located in the King Cetshwayo District Municipality in the North-Eastern part of KwaZulu-Natal. The uMhlathuze Local Municipality is bordered by uMfolozi, Mthonjaneni and uMlalazi Local Municipalities;

- The municipality has vast areas of commercial farmlands as well as a number of areas that are significant from an environmental perspective. The municipal area includes the formal towns of Empangeni, Richards Bay, eSikhawini, Ngwelezane, eNseleni, Vulindlela and Felixton. Rural settlements include Buchanana, Luwamba, Makwela, Mambuka, Hluma, Matshana and Mabuyela;

- Richards Bay and Empangeni are the most significant economic centres in the Local and District Municipalities. Richards Bay, as a harbour and industrial town, attracts people from surrounding towns, rural settlements and from beyond the district. Empangeni’s role is mainly as a commercial and service centre to the settlements of Esikhawini, Eshowe, Nkandla, Buchanana and other rural settlements and it attracts many people to the range of higher order services available in the town;

- The proposed development falls within a proposed expansion area identified by uMhlathuze municipality for future municipal development projects such as housing. The site is within proximity to two secondary nodes, namely Esikhawini node and Vulindlela node. Which is intersected by the primary corridor, the N2 highway. There are two other nodes within the market area, and these include Port Dunford which is an emerging tertiary node and Mabuyeni which is a rural node. All these nodes are under supplied with retail activities which is what the proposed retail centre aims to address;

- Acquiring land in rural and underdeveloped areas for development is possible and an alternative for developers to consider as opposed to development in established developed urban areas. The client has chosen Esikhawini area to be the home of their retail property development project – A shopping centre that will impact the economy and the livelihood of the community of Esikhawini;

- Rural and tribal areas have, for the large part, remained underdeveloped and are still experiencing a shortage of basic retail services. Thus there is a need for private investors and developers to provide the necessary services to the people. Development in these areas will in return create a wealth of local economic spinoffs that can greatly enhance a community's quality of life;

- Retaining income within communities and the economic benefits that a retail centre development can provide to an underdeveloped area could assist in creating a sustainable economic environment for the residents of the surrounding communities. The land is available, the people are there, a product is required which is aesthetically pleasing, economically viable, and suitable for its intended purpose;

- The project is set to bring about sustainable development in the area and the community needs the shopping centre. Specific development in areas around the proposed project area is much needed to set a high standard for the appearance of the shopping centre around the vicinity;

- The proposed development could be some economic hub in this area. It will serve a number of rural settlements within the municipal area. The area on which the proposed development is situated is largely rural populated;

- The proposed shopping centre is expected to attract a number of pedestrians, particularly within the development site, as it is traditional case in rural areas. Many people within the development site are expected to continue to travel to other areas for various goods and services. Even though the proposed development might not probably provide all the services that the local people are travelling to other areas for, however, it is anticipated that there will be a reduction in the number of trips in the direction of other areas. That ultimately reduces travel costs;

- It is envisaged that the proposed development is to benefit the municipality and its community since the proposed development is situated in an area where there are no similar developments;

- The proposed development is envisaged to benefit the municipality and the local communities of the uMhlathuze Local Municipality. It is to benefit the municipality from a rates collection point of view and formalisation of activities in the area by setting a precedence;

- The proposed shopping centre development will play an important role to strengthen the Municipality's economic and social perspective. The proposed development intends to also strengthen municipality's image;

- The aim of this study is to investigate the traffic impact of the development on the existing road network and to identify the most appropriate upgrades, if necessary, to alleviate such an impact;

- This Traffic Impact Assessment Report is submitted in support of the Proposed Inkosi Phalane Shopping Centre Development to be situated on Portion 1 of Erf 11497, Richards Bay, Farm Ruth No.: 16833, in the Esikhawini area. The proposed development will be located to the west of the Esikhawini area within the uMhlathuze Local Municipality in the King Cetshwayo District Municipal area in the KwaZulu Natal province;

- The proposed development comprises of a Shopping Centre of approximately 60 000 m^2 on a site that is 27 hectares in extent;

- The development site is situated in the Esikhawini area, in the KwaZulu Natal province, as shown in **Figure 1**, below;

- It is therefore anticipated that in total, the proposed development will generate a total of 1,900 trips during the Friday PM peak hour and 2,794 trips during the Saturday AM peak hour;

- The site observations as well as the analysis results as shown in **Table 3** above show that the intersection of National Route 2 / P535 (Western Terminal) is currently operating satisfactorily with no approach worse than LOS B during both the 2023 and 2028 Friday PM and Saturday AM peak hours. There are acceptable delays and plenty of spare road capacity available;

- The site observations as well as the analysis results as shown in **Table 3** above show that the intersection of National Route 2 / P535 (Eastern Terminal) is currently operating satisfactorily with no approach worse than LOS A during both the 2023 and 2028 Friday PM and Saturday AM peak hours. There are acceptable delays and plenty of spare road capacity available;

- The site observations as well as the analysis results as shown in **Table 3** above show that the intersection of P535 / P106 is currently operating satisfactorily with no approach worse than LOS C during both the 2023 and 2028 Friday PM and Saturday AM peak hours. There are acceptable delays and plenty of spare road capacity available. Nonetheless, during the 2028 Friday PM peak hour, the north approach will operate at an unacceptable LOS E with significant delays;

- The analysis results in **Table 3** above show that after the development generated traffic has been added to the 2023 and 2028 background traffic, the intersection of National Route 2 with P535 (Western Terminal) will continue to operate satisfactory with no approach worse than LOS B and C, respectively, during both the Friday PM and Saturday AM peak hours, with minor increase in delays and still plenty of spare road capacity available;

- This intersection will operate this way up to 2028 and beyond;

  - Therefore, there are no capacity road upgrades required as a result of the proposed development.

- The analysis results in **Table 3** above show that after the development generated traffic has been added to the 2023 and 2028 background traffic, the intersection of National Route 2 with P535 (Eastern Terminal) will continue to operate satisfactory with still no approach worse than LOS A during both the Friday PM and Saturday AM peak hours, with negligible increase in delays and still plenty of spare road capacity available;

- This intersection will operate this way up to 2028 and beyond;

  - Therefore, there are no capacity road upgrades required as a result of the proposed development.

- The analysis results in **Table 3** above show that after the development generated traffic has been added to the 2023 and 2028 background traffic, the intersection of P535 with P106 will continue to operate satisfactory with still no approach worse than LOS A during both the Friday PM and Saturday AM peak hours, with negligible increase in delays and still plenty of spare road capacity available;

- However, the north approach, which is P106 will operate at an unacceptable LOS F with significant delays and overcapacity. This will nonetheless affect the entire intersection functionality where it will operate at a poor LOS F;

- Furthermore, in order to improve the functionality of the approach that will operate at a poor LOS F with significant delays and overcapacity, there are adjustments that need to be undertaken in order to facilitate the accessibility of the development site by the development generated traffic as well as facilitate traffic circulation and movement in the area. **Figure 17** shows the existing intersection geometry and **Figure 18** shows the proposed intersection geometry;

- **Table 4** shows that should the intersection of P535 and P106 be converted from a two-way stop controlled intersection, as shown in **Figure 17** into a roundabout intersection, as shown **Figure 18**, this intersection will function satisfactorily with no approach worse than LOS B

during both the 2023 and 2028 Friday PM and Saturday AM peak hours with acceptable delays. There will be plenty of spare road capacity available;

- This intersection will operate this way up to 2028 and beyond;
- **Figure 19** shows the proposed Development Access Point 1 intersection configuration that is intended to serve the development site;
- The analysis results in **Table 3** show that after the development generated traffic has been added to the 2023 and 2028 background traffic, the intersection of P106 with Development Access Point 1 will operate satisfactorily with no approach worse than LOS A and B during both the Friday PM and Saturday AM peak hours, respectively, with negligible delays and some spare road capacity available;
- This intersection will operate this way up to 2028 and beyond;
- **Figure 20** shows the proposed Development Access Point 2 intersection configuration that is also intended to serve the development site;
- The analysis results in **Table 3** show that after the development generated traffic has been added to the 2023 and 2028 background traffic, the intersection of P106 with Development Access Point 2 will operate satisfactorily with no approach worse than LOS A during both the 2023 Friday PM and Saturday AM peak hours, with negligible delays and plenty of spare road capacity available;
- However, during 2028 this intersection will operate satisfactorily with no approach worse than LOS A and B during both the Friday PM and Saturday AM peak hours, with minor delays and some spare road capacity available;
- This intersection will operate this way up to 2028 and beyond;
    - There are no further capacity road or external intersection upgrades required as a result of the proposed development, other than the P535 and P106 and the proposed development access points, as discussed here above.
- The proposed development will be served by two ingress/egress points as discussed below. Access to the development site will not be taken off the National Route 2 or P535.
    - Instead one access point (Development Access Point 1) will be taken off the P106. This access point will be at a distance of not less than 300 metres from the centre of P535 with P106, or as agreed with the responsible roads' authority.
    - Another access point (Development Access Point 2) will be taken off the P106. This access point will be at a distance of not less than 150 metres from the centre of P106 with Development Access Point 1, or as agreed with the responsible roads' authority.
- The location of the proposed development access point will have no significant negative impact on the functionality of the traffic operating along the P106;
- All road improvements, accesses and exits are to be designed and dimensioned according to the responsible road authority's standards and requirements;
- The access to the development site should be designed to allow for easy movement of heavy vehicles, emergency and service vehicles;
- For the Development Access Point 1 measurements on-site indicate that the available shoulder sight distance in the southern direction towards P106 is approximately 330 metres which is well in excess of the recommended 122 metres sight distance. However, in the northern direction towards Gobandlovu the available sight distance is in excess of 160 metres which is more than the recommended sight distance;

- For the Development Access Point 2 measurements on-site indicate that the available shoulder sight distance in the southern direction towards Development Access Point 1 is in excess of 160 metres which is well in excess of the recommended 122 metres sight distance. Furthermore, in the northern direction towards Gobandlovu the available sight distance is also in excess of 160 metres which is more than the recommended sight distance;

- The document "uMhlathuze Land Use Scheme Regulations – Land Use Scheme Regulations – 25 September 2019" was used to determine the number of parking bays required to meet the parking demand that will be generated by the Proposed Inkosi Phalane Shopping Centre Development;

- The Parking Standards suggest that the parking rate that is applicable is: 4 parking bays/100 m^2 for the entire Shopping Centre;

- However, the development site is situated in an area where there is low vehicle ownership and where many people rely on public transport, non-motorised transport, etc. Furthermore, there is a proposed public transport facility within the development site that will accommodate 57 minibus taxis;

- Additionally, there is a fully fledged public transport facility located Esikhawini at a radius of approximately 1.50 kilometres to the east of the development site. This facility will play a very critical role in ensuring that those who do not have direct access to a private vehicle can also easily access the proposed development site;

- It was therefore assumed that an applicable rate of 2.0 parking bays/100 m^2 for the entire Shopping Centre be applied in this scenario;

- Applying the assumed rates, it is therefore required that in total a minimum of 1,200 parking bays be provided on site to meet the parking demand as a result of the proposed development;

- These parking bays will have to be provided along with all the required infrastructure to facilitate the accessibility of the establishment by the disabled persons as well;

- There is no commuter train service in the area and therefore rail does not seem to be the used mode of public transport in the vicinity of the development site;

- The development site is not an end destination on the public transport network but rather a stop on the existing N2, P535 and P106 routes;

- There are no formal public transport lay-bys provided in the direct vicinity of the development site.

- The traffic counts and site observations revealed that both buses and minibus taxis were operating within the development site. However, during the on-site information gathering both buses and minibus taxis were observed travelling along both the P535 and P106 past the development site in both directions. Furthermore, minibus taxis were also observed travelling along both the P535 and P106 looking for passengers. However, no minibus taxis were observed picking up or dropping off passengers in the direct vicinity of the development site;

- There is an existing fully fledged public transport facility in the Esikhawini that will also play a role in bringing public transport passenger to the development site;

- There is a reasonable number of people expected to visit the development site using public transport such as taxis. Therefore, in anticipation of the new public transport users that will be yielded by the proposed development, it is recommended that public transport facility that will accommodate about 56 minibus taxis be provided on site to meet the public transport demand. This facility will comprise of 44 parking bays and 12 loading bays. This public transport facility will ensure that the proposed development will be accessible to all people including those who do not have access to a private vehicle;

- In addition, public transport lay-bys are recommended to be provided downstream of the intersection of P106 with Development Access Point 1 and Development Access Point 2 intersections downstream of the intersection on both sides of the road;

- The number of additional transport users is not expected to result in an increase in the number of buses and minibus taxis operating along the P535 and P106. These new public transport users can be accommodated in the existing service;

- A reasonable number of pedestrians, from the immediate community, is expected to walk to this development. During on-site information gathering a few pedestrians were observed walking along P106 in the direction of Gobandlovu. Gobandlovu is situated to the north of the development site at a distance of approximately 1.30 kilometres which is considered an acceptable walking distance. Furthermore, Esikhawini is at a distance of approximately 1.20 kilometres which is also considered an acceptable distance and therefore, pedestrians from these communities are more likely to walk to the development site;

- Pedestrian facilities such as sidewalks are recommended to be provided on the property frontage of the development site to encourage and facilitate accessibility of the development site by pedestrians. These sidewalks should be linked to the public transport lay-by proposed to be provided at the entrance to the development site; and

- Furthermore, raised pedestrian crossings are also proposed to be provided at both access points on either side of the intersection. These pedestrians crossings should be linked to the public transport lay-bys and will also play a role of being traffic calming measures.

11. RECOMMENDATIONS

It is, therefore, recommended that the Proposed Inkosi Phalane Shopping Centre Development Traffic Impact Assessment Report be approved based on the following:

- **Table 4** shows that should the intersection of P535 and P106 be converted from a two-way stop controlled intersection, as shown in **Figure 17** into a roundabout intersection, as shown **Figure 18**, this intersection will function satisfactorily with no approach worse than LOS B during both the 2023 and 2028 Friday PM and Saturday AM peak hours with acceptable delays. There will be plenty of spare road capacity available. This intersection will operate this way up to 2028 and beyond.

- There are no further capacity road or external intersection upgrades required as a result of the proposed development, other than the P535 and P106 and the proposed development access points.

- The proposed development will be served by two ingress/egress points as discussed below. Access to the development site will not be taken off the National Route 2 or P535.

    - Instead one access point (Development Access Point 1) will be taken off the P106. This access point will be at a distance of not less than 300 metres from the centre of P535 with P106, or as agreed with the responsible roads' authority.

    - Another access point (Development Access Point 2) will be taken off the P106. This access point will be at a distance of not less than 150 metres from the centre of P106 with Development Access Point 1, or as agreed with the responsible roads' authority.

- The location of the proposed development access point will have no significant negative impact on the functionality of the traffic operating along the P106.

- All road improvements, accesses and exits are to be designed and dimensioned according to the responsible road authority's standards and requirements.

- The access to the development site should be designed to allow for easy movement of heavy vehicles, emergency and service vehicles.

- It was therefore assumed that an applicable rate of 2.0 parking bays/100 m^2 for the entire Shopping Centre be applied in this scenario.

- Applying the assumed rates, it is therefore required that in total a minimum of 1,200 parking bays be provided on site to meet the parking demand as a result of the proposed development.

- These parking bays will have to be provided along with all the required infrastructure to facilitate the accessibility of the establishment by the disabled persons as well.

- There is a reasonable number of people expected to visit the development site using public transport such as taxis. Therefore, in anticipation of the new public transport users that will be yielded by the proposed development, it is recommended that public transport facility that will accommodate about 56 minibus taxis be provided on site to meet the public transport demand. This facility will comprise of 44 parking bays and 12 loading bays. This public transport facility will ensure that the proposed development will be accessible to all people including those who do not have access to a private vehicle.

- In addition, public transport lay-bys are recommended to be provided downstream of the intersection of P106 with Development Access Point 1 and Development Access Point 2 intersections downstream of the intersection on both sides of the road.

- Pedestrian facilities such as sidewalks are recommended to be provided on the property frontage of the development site to encourage and facilitate accessibility of the development site by pedestrians. These sidewalks should be linked to the public transport lay-by proposed to be provided at the entrance to the development site.

- Furthermore, raised pedestrian crossings are also proposed to be provided at both access points on either side of the intersection. These pedestrians crossings should be linked to the public transport lay-bys and will also play a role of being traffic calming measures.

12. REFERENCES

1. Committee of Transport Officials (COTO), 2012. South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual, TMH 16, Volume 2, Version 1.0, August 2012.

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3. Department of Transport, 1985. South African Roads Board: Parking Standards (2nd Edition)"[1] PG 3/85, November 1985.

4. Department of Transport, 1995. Manual for Traffic Impact Studies. Research Report RR93/635, October 1995.

5. Department of Transport, 1995. South African Trip Generation Rates. Project Report PR 92/228, June 1995.

6. Inkosi Phalane Shopping Centre Draft Market Feasibility Study, February 2023.