



THE SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LIMITED

PROJECT NO. NRA: R.022-020-2013/F

**CONSULTING ENGINEERING SERVICES FOR
ELIMINATION OF THE AT-GRADE RAILWAY CROSSING
ON NATIONAL ROUTE R22 SECTION 1 AT KM 5.5**

TRAFFIC STUDY REPORT

AUGUST 2015

**THE SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LIMITED
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CONSULTING ENGINEERING SERVICES FOR ELIMINATION OF THE AT-GRADE RAILWAY CROSSING ON NATIONAL ROUTE R22 SECTION 1 AT KM 5.5

Traffic Study

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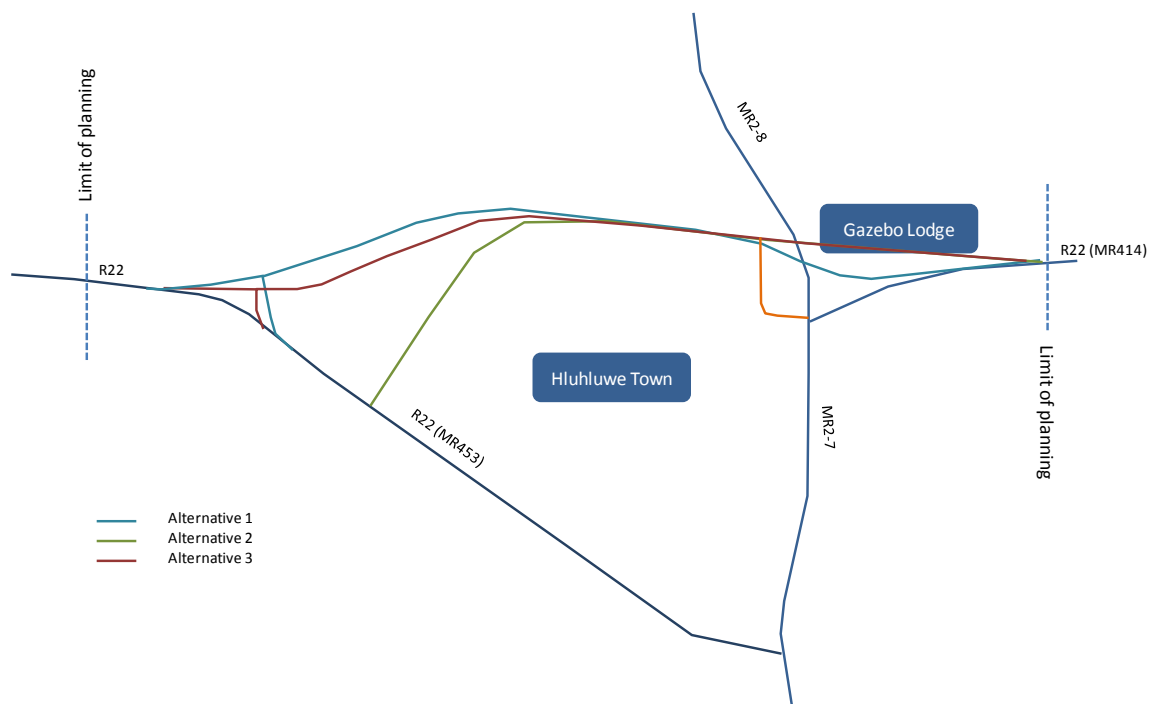
Executive Summary

Hatch Goba (Pty) Ltd was appointed by SANRAL to undertake a traffic study of vehicle movements in and around the town of Hluhluwe located in northern KwaZulu Natal (KZN). The traffic study assesses the traffic impacts of proposed bypass alternatives (options), to the north of Hluhluwe town centre, aimed towards eliminating an existing at-grade railway crossing.

Hluhluwe Town Centre is a small town known for its national parks, national diversity and cultural heritage. The area surrounding the town is currently undeveloped, but the area is of growing interest to international tourism and overland travellers. Hluhluwe therefore acts as a service centre for the wider region and a focus area for employment opportunities, shopping and recreational facilities, easily accessible off the N2 national route and is the starting point of the R22 which links Hluhluwe to Mozambique.

Three alternative bypass alignments were investigated (see diagram below):

- **Alternative 1** - The proposed bypass route follows the R22 alignment from the east and then rises above the railway line by way of a road over rail bridge. The alignment extends north of the town and ties into the R22 west of the town.
- **Alternative 2** – The proposed alignment follows a similar route as alternative 1 across the railway line, but follows the northern edge of the town and joins the MR453 at a priority controlled intersection west from Hluhluwe town centre.
- **Alternative 3** – The bypass alignment follows a straight line connection between the western and eastern portions of the R22. This alignment is similar to alternative 1, with the only difference being the road alignment across the railway crossing and the road alignment to the west of Hluhluwe where the R22 connects with the R22 (MR453).



All three alternatives eliminate the existing at grade railway crossing along the R22, thereby offering significant safety benefits to both regional and local traffic.

Traffic counts were conducted together with a number plate survey to gain a detailed understanding of vehicular movements in and around the town. The surveys indicate that the overall traffic demand on the surrounding road network is low (less than 300 vehicles in any direction for the peak hour) and that the majority (68%) of vehicles originating from the west of Hluhluwe return again to their origin within a 12 hour period.

A traffic model of the existing and proposed road network was developed to compare the various alternatives and to determine the total travel time for all vehicles on the road network. Calculations of travel time, capacity constraints, traffic volumes and intersection delays were computed in the analysis. An economic evaluation were also undertaken. Based on the results from the analysis it is recommended that **Alternative 3 be selected as the preferred alternative** as it offers the greatest benefit to all road users in terms of total travel time, delay and capacity benefits. The results from the economic analysis indicated that alternative 2 is the most feasible option, while alternative 3 will be the most beneficial to all the road users. (Alternative 2 has the lowest capital cost, resulting in a better cost-benefit ratio than the other two alternatives)

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1. Introduction

1.1 Terms of Reference and Appointment

Hatch Goba (Pty) Ltd has been appointed by SANRAL to undertake a traffic study of vehicle movements in and around the town of Hluhluwe located in northern KwaZulu Natal (KZN). This traffic study assesses the traffic impacts of the proposed bypass alternatives (options) to the north of Hluhluwe town centre, aimed towards eliminating an existing at-grade railway crossing. The various route alternatives are compared and recommendations are made with regard to traffic and safety benefits. The traffic study was conducted with the use of AIMSUN micro simulation software for the network analysis and SIDRA software for the individual intersection analysis. **Figure 1.1** indicates the road network for Hluhluwe.

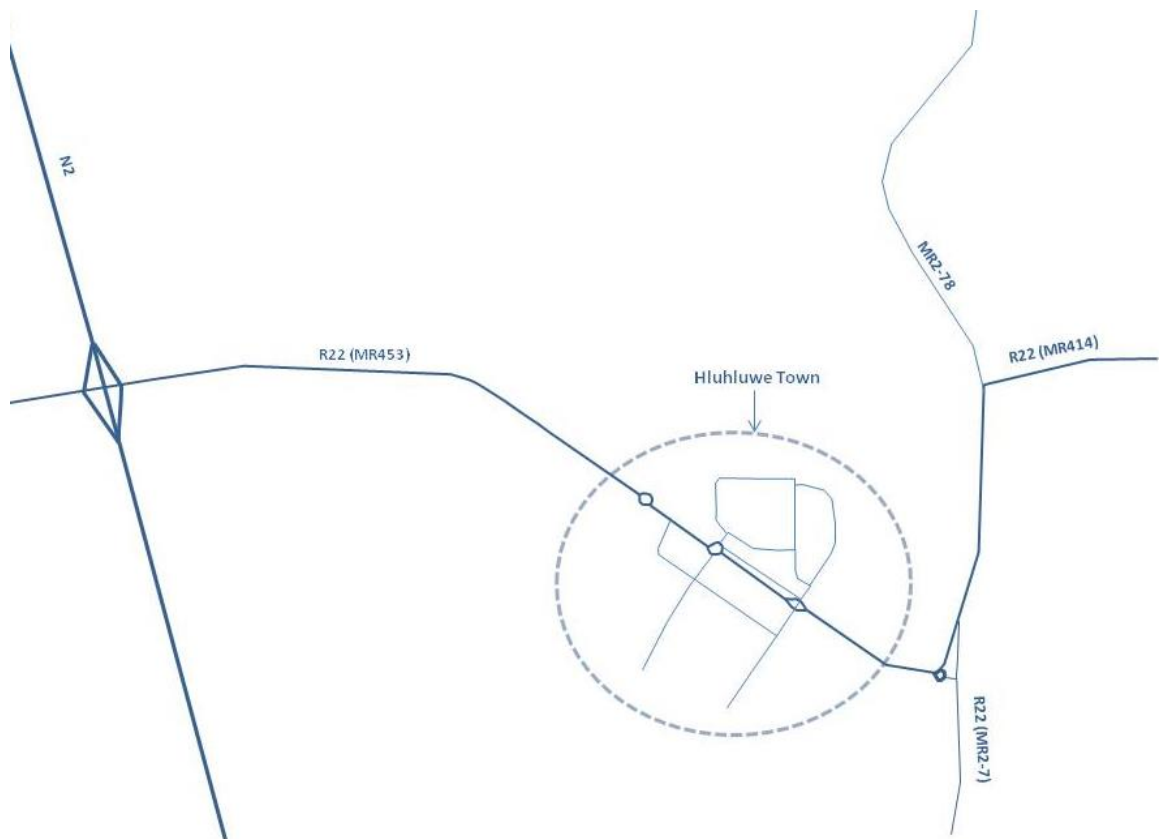


Figure 1.1: Hluhluwe Road Network

1.2 Background

Three alternative bypass alignments are proposed, all of which eliminate the existing at-grade rail crossing, located to the east of Hluhluwe town centre and along the R22. All alternatives propose a road over rail bridge and re-routing traffic along the northern edge of Hluhluwe town centre to rejoin the R22 west of the town. **Section 2.2** provides a discussion on the proposed bypass alignments.

1.3 Objectives

The primary objective of this study is to review and comment on the traffic impacts for the three bypass alternatives. The geometric design (horizontal and vertical alignments, cross sections and intersection geometrics) is not covered in this report but are addressed in detail in other design reports.

1.4 Scope of Work

The following tasks were undertaken in preparing this traffic report:

Traffic Surveys :

- Conduct traffic intersection counts at key locations to ascertain existing traffic profiles;
- 12 Hour surveys were undertaken in 15 minute count intervals on the 3rd December 2014 and categorised into two mode types (viz. Light and Heavy vehicles);
- Automatic Number Plate Recognition (ANPR) surveys were undertaken at two locations along the R22, one to the east of Hluhluwe town centre and the other to the west (see **Figure 3.1**). Correlating the number plates identifies the percentage of through traffic eligible to use the future bypass. The ANPR survey also gave an indication of the percentage of vehicles that enter the town from the west and return again during the day.

Traffic Engineering Analysis:

- An AIMSUN traffic model of the existing and proposed network scenarios was developed to determine the total travel time and average hourly speeds for all vehicles on the road network. The calculation of travel time takes capacity restraints, traffic volume and intersection delays into account. It also helped to determine the proposed bypass attraction rates.
- Preliminary investigation of the intersections at the terminal ends of the proposed by-pass alternatives as well as existing route through Hluhluwe. Specific attention was given to the following:
 - i) The junction where the bypass route intersects the existing MR453;
 - ii) The MR453/MR2-7 roundabout just east of Hluhluwe;
 - iii) The proposed new quaterlink with the R22 (MR2-7) intersection.

1.5 Assumptions and Limitations

The following assumptions and limitations are to be noted:

- 1) The traffic model does not consider any pedestrian movements within the town centre;
- 2) A 20-year horizon was used for the future forecasting to ensure that the recommended alternative can accommodate future predicted traffic conditions. A 2% growth rate per annum was assumed together with estimated traffic generation from potential future development as indicated in the Hluhluwe Development Plan (refer to Appendix B);

- 3) A review of the proposed geometric alignments is not included within this report. Proposed intersection layouts and performance evaluations are however included.
- 4) For the purpose of the traffic model the speed limit along the R22 bypass is assumed to be 100km/h and reduced to 60km/h on approaches to intersections. A speed limit of 60km/h is assumed for vehicles travelling through the town centre.
- 5) No road upgrades other than those linked to the bypass alternatives were known at the time of undertaking this study and therefore no other infrastructure upgrades are included in the analysis.
- 6) The AIMSUN model has been calibrated using available information and traffic counts.
- 7) No seasonal fluctuation has been factored into the analysis, despite the traffic counts being undertaken towards the end of the school term.

2. Study Area and Project Description

The study area is in the vicinity of Hluhluwe as shown in **Figure 2.1**. Hluhluwe Town Centre is a small town in northern KwaZulu–Natal, South Africa, it is known for its national parks, national diversity and cultural heritage. The area surrounding the town is currently undeveloped, although it is of growing interest to international tourism and overland travellers and therefore acts as a service centre for the wider region. Hluhluwe town is a focus of employment opportunities, shopping and recreational facilities which are easily accessible off the N2 national route, it is also the starting point of the R22 which links Hluhluwe to Mozambique. Various planning documents support that Hluhluwe is considered the tourism hub and considering its location it does serve as a gateway to large parts of the Zululand region. One of the strategic focus points of the Big Five False Bay Spatial Development Framework is to pursue social and economic development. Hluhluwe Town has been identified as one of the major development areas.



Figure 2.1: Hluhluwe Study Area

2.1 Proposed Bypass Alternatives

The following bypass alternatives were considered (see **Figure 2.2**):

Alternative 0 (Null Alternative) – This is the existing route through the town centre with vehicles travelling along the R22 from the east and turning left onto MR2-7 (the portion of the R22 running in a north/south direction) after crossing the existing at grade railway crossing. Vehicles are required to turn right at an existing roundabout and pass through a further three roundabouts through the town centre. Thereafter the R22 continues westwards and joins with the N2.

Alternative 1 - The proposed bypass route follows the R22 alignment from the east and then rises above the railway line by way of a road over rail bridge. The alignment extends past the north of the town and ties into the R22 west of the town. The bypass portion will have a design speed of 100 km/h.

The portion of R22 (MR453) between the western edge of the town and the new bypass will need to intersect by way of a priority controlled intersection. The posted speed limit along this portion of R22 (MR453) is assumed to be 80km/h, but will have a design speed of 100 km/h.

A quarterlink is proposed to the east of the town linking the proposed bypass with MR2-7 (the portion of the R22 running in a north/south direction). The quarterlink enables vehicles from the north, south and the town centre to connect with the bypass. Vehicles from the town centre therefore have a choice to either:

- 1) travel eastwards along R22, northwards along the R22, turn left onto the quarterlink and right/left onto the bypass, or
- 2) travel westwards along R22 (MR453) and turn left/right onto the bypass.

The route vehicles would follow depends largely on which direction they wish to travel and their proximity to either route within the town centre.

- **Alternative 2** – The proposed alignment follows a similar route as Alternative 1 across the railway line, but skirts the northern edge of the town and joins the MR453 at a priority controlled intersection west from Hluhluwe town centre. The benefit of this alignment is the shorter length of new road to be constructed.

Alternative 3 – This alignment is similar to Alternative 1, with the only difference being the road alignment across the railway line and the road alignment to the west of Hluhluwe where the R22 connects with the R22 (MR453). Alternative 3 follows a straight line approach and requires some property expropriation (viz. Gazebo Lodge).

The various route lengths for the different alternatives as obtained from the conceptual layouts are shown in **Table 2.1** below.

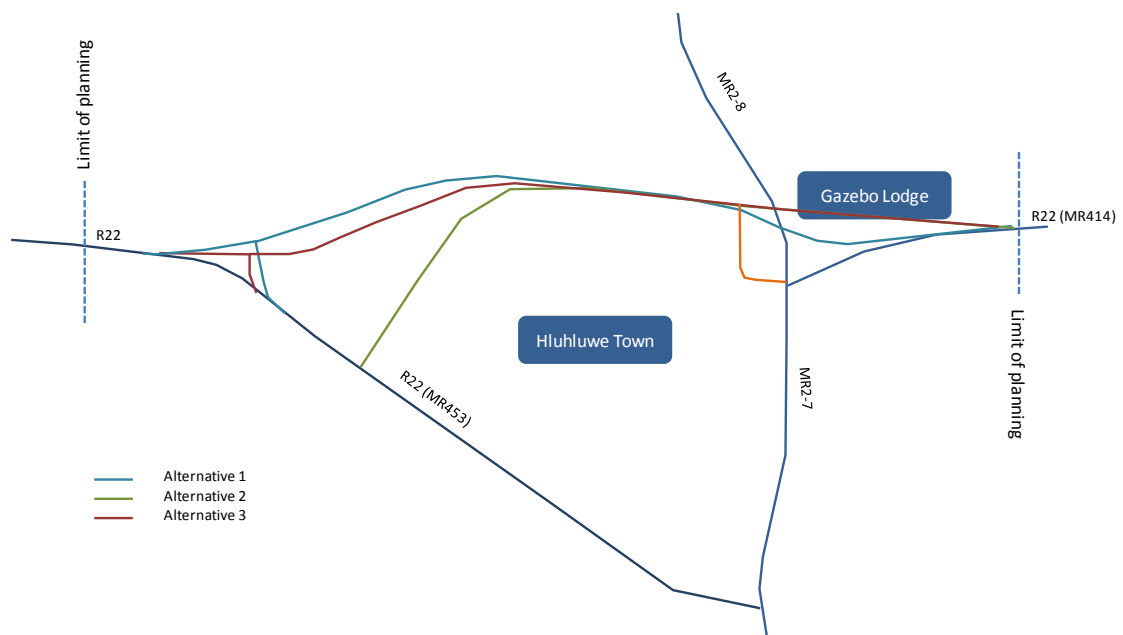


Figure 2.2: Hluhluwe Bypass Alternatives

Table 2.1: Alternative Route Lengths

Alternative	Distance (km)	Length of new road (km)
0	6.12	0
1	4.42	3.857
2	5.14	3.00
3	4.38	3.818

A technical comparison of these three alternatives is given in **Chapter 4**.

3. Existing Roads and Traffic Conditions

3.1 Existing Road Infrastructure

The major routes in the district are the National Road 2 (N2) which is the major route linking Hluhluwe with Richards Bay to the south, and Pongola to the north. The R22 is the starting point of the Lubombo Spatial Development (LSD) initiative, which links Hluhluwe to the Mozambique Border. These two roads have also been identified as major corridors within the Umkhanyakude District. The Lubombo SDI route was upgraded to asphalt in the 1990's and is prioritised as a Spatial Development Initiative of national significance. It has greatly improved access to large parts of the Zululand Region to the north of Hluhluwe. The route extends from Hluhluwe through to Mbazwana to join the only other asphalt road in the region at Pelindaba, before heading north east through KwaNgwanase to the Mozambique border at Farazel (The Big 5 False Bay Municipality, 2014).

The R22 intersects the N2 by way of a diamond interchange and is the primary access to Hluhluwe and the surrounding area. An alternative access to Hluhluwe is available from the N2 via a gravel road (D566 Road), but is secondary to the signposted route to Hluhluwe. The R22 is a National Road and also classified as a Tourism Route. Most of the surrounding local roads are suitably maintained gravel roads which can be travelled with a normal passenger vehicle.

The surrounding road network is displayed in **Figure 2.1** and briefly discussed below.



R22 – Rural Road, East of Hluhluwe

The R22 is a Class 3 District Distributor road in terms of the RISFSA Road classification (NDOT, 2007). The R22 is sign posted at 100km/h (east of Hluhluwe) and consists of a single carriageway with a rural cross section.



R22 – Rural Road, West of Hluhluwe

The R22 is a Class 3 District Distributor road in terms of the RISFSA Road classification (NDOT, 2007). The R22 is a single carriageway with 1m surfaced shoulders.



R22 – Urban Road, Hluhluwe

The R22 is a Class 3 District Distributor road in terms of the RISFSA Road classification (NDOT, 2007). The R22 is a dual carriageway with one lane in each direction, separated with a kerbed raised median). The R22 passes through Hluhluwe and leads to the town via four roundabouts and some minor access roads.

3.2 Planned Road Infrastructure Improvements

At present, no significant road improvements/upgrades are known of within the surrounding area, apart from the Lubambo Spatial Development Initiative.

3.3 Existing Traffic Operations

The present traffic demand was estimated from traffic counts that were conducted at key intersections within the study area. 12 Hour (06:00-18:00) surveys were conducted on Wednesday 3rd December 2014 at the following locations (see **Figure 3.1**):

- Station 1 - Hluhluwe N2 Interchange – Eastern Terminal;
- Station 2 - Hluhluwe N2 Interchange – Western Terminal;
- Station 3 - R22 / Roundabout east of Hluhluwe;
- Station 4 - ANPR location 1, west of Hluhluwe; and
- Station 5 – ANPR location 2, east of Hluhluwe.

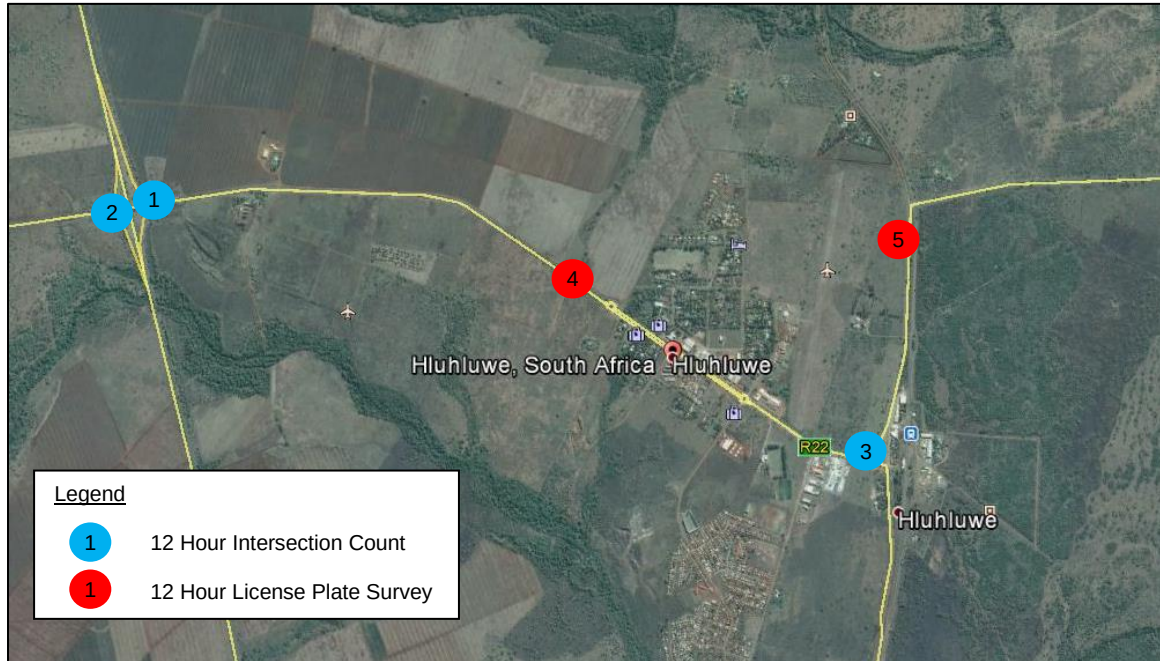


Figure 3.1: Traffic Count Survey Locations

Figure 3.2 shows graphs of the half hourly counts conducted at the three count stations.

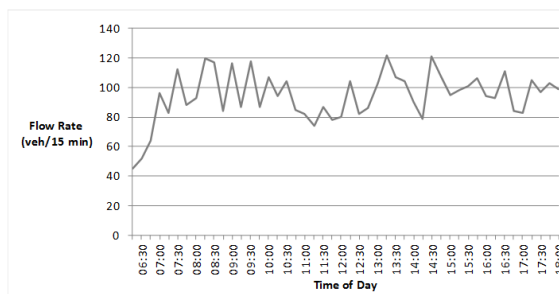
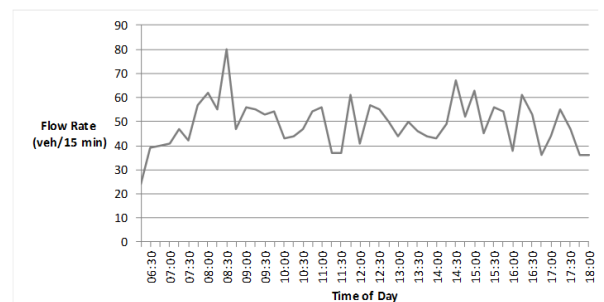
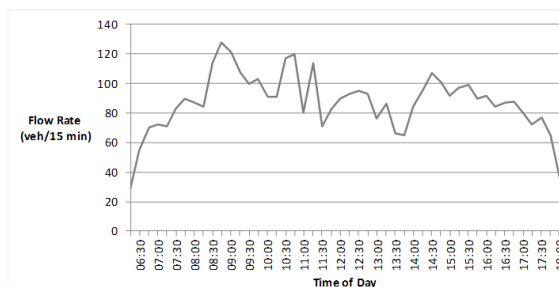


Figure 3.2: Station 4 - 12 hour counts



Station 5 – 12 hour counts



Station 3 – 12 hour counts

Analysis of the traffic counts and histograms indicated the following:

- The weekday AM peak hour is from 08:00 to 09:00.
- The present traffic volumes observed on the surrounding road network can generally be described as “low” since volumes typically do not exceed 300 vehicles per hour (vph) and are well within roadway capacity.

The observed traffic data is presented in **Figures 3.3 to 3.11** below.

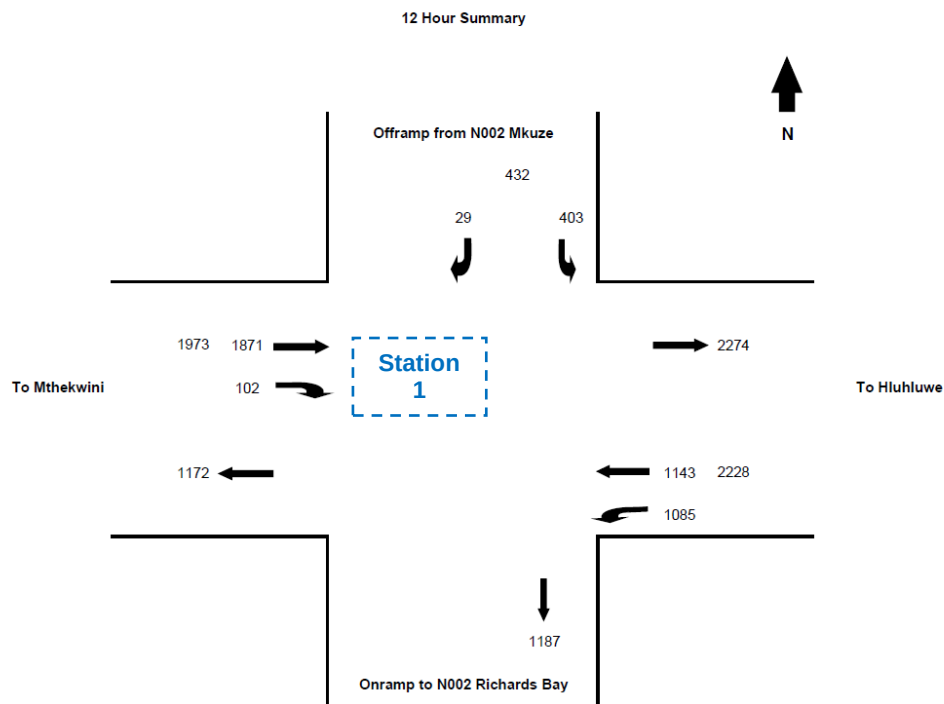


Figure 3.3: Hluhluwe Interchange, Eastern Terminal – 12 Hour Count Summary

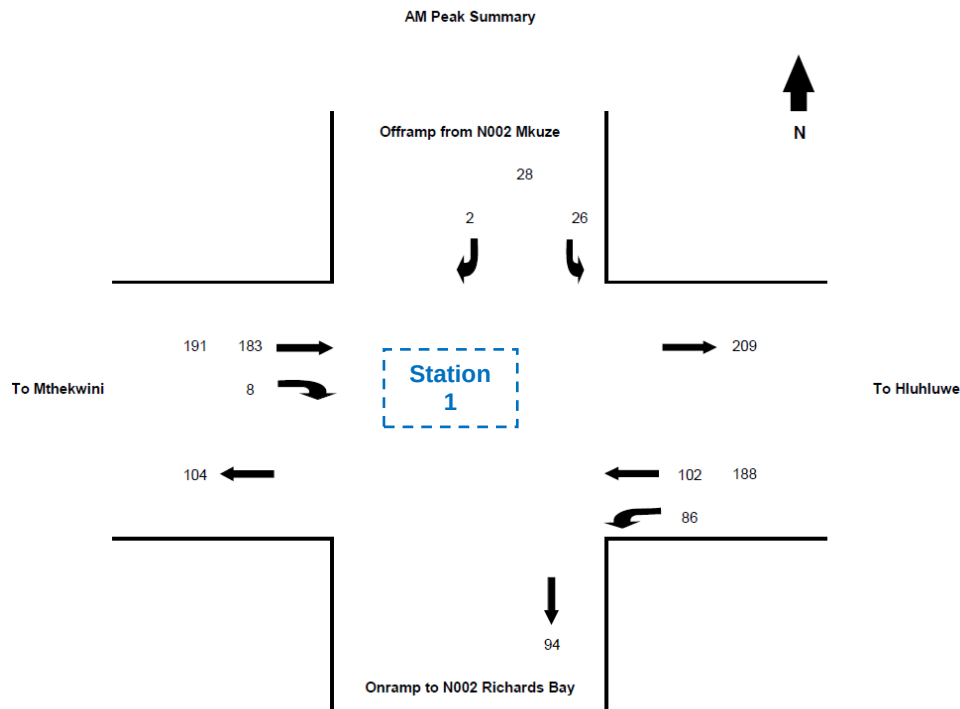


Figure 3.4: Hluhluwe Interchange, Eastern Terminal – AM Peak Summary

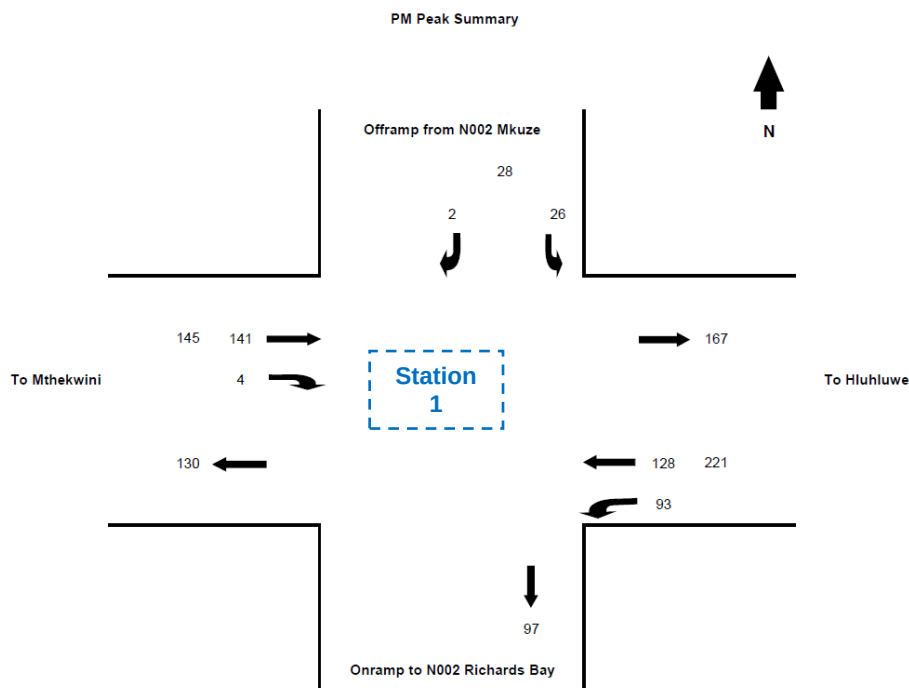


Figure 3.5: Hluhluwe Interchange, Eastern Terminal – PM Peak Summary

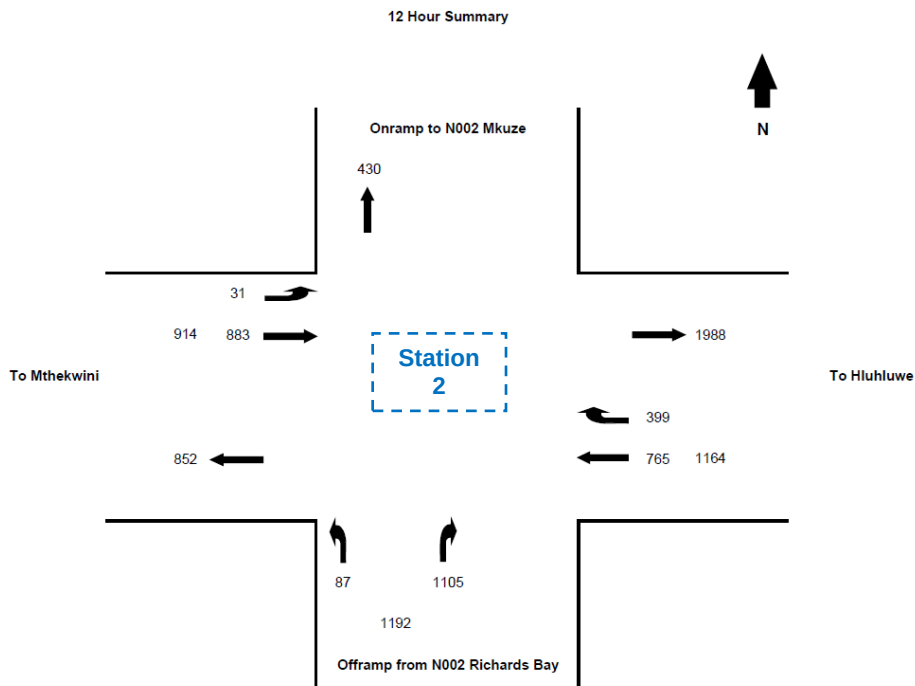


Figure 3.6: Hluhluwe Interchange, Western Terminal – 12 Hour Count Summary

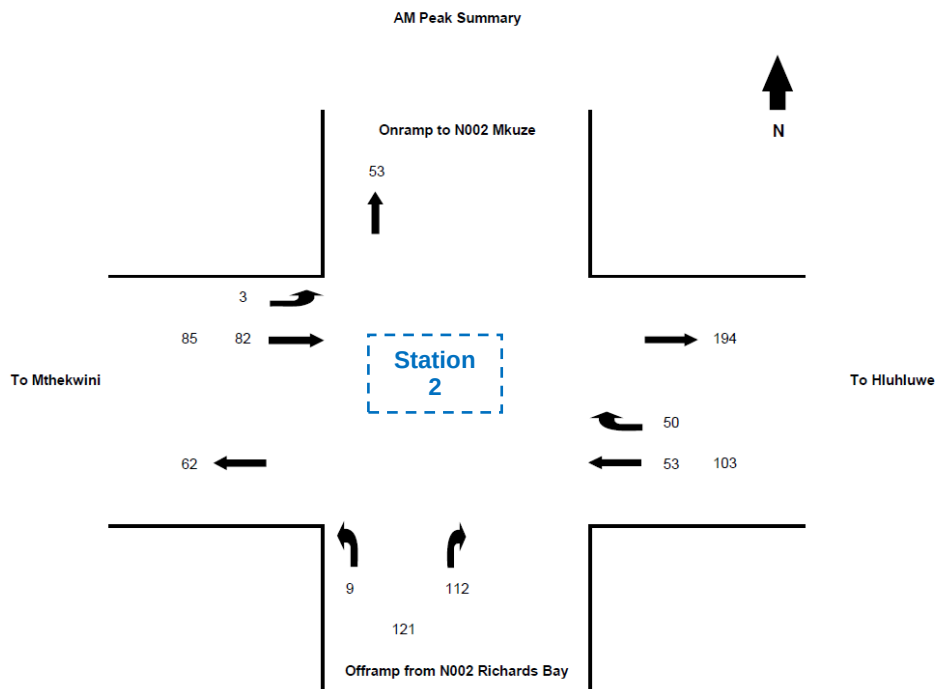


Figure 3.7: Hluhluwe Interchange, Western Terminal – AM Peak Summary

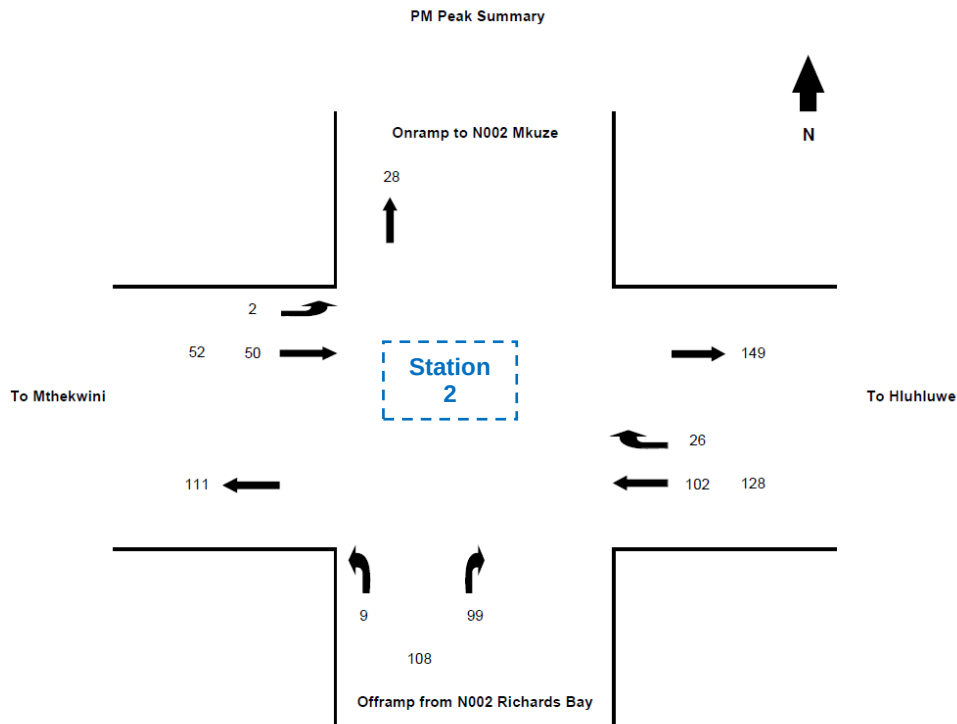


Figure 3.8: Hluhluwe Interchange, Western Terminal – PM Peak Summary

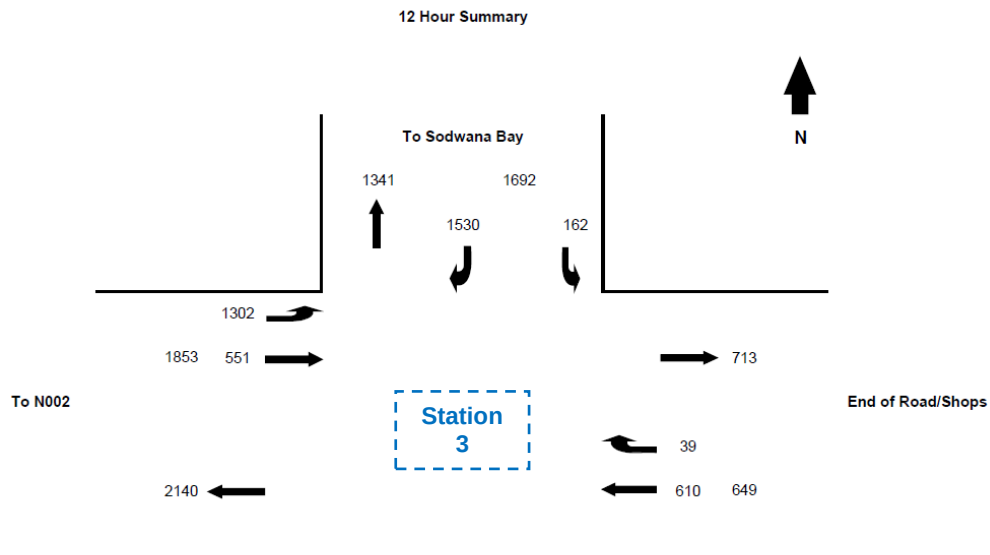


Figure 3.9: R22 / Roundabout Eastern End of Hluhluwe – 12 Hour Count Summary

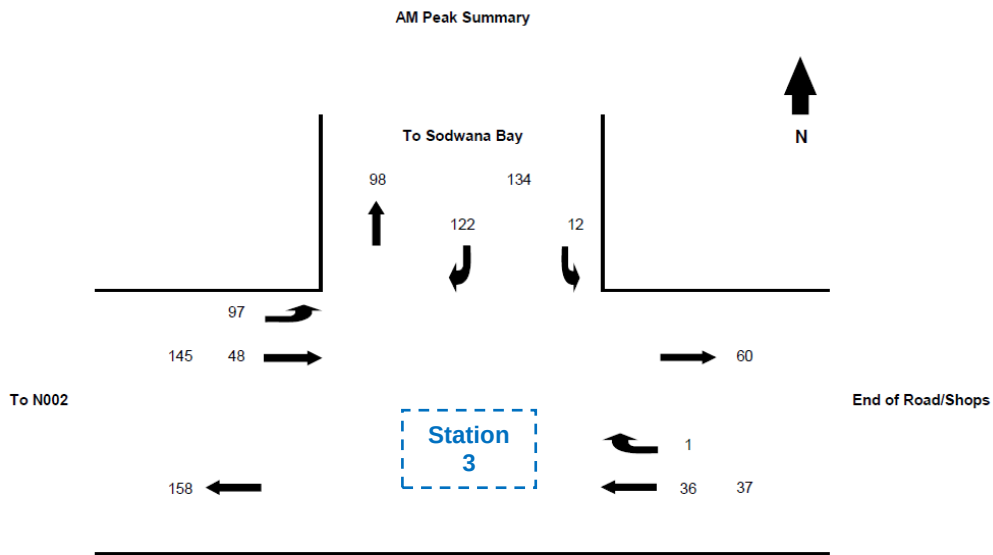


Figure 3.10: R22 / Roundabout Eastern End of Hluhluwe – AM Peak Summary

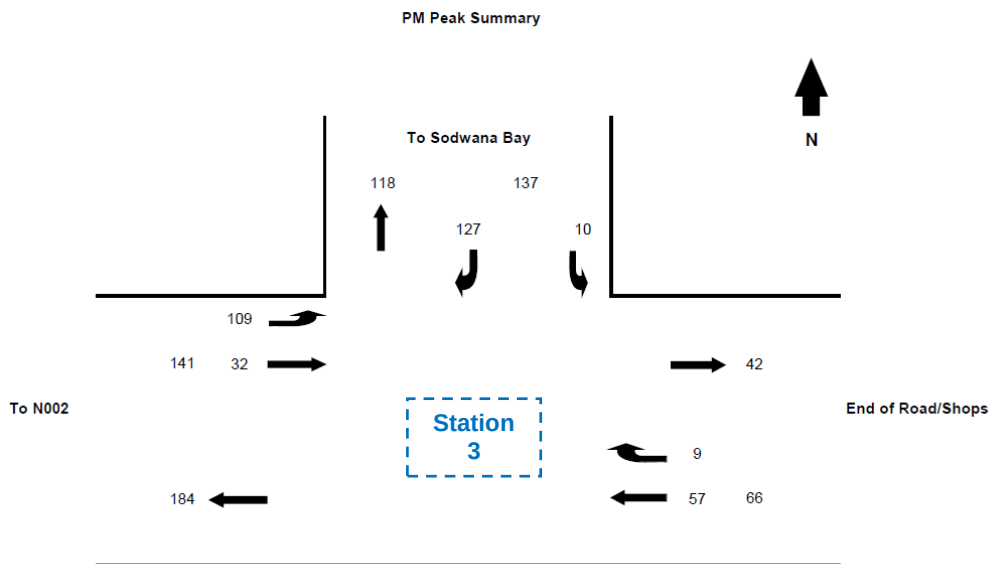


Figure 3.11: R22 / Roundabout Eastern End of Hluhluwe – PM Peak Summary

3.4 ANPR Origin-Destination Survey

Two locations were identified along the R22, one east of the town and the other to the west. Video cameras were set up to capture the vehicle licence plates travelling in both directions. Number plate recognition software was used to automatically match vehicles passing the two locations within a 12 hour period (06:00-18:00). Using this information, it was possible to calculate:

- 1) The number of vehicles passing through the town from east (origin) to west (destination);
- 2) The number of vehicles passing through the town from west (origin) to east (destination);
- 3) The number of vehicles who entered or passed through the town from the west and who was observed again at ANPR 1 during the 12 hour period.

Analysis of the ANPR origin-destination surveys indicated the following:

- 25% of eastbound traffic observed at ANPR 1 (see Location 4 in **Figure 3.1**) passed through the town and was observed at ANPR 2 (see Location 5 in **Figure 3.1**);
- 47% of the vehicles observed at ANPR 2 passed through the town westwards and was observed at ANPR 1;
- 68% of the vehicles observed at ANPR 1, who entered or passed through the town from the west, was observed again at ANPR 1 during the 12 hour survey period. The 68% does include some of the above-mentioned 25% eastbound traffic. **Figures 3.12** and **3.13** shows the two-way directional counts at the two ANPR survey locations.

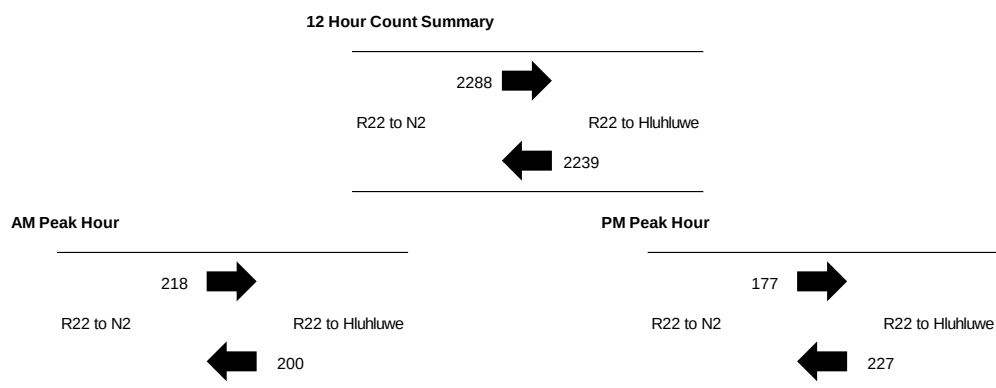


Figure 3.12: ANPR 1 Station 4 Vehicle Volumes

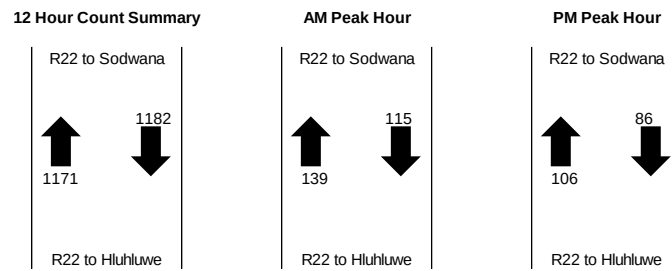


Figure 3.13: ANPR 2 Station 5 Vehicle Volumes

4. Traffic Analysis: Existing & Future Scenarios

The existing 2014 traffic count data has been used as input to SIDRA Intersection Analysis. Note that only the AM Peak hour has been modelled because the AM Peak represents the highest vehicular volumes on the road network. Current traffic operations for the existing and future scenarios was analysed by examining the performance of the intersections for both scenarios. The outputs for the existing and future scenarios are discussed in Section 4.1.

A 20-year design horizon was used to test future traffic demand, i.e. 2034. The predicted future traffic flows have been estimated by applying an estimated annual growth rate of 2% . The future development traffic for Hluhluwe was estimated using information from the 2013 Big 5 False Bay Spatial Development Framework (Udidi, 2013) and a high level Hluhluwe development framework plan.

The additional vehicle trips that could be generated by the proposed developments were calculated using trip generation rates as provided in the South African Trip Data Manual (September 2012) published by the South African Committee of Transport Officials (hereafter referred to as the COTO Trip Manual). **Table 4.1** indicates the trip rates that were used:

Table 4.1: Trip generation rates

Land Use	Trip generation rates
Residential – Single dwelling units	A trip rate of 1 vph per dwelling unit is recommended together with a directional split of 25/75 inbound/outbound in the AM peak. The PM peak has a directional split of 70/30 inbound/outbound.
Retail	A trip rate of 0.60 vph/100m ² is recommended together with a directional split of 63/35 inbound/outbound in the AM peak. For the PM peak a trip rate of 3.40 vph/100m ² is recommended with a directional split of 50/50 inbound/outbound.
Industrial	A trip rate of 0.80 vph/100m ² is recommended together with a directional split of 70/30 inbound/outbound in the AM peak, with a PM peak directional split of 25/75 inbound/outbound.
Business	A trip rate of 2.1 vph/100m ² is recommended together with a directional split of 85/15 inbound/outbound in the AM peak, with a PM peak directional split of 20/80 inbound/outbound.

4.1 Current Intersections

This section discusses the results from the Sidra analysis for the existing (2014) and future (2034) traffic demand for the R22 (MR 453/ MR 2-7) Traffic circle.

4.1.1 2014 Demand

R22 (MR453 / MR2-7) Traffic circle (Unsignalised)

Figure 4.1 shows that the unsignalised traffic circle of MR453 / MR2-7 currently operates at an overall LOS A. Minimal delays are experienced by vehicles arriving from all legs of the traffic circle.

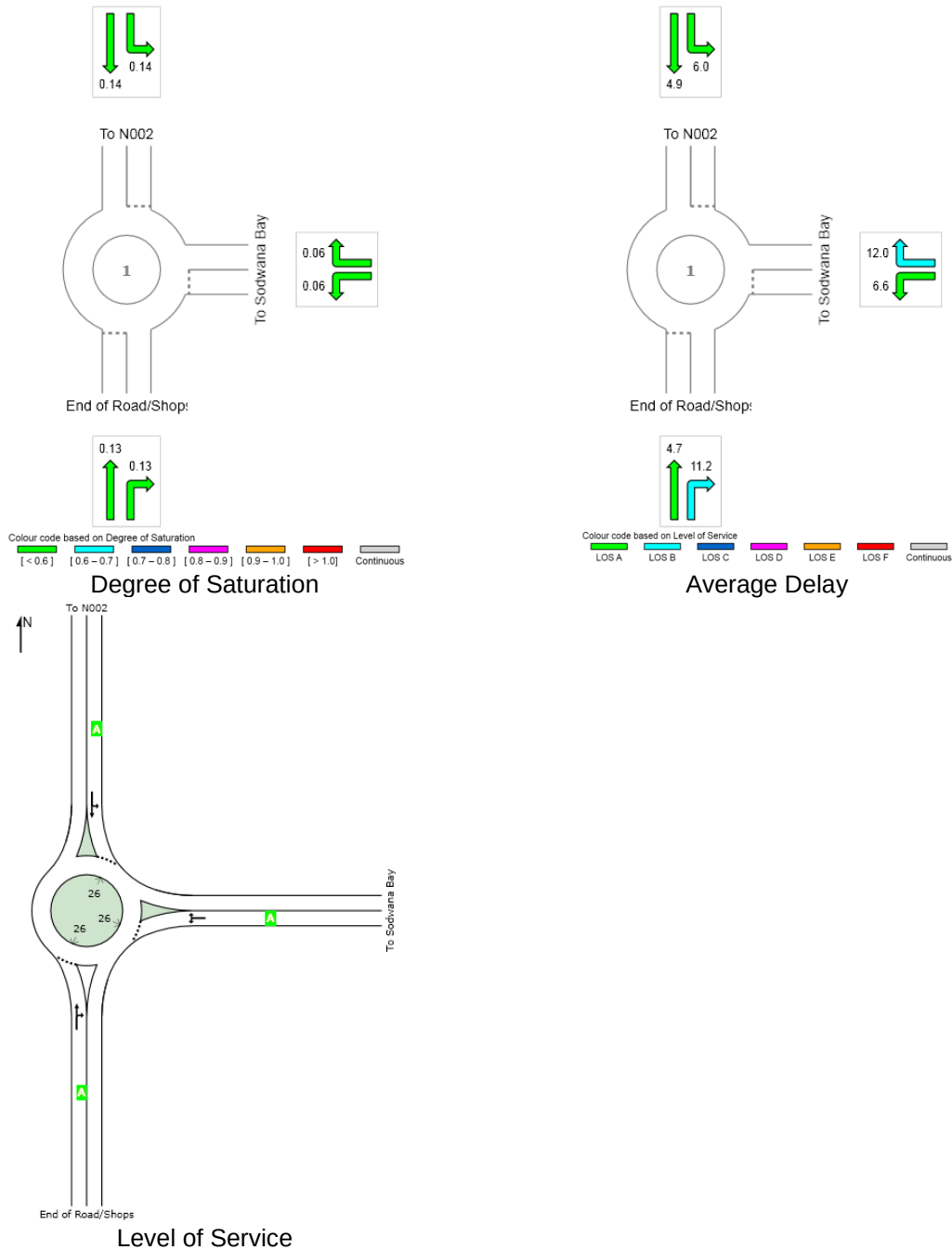


Figure 4.1: 2014 Existing Scenario – R22 (MR453 / MR2-7)

4.1.2 2034 Demand

R22 (MR453 / MR2-7) Traffic circle (Unsignalised)

Figure 4.2 shows that the traffic circle of MR453 / MR2-7 operates at an overall LOS A for the future scenario (2034). Minimal delays are experienced by vehicles arriving from all legs of the traffic circle.

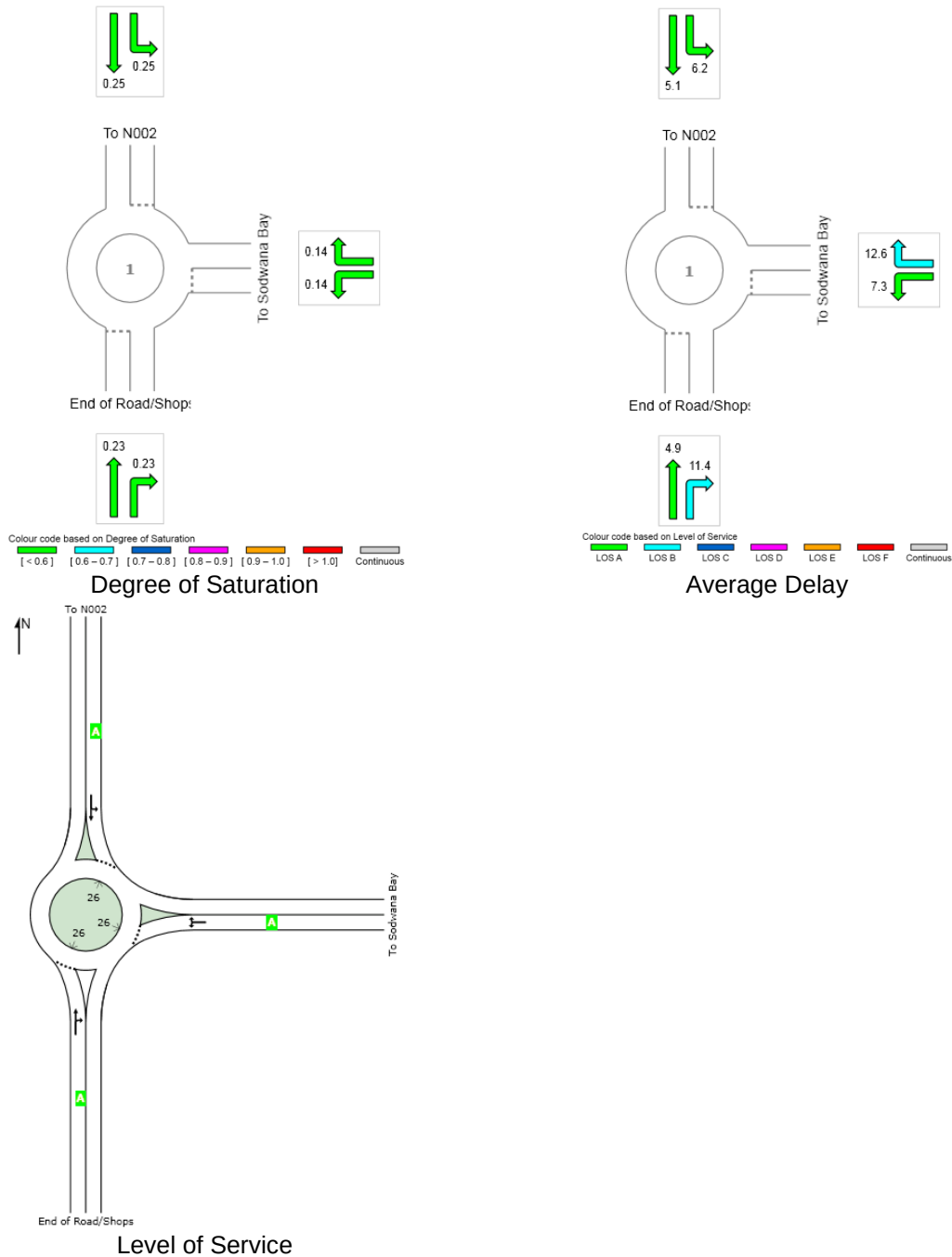


Figure 4.2: 2034 Future Scenario – R22 (MR453 / MR2-7)

4.2 Proposed intersections

The traffic impact of the proposed alternatives has been assessed by examining the performance of critical intersections on the surrounding road network using traffic volumes as predicted by the AIMSUN Model. The detailed results are available on request. The intersections analysed are given in **Table 4.2** below and displayed in **Figure 4.3**.

Table 4.2: Intersections Analysed

Intersection Number	Major Road	Minor Road	Intersection Type	Existing/New/Upgraded
1	R22 / New Bypass Alignment	MR453	Priority	Alternatives 1 and 3 – New Alternative 2 – N/A
2	New Bypass Alignment	Quarterlink	Priority	Alternatives 1,2 & 3 – New
3	MR2-7	Quarterlink	Priority	Alternatives 1,2 & 3 – New

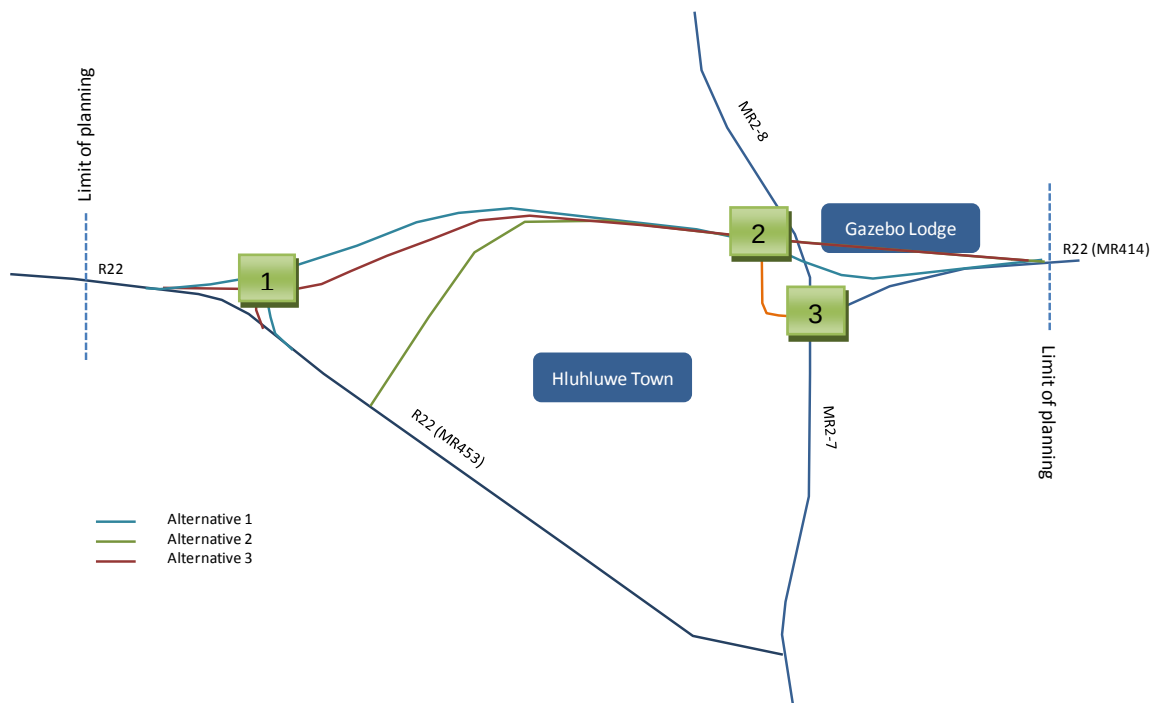


Figure 4.3: Intersections analysed

The purpose of the analysis is to determine the Level of Service (LOS) for the different alternatives to ensure that the proposed layouts are capable of accommodating the anticipated future traffic demand for the year 2014 and 2034. The analysis for each intersection is described below while **Figures 4.4 – 4.9** summarise the results.

4.2.1 Intersection 1 – Bypass / MR453 Priority Intersection

Alternatives 1 and 3

Vehicles approaching the intersection from the west will be travelling at 100km/h. A dedicated right turn lane is therefore proposed to ensure vehicles bound for Hluhluwe town centre are protected without obstructing through moving traffic. The warrants for a right turn lane (Road Access Guidelines, 2002) was met and the lane distance should allow sufficient stopping distance for turning vehicles.

Similarly a deceleration lane is proposed for traffic approaching from the east and turning left towards Hluhluwe. The warrant for a left turn lane is not warranted as the anticipated vehicle volumes are too low. However, given the travelling speed of 100km/h, a taper is proposed.

In addition, an acceleration lane is proposed to aid vehicles turning left onto the bypass to merge with through moving traffic. A dedicated right turn lane and a left turn slip lane is proposed for vehicles approaching from the south (Hluhluwe traffic) to prevent right turning traffic from obstructing left turning vehicles.

Figure 5.1 below indicates that the predicted LOS is well within capacity at LOS B. In capacity terms, a LOS D or better is deemed acceptable and therefore no capacity issues are anticipated.

It is clear from the results that a smaller intersection would suffice when only considering capacity. However, given the speed limit proposed for the bypass, safety at the intersection requires mitigation. The various acceleration, deceleration and turning lanes all relate to safety, rather than capacity.

It must however be stressed that the proposed layouts are indicative only and should form the basis of a road safety audit once the conceptual layouts have been approved.

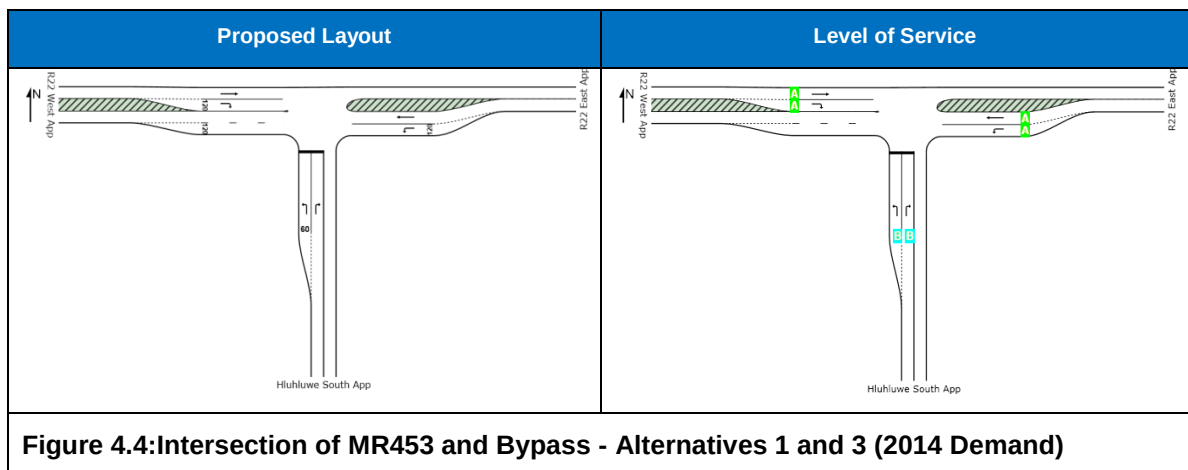
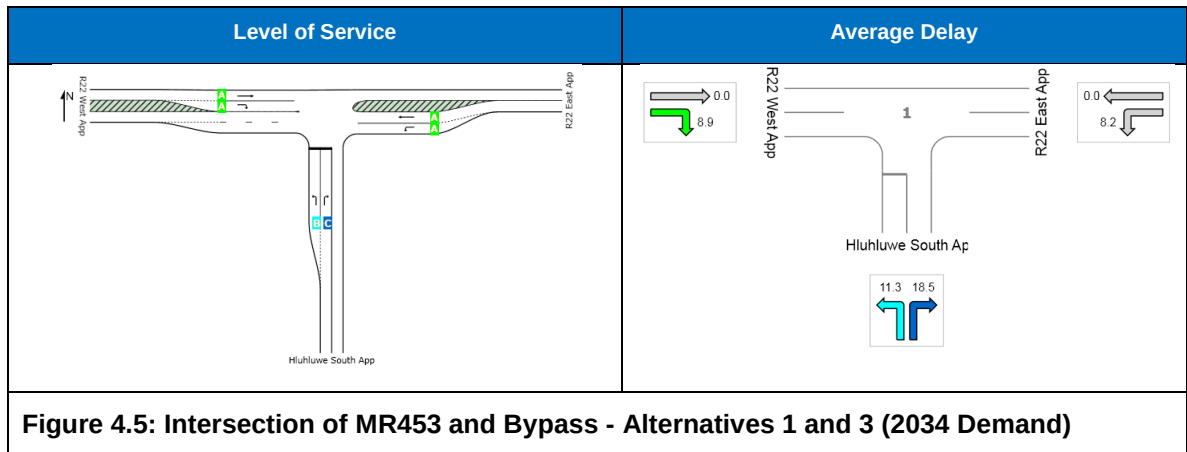


Figure 4.5 shows a predicted overall LOS A for the future scenario, with a LOS C for the right turning traffic from the MR453 into the bypass. No capacity issues are anticipated for this intersection.



Alternative 2

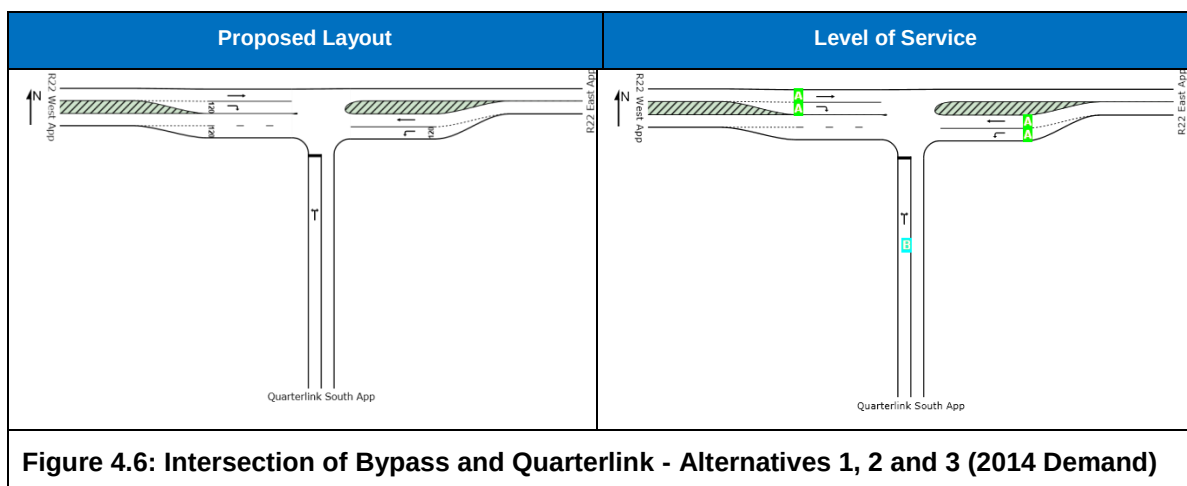
Intersection 1 is not required in Alternative 2.

4.2.2 Intersection 2 – Bypass / Quarterlink Priority Intersection

Alternatives 1, 2 and 3

A similar layout to that proposed for Intersection 1 is envisaged for Intersection 2. The location of the intersection is the same for Alternatives 1 and 2, while Alternative 3 with its straight alignment requires the intersection to be located further north. A right turn lane, deceleration lane and acceleration lane are proposed to ensure safety for all vehicles using the intersection following the same motivation proposed in **Section 4.2.1**. A single lane approach is however deemed appropriate for vehicles approaching from the south as the number of vehicles using the quarterlink is only 44 vehicles in the peak hour.

Figure 4.6 below indicates that the predicted LOS is the same as Intersection 1 at LOS B. It is important to note that SIDRA only takes into consideration vehicle volumes, lane widths and lane configuration. It does not consider sight distances.



The predicted LOS is the same for the 2034 traffic demand as the 2014 traffic demand above, with a LOS B. Minimal delays are experienced by vehicles arriving from all legs of this intersection as shown in **Figure 4.7**.

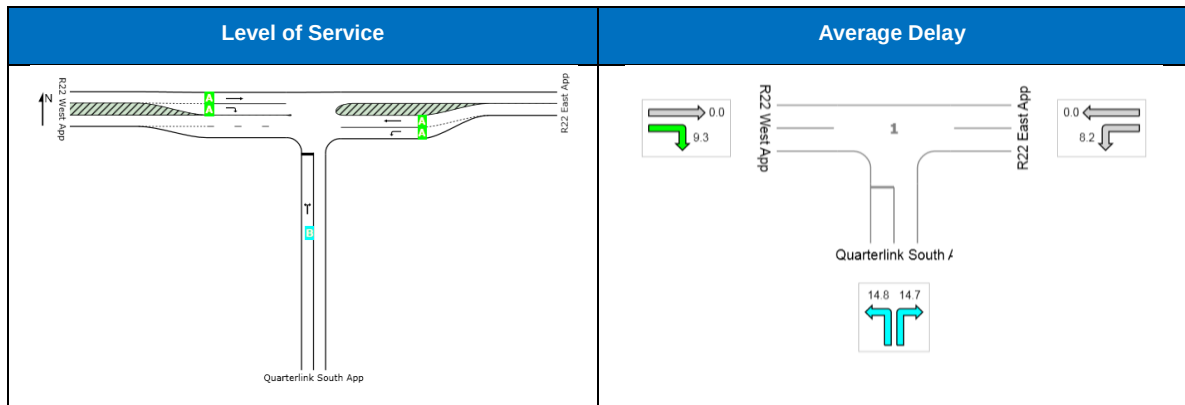


Figure 4.7: Intersection of Bypass and Quarterlink - Alternatives 1, 2 and (2034 Demand)

4.2.3 Intersection 3 – Quarterlink / MR2-7 Priority Intersection Alternatives 1, 2 and 3

This priority intersection is proposed for all alignments. The major road will remain MR2-7 which runs in a north/south direction. The vehicular volumes anticipated to use the quarterlink vary depending on the alignment option, with the maximum two-way vehicle volumes being 91 vehicles per hour. A 60km/h speed limit is proposed along the section of MR2-7 approaching the quarterlink. No acceleration or deceleration lanes are deemed necessary. A right turn lane is however proposed on the MR2-7 southbound approach to ensure turning vehicles to not obstruct southbound vehicles. The proposed layout is shown in **Figure 4.8**.

The results indicate a good LOS for all approaches for the 2014 and 2034 traffic demand (see **Figure 4.8** and **Figure 4.9**).

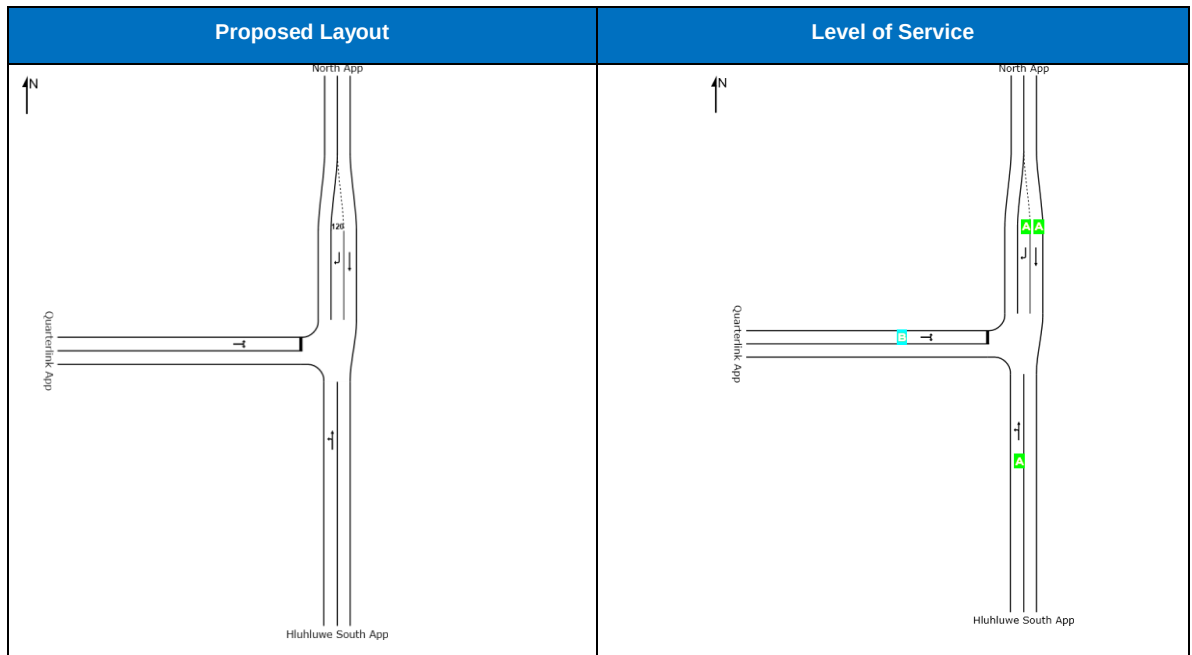


Figure 4.8: Intersection of Quarterlink and MR2-7 - Alternatives 1, 2 and 3 (2014 Demand)

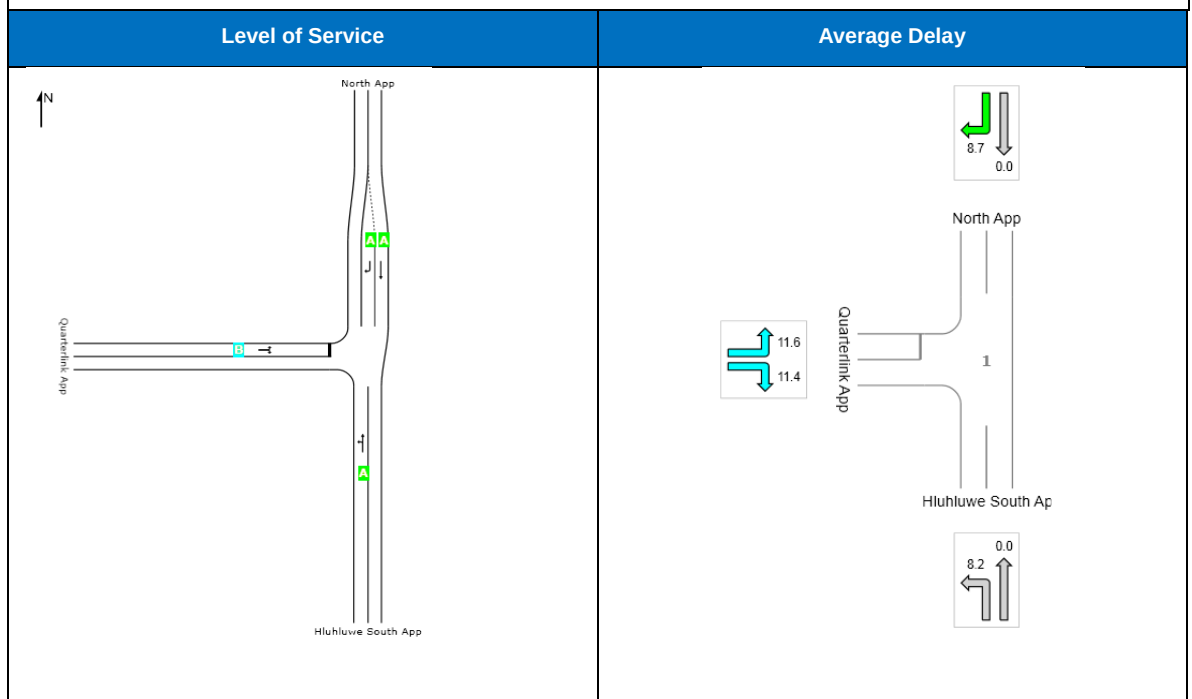


Figure 4.9: Intersection of Quarterlink and MR2-7 - Alternatives 1, 2 and 3 (2034 Demand)

5. Transportation Assessment

5.1 Model Development

The AIMSUN software is a dynamic simulation environment geared to assess road network performance, through the continuous modelling of individual vehicle movements for various vehicle classes throughout the simulation period using several vehicle behaviour models. Some of the advantages of developing the AIMSUN Traffic model is the ability to assess the combined impacts of individual developments at a network level and to accurately test the effectiveness of road infrastructure proposals.

The AIMSUN base year (2014) network built for this study is shown in **Figure 5.1**, while parts of the proposed bypass alternative networks is shown in **Figures 5.2 to 5.4**.

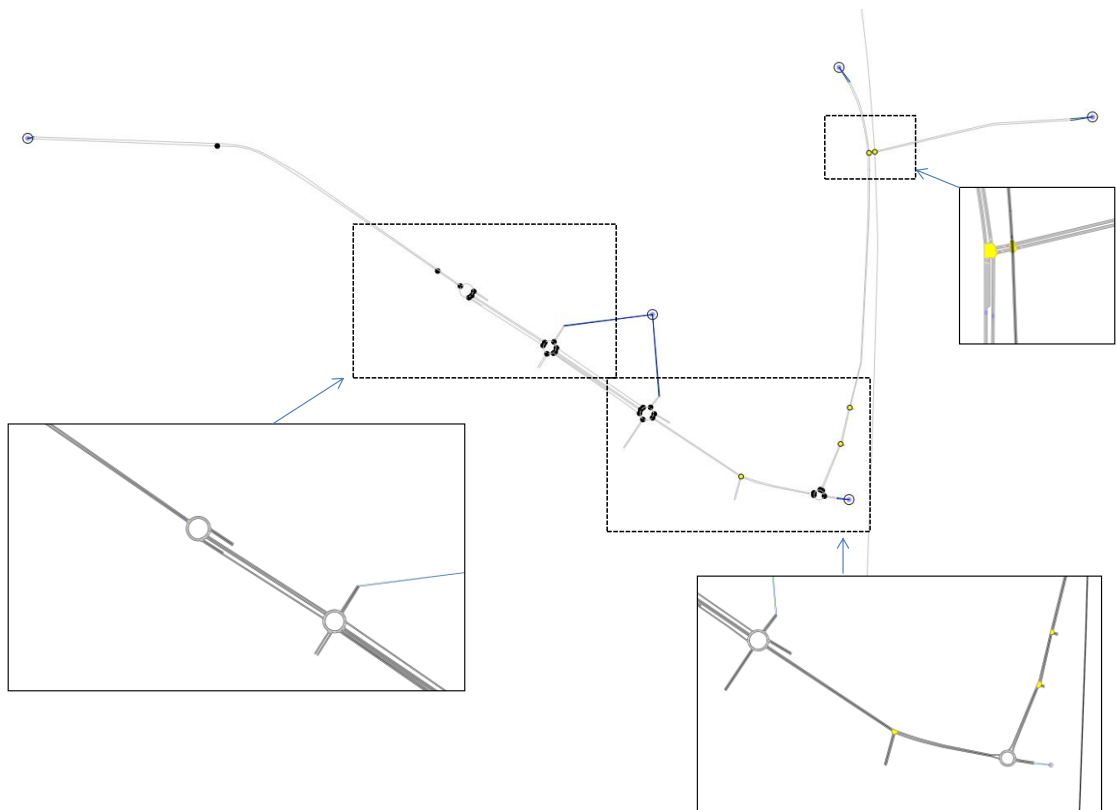


Figure 5.1: Hluhluwe Base Network

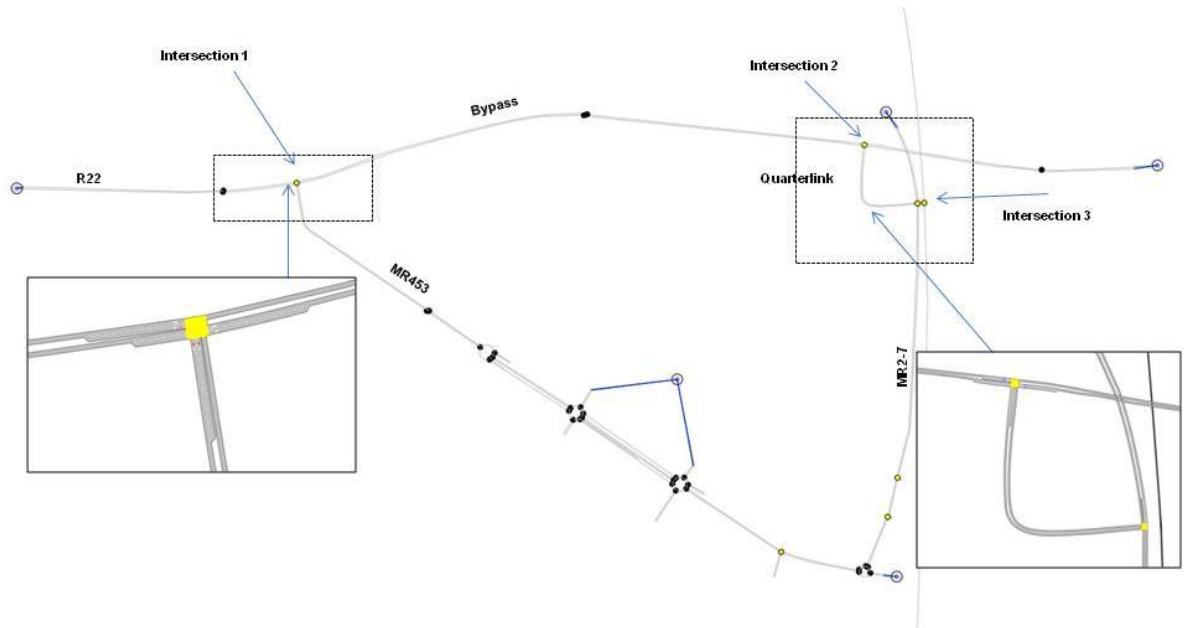


Figure 5.2: Proposed Future Network, Alternative 1

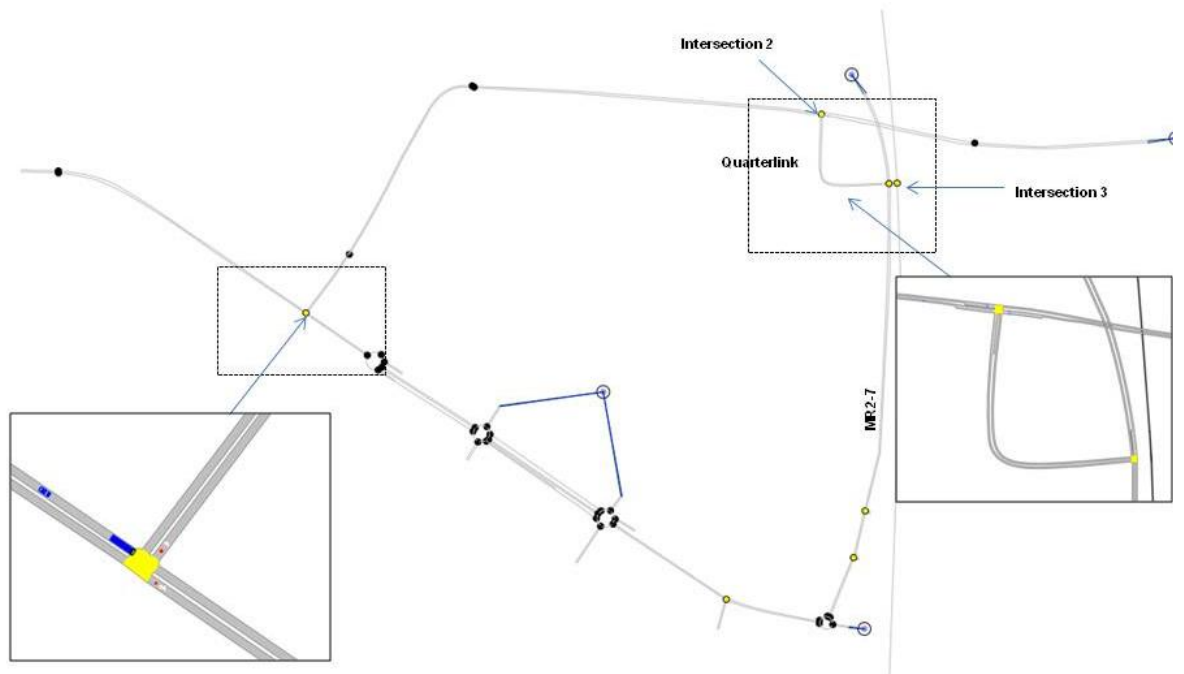


Figure 5.3: Proposed Future Network, Alternative 2

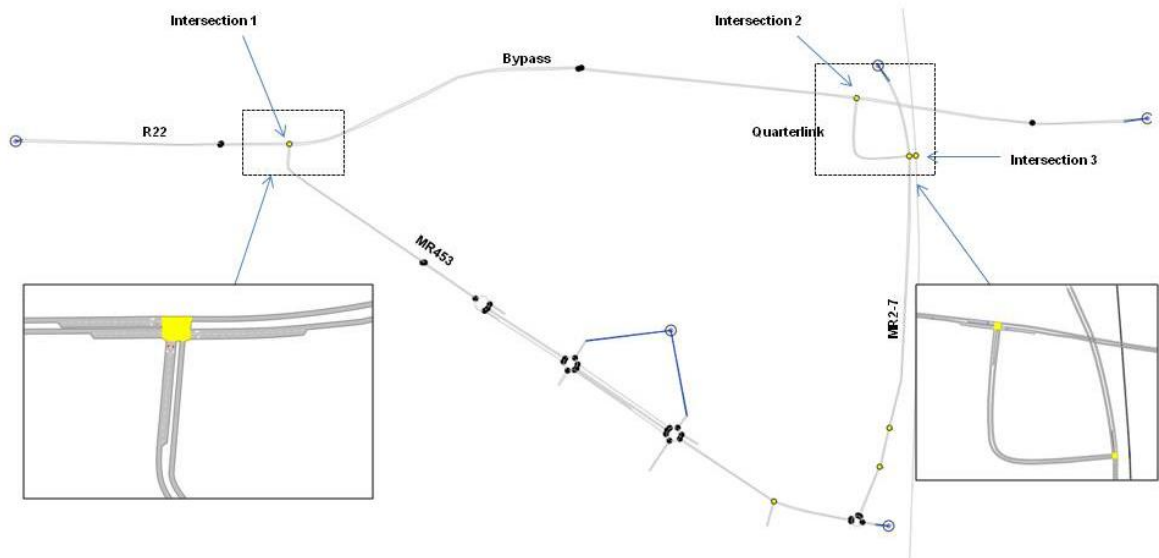


Figure 5.4: Proposed Future Network, Alternative 3

The base network was built from Google Earth Imagery, which at the time was the latest photography available. The future network was built on preliminary traffic layouts provided in AutoCAD format. In terms of the network components required in the AIMSUN model, the following road characteristics were specified:

- Road sections: Number of lanes, widths, classification, geometric location and curvature.
- Nodes representing intersections: Type of control (signals, stop or yield).
- Turns: Allowed turning movements, turning lanes, etc.

No site visits were undertaken to confirm the layouts of the intersections or road elements, as observed from Google Earth.

5.1.1 Road Classification

Three categories of road sections were created which are described in **Table 5.1**.

Table 5.1: AIMSUN Road Classifications

Road Type	Classification	Capacity (Vehicles / hour / lane)	Speed (Km/h)
1	Rural Road	1600	100
2	Urban Road	1400	60
3	Urban Street	1200	50

5.1.2 Matrix Development

Trip Matrices were developed for the AM peak hour (08:00 – 09:00) for the existing traffic volumes and includes future bypass traffic. The matrix excludes internal trips within the town centre. A manual trip distribution was carried out based on the traffic count data and licence plate survey results (see **Figure 3.1**). The base traffic counts were balanced to create a trip matrix as shown in **Table 5.2**.

The following zones were defined in order to create the origin-destination matrix for the model (see figure 5.5):

- Zone 1: Area east of Hluhluwe;
- Zone 2: Area north of Hluhluwe;
- Zone 3: Area south of Hluhluwe
- Zone 4: Town Centre
- Zone 5: Area west of Hluhluwe

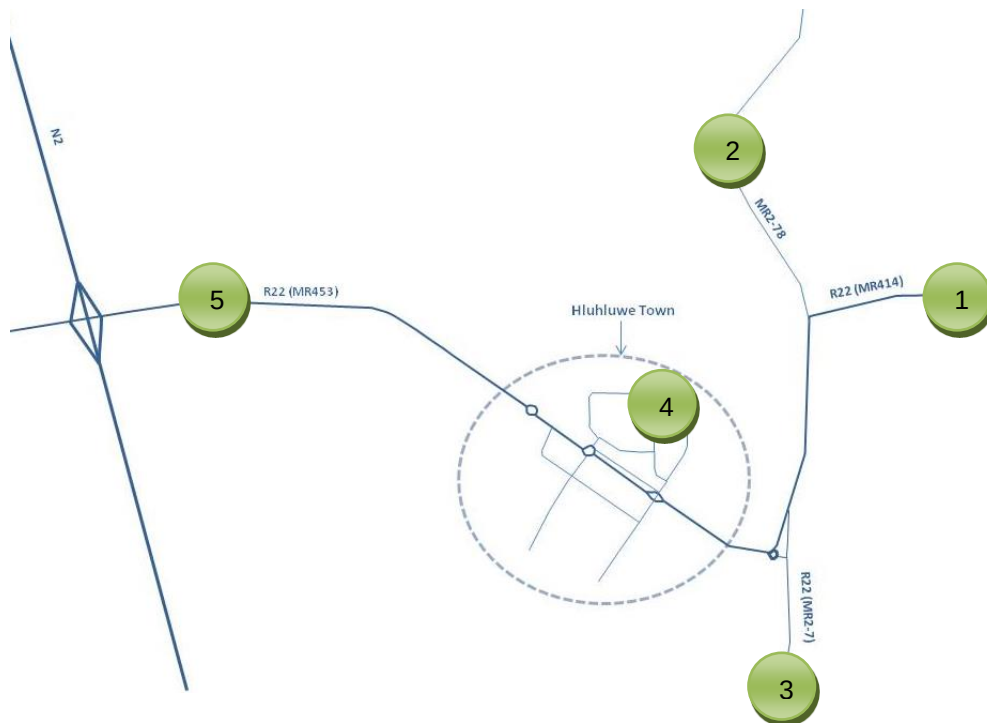


Figure 5.5: Traffic zones – Model

Table 5.2: Trip Matrix for Total trips (Light & Heavy vehicles)

		Destination				
		Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Origin	Zone 1	X	1	19	60	71
	Zone 2	2	X	2	3	3
	Zone 3	2	1	X	53	10
	Zone 4	78	2	29	X	121
	Zone 5	59	2	16	162	X
	Total	141	6	66	278	205

Table 5.3 indicates the percentage trip distribution for the various modelled zones. The table indicates that Zone 2 generates a very small percentage of vehicular trips and similarly attracts a small amount of trips. For the creation of an origin-destination matrix, it was assumed that 5% of the traffic observed at ANPR Station 2 have destinations in or originates from Zone 2.

Table 5.3: Percentage trip origin distribution per zone

		Destination				
		Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Origin	Zone 1		1	12	40	47
	Zone 2	20		20	30	30
	Zone 3	3	2		80	15
	Zone 4	34	1	12		53
	Zone 5	24	1	7	68	

The traffic surveys show that the average Heavy Vehicles (HV) contributed 11% of the total traffic volumes. Separate trip matrices for heavy and light vehicles were developed by using a 89:11 (light vehicle: heavy vehicle) modal split.

5.2 Model Output and Results

The AIMSUN Model enabled the testing of the various route alternatives and to compare them against the existing scenario. Recommendations with regard to traffic and safety benefits became apparent once the modelling results were analysed. The following attributes formed the basis of to compare the road infrastructure alternatives:

- Travel time;
- Distance travelled;
- Delay time;
- Average speed.

Generally speaking, one of the core reason for motivating a bypass to a town is the diversion of through traffic travelling through the town centre, thereby improving traffic conditions for those vehicles within the town centre and reducing delays for vehicles bypassing the town. The construction of a bypass often has significant environmental and economic consequences. On the one hand, they reduce noise and pollution emissions along the existing route, while on the other hand, such projects are often accompanied by fears on the part of local proprietors and businesses regarding the scope of their business revenues, the value of their properties, and the impact of the road on land uses. Petrol stations, quick stop service stations and fast food restaurants cater largely for through traffic and are the most likely to be impacted by the diversion of traffic due to the bypass, although all alternatives provides easy access to the CBD.

Evident from the number plate survey was that almost 70% of traffic coming from the west of Hluhluwe went to Hluhluwe town area or areas to the east of Hluhluwe, and returned again during the 12 hour survey period. This suggest that the impact of the bypass will not have a big impact on local business. Also, only 25% of the eastbound traffic observed at ANPR 1 passed through the town and was observed at ANPR 2, while 47% of the vehicles observed at ANPR 2 passed through the town and was observed at ANPR 1. The traffic counts observed at station 3 suggest that 67% of the traffic coming from the west or Hluhluwe town turn left at the circle and travels north, while 91% of the traffic coming from the north travels towards the west with 53% of them travelling to Hluhluwe town.

The following potential benefits can be derived from the construction of a bypass to the north of Hluhluwe town area:

- The elimination of the R22 at-grade railway crossing. This offers a significant safety benefit for both the town centre traffic as well as regional traffic.
- Improvement of road safety along the section of the MR453 that passes through the town centre, especially for pedestrians due to the reduction of vehicular and pedestrian conflict in the town area.
- 11% of heavy vehicles identified which are not destined for the town centre. The bypass will provide an alternative route for these vehicles, removing most of them from the town centre. This will increase the lifespan of the pavement of MR453.
- Noise and pollutant emission reduction in town area.

- Travel time saving for through traffic.
- Opportunity for local construction contractors and associated local community enterprises to gain economic benefits from the construction of the bypass.

Table 5.4 below shows the model outputs for the three alternatives tested compared against the Null Alternative (Do Nothing), the table also shows the average travel time and speed between Zone 1 to Zone 5 for each alternative.

Table 5.4: Model Outputs for the Bypass Alternatives (Existing Year)

Alternative	All Vehicles						Bypass Vehicles Only					
	Vehicles	Average Speed (km/h)	Total Distance Travelled (km)	Average Delay (seconds/km)	Travel Time (seconds/km)	Total Travel Time (seconds)	Travelling Westwards (Zone 5 to 1)			Travelling Eastwards (Zone 1 to 5)		
							Vehicles	Average Travel Time (Zone 1 to 5)	Average Travel Speed	Vehicles	Average Travel Time (Zone 1 to 5)	Average Travel Speed
0	718	60.3	2400	7.3	60.2	144526	59	364.2	60.4	71	360.2	60.8
1		67.8	2268	6.2	53.1	120426		160.1	98.4		157	100.3
2		66.4	2245	5.1	54.2	121744		219.6	80.0		204.2	85.8
3		67.8	2265	6.2	53.1	120355		160.8	98.4		157.5	100.4

The results indicate that Alternative 1 and 3 has the lowest total travel time and highest average speed for **all vehicles within the model**. Alternatives 1 and 3 have the lowest travel time and highest average speed for the traffic **using the bypass only**.

All Alternatives (1, 2 and 3) showed improved travel time and delay than the existing (Do Nothing) scenario, confirming that the bypass is beneficial from a traffic and transport point of view.

The trip generation and growth rate methodology discussed in Section 4, together with the trip distribution method explained in Section 5.1.2. were used to develop a 20 year trip matrix as displayed in **Table 5.5)**

Table 5.5: Trip Matrix for Total trips (Light & Heavy vehicles) – 2034 Forecast year

		Destination				
		Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Origin	Zone 1	X	2	27	132	103
	Zone 2	3	X	3	6	5
	Zone 3	3	2	X	94	15
	Zone 4	136	4	50	X	212
	Zone 5	86	3	23	306	X
	Total	228	11	103	538	335

Table 5.6 below shows the 2034 model results for the three alternatives for future traffic tested and compared against the Null Alternative. The results for the future scenario is very similar to the existing scenario, with Alternative 1 and 3 having the lowest travel time and highest average speed for **all vehicles within the model**. All Alternatives showed improved travel time than the existing scenario, especially the bypass traffic where the travel time reduces with more than 50%. This confirms that the bypass is beneficial from a traffic and transport point of view.

Table 5.6: Model Outputs for the Bypass Alternatives (20 Year Forecast)

Alternative	All Vehicles						Bypass Vehicles Only					
	Vehicles	Average Speed (km/h)	Total Distance Travelled (km)	Average Delay (seconds/km)	Travel Time (seconds/km)	Total Travel Time (seconds)	Travelling Westwards (Zone 5 to 1)			Travelling Eastwards (Zone 1 to 5)		
							Vehicles	Average Travel Time (Zone 1 to 5)	Average Travel Speed	Vehicles	Average Travel Time (Zone 1 to 5)	Average Travel Speed
0	1181	59.4	3953	8.26	61.8	241445	77	369.5	59.6	93	369.4	59.2
1		67.6	3759	6.8	58.1	200282		160.8	98		161.6	97.5
2		65.6	3681	6	55.8	202105		225.8	77.8		208.1	84.2
3		67.5	3758	6.9	58.1	200522		161.5	98		162.1	97.6

5.2.1 *Benefit for Regional Traffic*

Focussing on the benefit for the regional traffic, the through traffic travelling from the west (N2) to the east (St. Lucia, Swaziland, Mozambique, Sodwana Bay and Game lodges) and also in the opposite direction, alternatives 1 and 3 have the best results. This is based on lowest calculated travel times between the two zones. One of the main reasons for this is that these two alternatives have the shortest bypass distance and also eliminates through traffic having to go through a priority intersection to the west of Hluhluwe town. Alternative 1 is recommended above Alternative 3, because, despite having nearly identical results, Alternative 3 is likely to be more expensive to implement since it involves the expropriation of the Gazebo Lodge property and demolition of these buildings.

5.2.2 *Benefit for Town Traffic*

In addressing the benefit to the town, it must first be established whether or not there is a need for the bypass. It has been mentioned that the primary reason for the bypass is the elimination of the R22 at-grade railway crossing, as this enhances the safety of all road users in the Hluhluwe area (local and visitor traffic). Benefits to the town include improved safety of pedestrians as the bypass removes all through traffic (except those wishing to stop in town). Other benefits include the reduction of HV traffic through the town (currently 11%), which also reduces noise and vehicle emissions within the town.

The AIMSUN model results indicate that with Alternative 2, some of the traffic from the town wishing to travel east prefer to use the bypass. This is because the bypass skirts the northern edge of the town and joins MR453 at a priority controlled intersection west of the town. This creates an attractive alternative route to the east, as the number of intersections and consequent delays are less than travelling through the town centre. Alternative 2 shows the best results for town traffic.

5.2.3 *Benefit for All Road Users*

Alternative 1 and 3 is the most beneficial to all the users. The AIMSUN model results indicate that alternative 1 and 3 has the lowest total travel time, the shortest travelling distance for through traffic and also the highest average speed. Alternative 1 is recommended as the preferred option motivated as follows:

- It provides an opportunity for the through traffic to pass Hluhluwe north of the town without going through the town, which reduces the travel time by 50%;
- Alternative 1 is recommended above Alternative 3, because, despite having nearly identical results, Alternative 3 is likely to be more expensive to implement since it involves the expropriation of the Gazebo Lodge property and demolition of these buildings.

5.3 Economic Analysis

Our analysis was based on the National Treasury's Capital Planning Guidelines (2014) and generally accepted CBA best practice to obtain the current rates for each of the parameters e.g. values of time, vehicle operating costs. Where current data did not exist, historical values were indexed to 2014 levels using either the consumer price index (CPI), or average wage rates published by StatsSA. Conceptual design level indicative implementation cost data was calculated by Hatch Goba at a minimum rate of R15 million per km (VAT exclusive), we also used a rate of current contract prices for similar work as a sensitivity test (R8 million per km, VAT exclusive). The economic benefits were built on the traffic modelling outputs from the AIMSUN Model (see Section 5.2). Project benefits were quantified in terms of average network distances. Speeds were captured from the AIMSUN model and used in monetising the benefits.

Travel time and travel distance savings on the most likely project case were compared to the 'Do Minimum' base case.

In order to calculate the net economic worth of the alternative bypass options, our discounted cash flow (DCF) model was applied to calculate the benefit/cost ratio (BCR), internal rate of return (IRR) and net present value (NPV) for option comparisons and selection purposes. In accord with general practice the DCF was undertaken using a 8% real discount rate over a 30 year evaluation period. The results for the options were compared to those in the do nothing (Alternative 0) case to identify the net incremental benefits of the project.

Sensitivity analysis is a key aspect of this study given the many variables and parameters which determine the outcome of the CBA. We undertook a range of sensitivity analyses to test the impact of benefit growth and changes in discount rate on the results.

5.3.1 Quantifying and Monetising Benefits

A distinction should be made between quantifying benefits, which involves measuring the tangible amount that would be saved. This can usually be expressed in terms of physical units, as a result of the transport improvements and monetising benefits, which involves applying a rand value to the quantified benefits. We quantified the economic benefits, such as time saved, decrease in kilometres travelled, lower fuel consumption and crashes avoided with the assistance of the AIMSUN transport model described in Section 5.2.

Unit prices used for monetising benefits are listed in Table 7.1 below. Appropriate inflation adjustments were made to reflect 2014 prices in cases where data applied to an earlier year.

Table 5.7: Economic Unit Prices

	Light	Heavy
Fuel (R)	9.8	10.16
Oil (R)	32	32
Tyres (R)	5,572	192,500
Capital (R)	196,529	1,063,546
	Business	Non-business
Time value (R per hour)	80	40

5.3.2 Evaluation Outcomes

The following observations were made from the results showed in Table 5.10 based on a minimum capital cost of R57,855,000.00 for alternative 1, R45,000,000.00 for alternative 2 and R57,270,000.00 for alternative 3 (VAT excl.):

- All the alternative are economically viable, albeit with values just above the marginal rates of return. The break even cost for Alternative 1 and 3 to remain economically viable is R61,573,000.00 (VAT excl.), beyond which the project would not be viable. Alternative 2 would not be economically justified beyond a cost of R60,000,000.00 (VAT excl.).
- Alternative 2 delivers the best IRR with the highest BCR and NPV. From an economic perspective it is therefore the preferred option, due to the shorter section of new road that needs to be build, reducing the capital cost. Although alternative 2 has the best BCR, Alternative 3 is the most beneficial to all the users.
- Alternative 1,2 and 3's first year rate of return indicates that it is justified for immediate implementation.
- The high implementation cost is due mainly to the inclusion of a road over rail bridge. The results show that excluding the cost of the road over rail bridge increases the BCR to 1.6 for Alternative 1 and 3, and 2.4 for Alternative 2.
- The residual value of the bridge has been taken into consideration during this study.

Table 5.8: Economic Evaluation Outcomes – Minimum Cost

Alternative 1						Alternative 2						Alternative 3					
NPV R 3,443,040						NPV R 14,840,698						NPV R 4,596,344					
PWOB R 61,573,483						PWOB R 61,027,953						PWOB R 62,234,052					
BCR 1.1						BCR 1.4						BCR 1.1					
IRR 8.6%						IRR 11.2%						IRR 8.8%					
Costs	Benefits	Net benefit	FYRR			Costs	Benefits	Net benefit	FYRR			Costs	Benefits	Net benefit	FYRR		
0	2015	57855000	4632387	-57855000	8.0%	0	2015	45000000	4551997	-45000000	10.1%	0	2015	57270000	4668655	-57270000	8.2%
1	2016		4702403	4702403	8.1%	1	2016		4625147	4625147	10.3%	1	2016		4740870	4740870	8.3%
2	2017		4772419	4772419	8.2%	2	2017		4698296	4698296	10.4%	2	2017		4813085	4813085	8.4%
3	2018		4842435	4842435	8.4%	3	2018		4771446	4771446	10.6%	3	2018		4885301	4885301	8.5%
4	2019		4912451	4912451	8.5%	4	2019		4844596	4844596	10.8%	4	2019		4957516	4957516	8.7%
5	2020		4982467	4982467	8.6%	5	2020		4917746	4917746	10.9%	5	2020		5029731	5029731	8.8%
6	2021		5052483	5052483	8.7%	6	2021		4990896	4990896	11.1%	6	2021		5101946	5101946	8.9%
7	2022		5122499	5122499	8.9%	7	2022		5064046	5064046	11.3%	7	2022		5174161	5174161	9.0%
8	2023		5192515	5192515	9.0%	8	2023		5137195	5137195	11.4%	8	2023		5246377	5246377	9.2%
9	2024		5262531	5262531	9.1%	9	2024		5210345	5210345	11.6%	9	2024		5318592	5318592	9.3%
10	2025		5332547	5332547	9.2%	10	2025		5283495	5283495	11.7%	10	2025		5390807	5390807	9.4%
11	2026		5402564	5402564	9.3%	11	2026		5356645	5356645	11.9%	11	2026		5463022	5463022	9.5%
12	2027		5472580	5472580	9.5%	12	2027		5429795	5429795	12.1%	12	2027		5535237	5535237	9.7%
13	2028		5542596	5542596	9.6%	13	2028		5502944	5502944	12.2%	13	2028		5607452	5607452	9.8%
14	2029		5612612	5612612	9.7%	14	2029		5576094	5576094	12.4%	14	2029		5679668	5679668	9.9%
15	2030		5682628	5682628	9.8%	15	2030		5649244	5649244	12.6%	15	2030		5751883	5751883	10.0%
16	2031		5752644	5752644	9.9%	16	2031		5722394	5722394	12.7%	16	2031		5824098	5824098	10.2%
17	2032		5822660	5822660	10.1%	17	2032		5795544	5795544	12.9%	17	2032		5896313	5896313	10.3%
18	2033		5892676	5892676	10.2%	18	2033		5868693	5868693	13.0%	18	2033		5968528	5968528	10.4%
19	2034		5962692	5962692	10.3%	19	2034		5941843	5941843	13.2%	19	2034		6040744	6040744	10.5%
20	2035		6032708	6032708	10.4%	20	2035		6014993	6014993	13.4%	20	2035		6112959	6112959	10.7%
21	2036		6102724	6102724	10.5%	21	2036		6088143	6088143	13.5%	21	2036		6185174	6185174	10.8%
22	2037		6172740	6172740	10.7%	22	2037		6161293	6161293	13.7%	22	2037		6257389	6257389	10.9%
23	2038		6242756	6242756	10.8%	23	2038		6234443	6234443	13.9%	23	2038		6329604	6329604	11.1%
24	2039		6312772	6312772	10.9%	24	2039		6307592	6307592	14.0%	24	2039		6401820	6401820	11.2%
25	2040		6382788	6382788	11.0%	25	2040		6380742	6380742	14.2%	25	2040		6474035	6474035	11.3%
26	2041		6452804	6452804	11.2%	26	2041		6453892	6453892	14.3%	26	2041		6546250	6546250	11.4%
27	2042		6522820	6522820	11.3%	27	2042		6527042	6527042	14.5%	27	2042		6618465	6618465	11.6%
28	2043		6592836	6592836	11.4%	28	2043		6600192	6600192	14.7%	28	2043		6690680	6690680	11.7%
29	2044		6662852	6662852	11.5%	29	2044		6673341	6673341	14.8%	29	2044		6762896	6762896	11.8%
30	2045	-14000000	6732868	20732868	11.6%	30	2045	-14000000	6746491	20746491	15.0%	30	2045	-14000000	6835111	20835111	11.9%



6. Conclusions and Recommendations

This traffic report has reviewed the various transportation benefits that the proposed three bypass alternatives would have when compared to the existing situation (viz. The Null Alternative).

The following conclusions are drawn:

- Three alternative bypass alignments were investigated. They were
 - Alternative 1 – The proposed bypass route follows the R22 alignment from the east as far as possible and then rises above the railway line by way of a road over rail bridge. The alignment extends past the north of the town and ties into the R22 west of the town.
 - Alternative 2 – The proposed alignment follows a similar route as alternative 1 across the railway line, but skirts the northern edge of the town and joins the R22 (MR453) at a priority intersection just west of the town.
 - Alternative 3 – The bypass alignment follows a straight line connection as far as possible between the western and eastern portions of the R22. This alignment is similar to alternative 1, with the only difference being the road alignment across the railway crossing and the road alignment to the west of Hluhluwe where the R22 connects with the R22 (MR453). .
- All three alternatives eliminate the existing at grade railway crossing along the R22, which offers significant safety benefits to both regional and local traffic;
- Traffic counts were undertaken at key locations surrounding Hluhluwe and indicated the following:
 - A weekday peak hour from 08:00 to 09:00 was observed;
 - The overall traffic demand on the surrounding road network is low (less than 200 vehicles in any direction).
- Numberplate surveys were conducted both to the west and east of Hluhluwe and indicated the following:
 - 25% of all eastbound vehicles (observed west of Hluhluwe) passed through the town in an eastbound direction;
 - 47% of all westbound vehicles (observed east of the Hluhluwe) passed through the town;
 - 68% of the eastbound vehicles (observed west of Hluhluwe) had destinations within the town and returned the same way during the 12 hour survey period.
- A traffic model of the existing and proposed road network was developed to compare the various alternatives and to determine the total travel time for all vehicles on the road network. The calculation of travel time considers capacity restraints, traffic volume increases and intersection delays into the analysis.

- Alternatives 1 and 3 have the lowest travel time and highest average speed for traffic using the bypass only; Alternative 1 requires a smaller footprint of land from the Gazebo Lodge to be expropriated.
- All Alternatives (1, 2 and 3) showed improved travel time and delay than the existing scenario, confirming that the bypass is beneficial from a traffic and transport point of view.
- **Alternative 1 and 3 is the most beneficial to all the users.** The AIMSUN model results indicate that alternative 1 and 3 has the lowest total travel time, the shortest travelling distance for through traffic and also the highest average speed.
- Based on the results from the analysis it is recommended that **Alternative 3 be selected as the preferred alternative** as it offers the greatest benefit to all road users in terms of total travel time, delay and capacity benefits. The results from the economic analysis indicated that alternative 2 is the most feasible option, while alternative 3 will be the most beneficial to all the road users. (Alternative 2 has the lowest capital cost, resulting in a better cost-benefit ratio than the other two alternatives)

The following recommendations are made:

- The following intersection layouts are proposed as for the various alternatives:

R22 / R22 (MR453) Priority Intersection (new intersection)

- Provision of a right turn lane to protect right turners from eastbound through moving vehicles;
- Provision of a left turn deceleration lane to allow vehicles to turn left without obstructing through moving vehicles;
- Provision of an acceleration lane to allow vehicles turning left onto the bypass to accelerate before joining through moving vehicles;
- Provision of a left turn slip lane for vehicles turning left onto the bypass travelling towards the N2.

Bypass / Quarterlink Priority Intersection (new intersection)

- Provision of a right turn lane to protect right turn vehicles;
- Provision of a left turn deceleration lane to allow vehicles to turn left without obstructing through travelling vehicles;
- Provision of an acceleration lane to allow vehicles turning left onto the bypass to accelerate before joining through moving vehicles;

Quarterlink / MR2-7 Priority Intersection (new intersection)

- Provision of a right turn lane for southbound vehicles using the quarterlink.
- Shoulder Sight Distance and Stopping Sight Distance should be confirmed for all intersections during the design stage;

- It is recommended that **Alternative 1 or 3 be selected as the preferred alternative** as it is the most beneficial to ALL ROAD USERS.

7. References

1. National Department of Transport, Road Infrastructure Strategic Framework For South Africa (RIFSA) (2007).
2. Technical Recommendations for Highways TRH17, Geometric Design of Rural Roads (1988).
3. The Big 5 False Bay Municipality, Draft IDP Review 2013/2014, Hluhluwe (2014).
4. Uddi, Big 5 False Bay Spatial Development Framework, Final Comprehensive Report, Department of Governance and Traditional Affairs, Province of Kwazulu Natal (2013).

APPENDIX A

Geometric Layouts for Alternatives 1, 2 and 3



forestry, fisheries & the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

SPECIALIST DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE

Traffic Study Report

Kindly note the following:

1. This form must always be used for assessment that are in support of applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting, where this Department is the Competent Authority.
2. This form is current as of August 2023. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at <https://www.dffe.gov.za/documents/forms>.
3. An electronic copy of the signed declaration form must be appended to all Draft and Final Reports submitted to the department for consideration.
4. The specialist must be aware of and comply with 'the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020', where applicable.

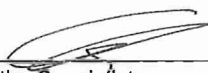
1. SPECIALIST INFORMATION

Title of Specialist Assessment	Traffic Impact Assessment
Specialist Company Name	Hatch Africa (Pty) Ltd
Specialist Name	Craig Bradley
Specialist Identity Number	6306235136087
Specialist Qualifications:	BTech (Civil)
Professional affiliation/registration:	PrTechEng (Civil)
Physical address:	2 nd Floor False Bay Building, Tygerberg Park, 163 Uys Krige Drive, Platteklouf, Cape Town, 7500
Postal address:	P.O Box 3878
Postal address	Tygervalley, 7536
Telephone	021 911 5823
Cell phone	084 464 6046
E-mail	Craig.bradley@hatch.com

2. DECLARATION BY THE SPECIALIST

I, Craig Bradley declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
 - any decision to be taken with respect to the application by the competent authority; and;
 - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of the Specialist

Hatch Africa (Pty) Ltd

Name of Company:

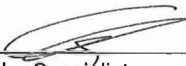
03 Jul 2025

Date



3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Craig Bradley, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.


Signature of the Specialist

Hatch Africa (Pty) Ltd
Name of Company

03 July 2025
Date

Click or tap here to enter text.


Signature of the Commissioner of Oaths

Click or tap to enter a date. 4 July 2025
Date

Sumira Jivan

Admitted Attorney of the High Court of South Africa
Commissioner of Oaths ex officio
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