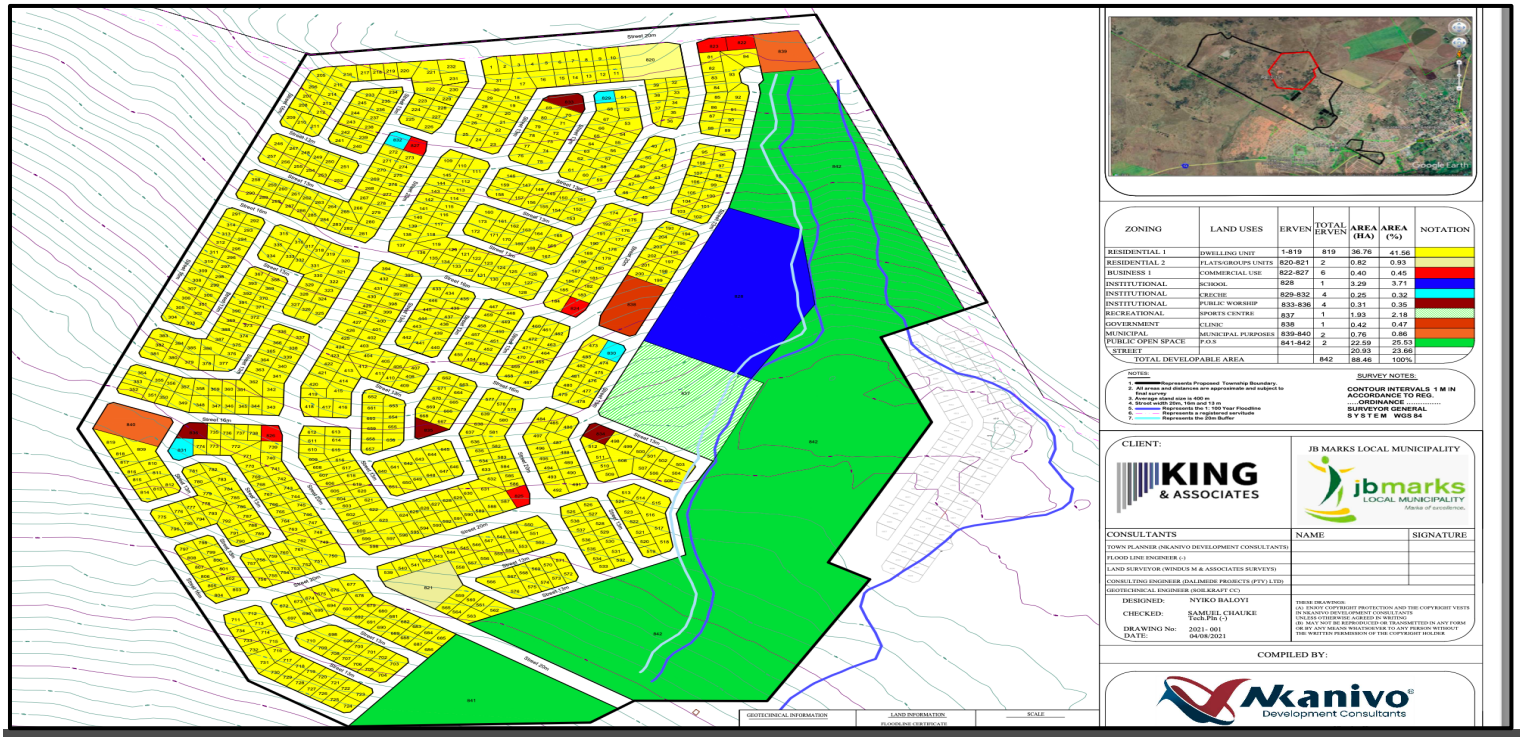

TRAFFIC IMPACT STUDY

THE PROPOSED TOWNSHIP TO BE SITUATED ON PORTION 3 OF THE FARM DOORNPAN NUMBER 193IP IN JB MARKS LOCAL MUNICIPALITY

CLIENT:

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Rev 01

19th November 2021

ABIDIA

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DOCUMENT CONTROL SHEET

Project Title	**THE PROPOSED TOWNSHIP TO BE SITUATED ON PORTION 3 OF THE FARM DOORNPAN NUMBER 193IP IN JB MARKS LOCAL MUNICIPALITY**
Report Title	**TRAFFIC STUDY REPORT**
Reference	
Date	**19th November 2021**

RECORD OF REVISIONS AND AMENDMENTS

Date	Section	Title	Revision No.

QUALITY CONTROL

Prepared By	**Designation**	**Signature**	**Date**
Mfundo Mkhize	Traffic Engineer		2021-11-19
Checked By	**Designation**	**Signature**	**Date**
Abraham Mukokanduku	Traffic Engineer		2021-11-19
Issued By	**Designation**	**Signature**	**Date**
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DECLARATION

I certify that this TRAFFIC IMPACT STUDY – **PORTION 3 OF THE FARM DOORNPAN NUMBER 193IP IN JB MARKS LOCAL MUNICIPALITY** was prepared by me according to the requirements of the South African Traffic and Site Traffic Assessment Manual and I have experience and training in the field of traffic and transportation engineering.

Signed……..

Date: 19 November 2021

Name	:	**Abraham Mukokanduku (PrEngTech; PrCPM)**
Qualification	:	**B.Sc. Hons Civil Engineering**
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1. INTRODUCTION

1.1. Background

Abidia Structural Engineers and Project Managers was appointed by Nkanivo Development Consultants in April 2021 to conduct a traffic impact assessment for Township Establishment of Doornpan in JB Marks Local Municipality, within the Dr Kenneth Kaunda District Municipality in the North West Province.

There is a green field on the proposed property and 842 stands have been proposed by the Town Planners for the development – in which 821 stands are residential.

Abidia Structural Engineers and Project Managers conducted traffic assessment at three traffic intersections as follows:

- Intersection A – Lephurrwane Street & Manaka Street (26°18'53.21"S, 26°48'2.50"E),
- Intersection B – Dock Street & Manaka Street (26°18'22.43"S, 26°48'5.36"E), and
- Intersection C – Dock Street & Dingaka Street (26°18'36.56"S, 26°48'33.83"E), for a two-day manual count (Friday 14th and Saturday 15th May 2021).

1.2. Objectives of the Traffic Impact Assessment

The objectives of the Assessment report are as follows:

- To determine the impact that the additional traffic generated by the proposed development will have on the existing and future road network (if applicable);
- To propose measures (if applicable) that could be put in place to accommodate the impact that the proposed development will have on the existing traffic and road conditions;
- To determine suitable access regimes for the proposed development; and
- To provide sufficient information for the approval of the proposed development.

1.3. Report Structure

The remainder of the report is structured as follows:

- The development details, study area and comments on the site visit are provided in **Chapter 2**;
- Matters pertaining to the existing roadway elements, Public transport and pedestrian matters are discussed in **Chapter 3**;

- The existing traffic conditions and proposed development's traffic are described in **Chapter 4**;
- The capacity analysis of the existing traffic and the impact of the proposed development traffic are detailed in **Chapter 5**;
- The proposed town layout is assessed in terms of access spacing, accommodation of public transport and pedestrians in **Chapter 6**; and
- The TIS conclusions and recommendations are summarised in **Chapter 7**.

1.4. Methodology

The guidelines as outlined in the TMH 16 Vol 1 – South African traffic Impact and Site Assessment Manual were followed. Guidelines as set by the JB Marks Local Municipality were not available during this study.

In detail, the methodology followed is outlined below:

- From the two-day manual traffic count conducted at Intersection A, Intersection B and Intersection C on a Friday and Saturday current traffic flow patterns were obtained, affected accesses were noted;
- Based on TMH 17 Vol. 1 – South African Trip Data Manual, trips that will be generated by the development using applicable trip generation rates as specified in the said manual were noted;
- Taking cognisance of the proposed traffic volumes existing routes were assessed against negative impacts in terms of traffic flow;
- Traffic operation, intersection safety and the existing road condition were assessed; and
- Considering the major findings of this study conclusions and recommendations were made.

1.5. Development Controls and Property Particulars

The development is a greenfield development with informal settlements within the site. The details of the rights applied for and respective trip generation rates are shown in Table 1 below. The developments comprise of the development of Doornpan in JB Marks Local Municipality. The town layout is shown in **Figure 1** below.

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Table 1: Doornpan – Mixed Use Development

Portion	Land Use	Erven/ Units	Adjustment Factors Applied		Land Use Code	Trip Rate		Directional Split (%)			
			Mixed Use Development	Very Low Car Ownership		Peak hour		AM Peak		PM Peak	
						AM	PM	In	Out	In	Out
3 of Farm Doornpan 193	Residential 1 (low income)	**821**	Y	YES (70% Trip Adjustment factor)	210	1.0	1.0	0.25	0.75	0.70	0.30

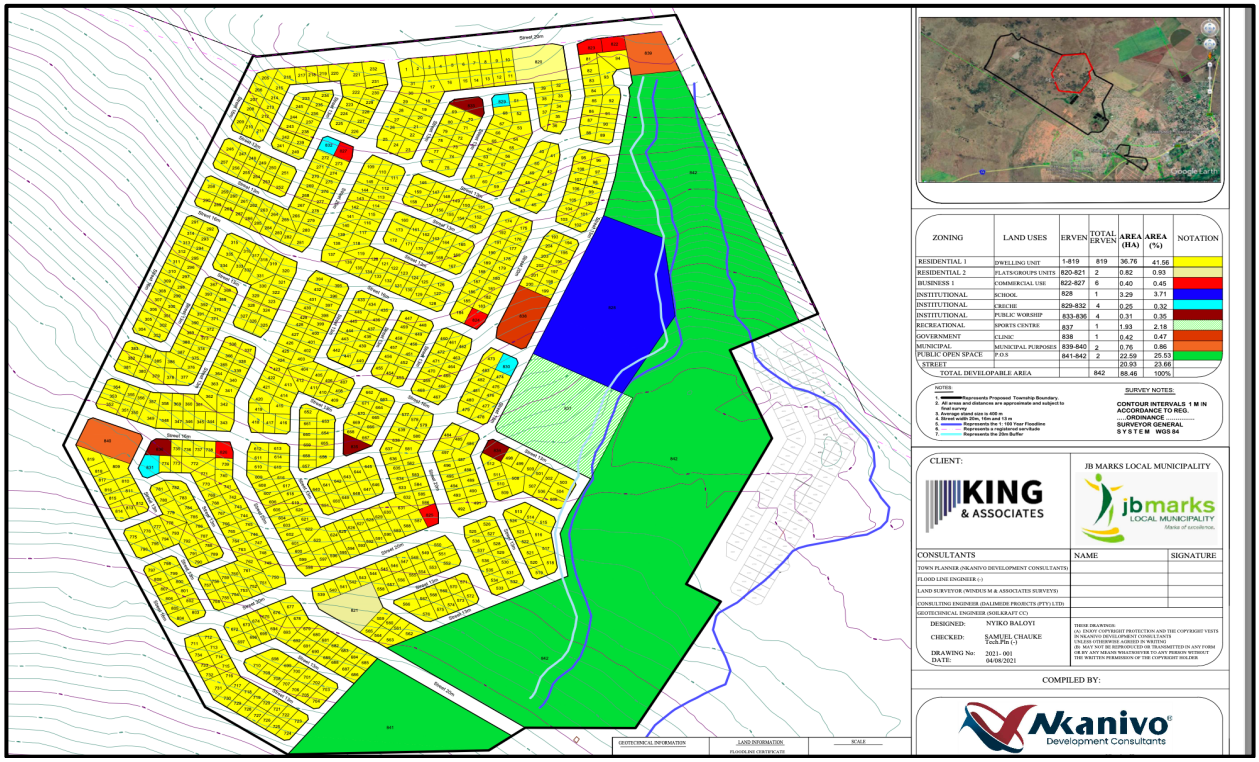

Figure 1: Proposed Township Layout - Doornpan

1.6. Site Visit

A site visit was conducted to attain a sense of the area in terms of traffic engineering aspects. The objectives of the site visit were:

- To observe the existing traffic operations and pedestrian movement; and
- To reaffirm the geometric layout of the intersections in the study area.

The site visit was under taken on 14th and 15th May 2021 in clear weather conditions. The observations made during the site visit are summarised in the subsequent sections per intersection in the study area.

1.6.1. Intersection A – Lephurrwane Street & Manaka Street

The observations made relating to the area in the direct vicinity of the intersection include:

- Manaka Street falls under jurisdiction of JB Marks Local Municipality and intersection A remains under the jurisdiction of the JB Marks Local Municipality,
- The locality of the intersection and the surroundings are presented in **Figure 2**,
- The intersection is four way stop sign controlled,
- Deceleration lanes are not provided to accommodate left turning traffic from the Manaka Street,
- Dedicated pedestrian crossing is not provided at the intersection,

Figure 2: Geometric Configuration of Intersection A

1.6.2. Intersection B – Dock Street & Manaka Street

The observations made relating to the area in the direct vicinity of the intersection include:

- Manaka Street falls under jurisdiction of JB Marks Local Municipality and intersection A remains under the jurisdiction of the JB Marks Local Municipality,
- The locality of the intersection and the surroundings are presented in **Figure 3**,
- The intersection is a three way stop sign controlled,

- Deceleration lanes are not provided to accommodate left turning traffic into the intersection,
- No dedicated pedestrian crossing is provided at the intersection,

Figure 3: Geometric Configuration of Intersection B

1.6.3. Intersection C – Dock Street & Dingaka Street

The observations made relating to the area in the direct vicinity of the intersection include:

- Manaka Street falls under jurisdiction of JB Marks Local Municipality and intersection A remains under the jurisdiction of the JB Marks Local Municipality,
- The locality of the intersection and the surroundings are presented in **Figure 4**,
- The intersection is three way stop sign controlled,
- Deceleration lanes are not provided to accommodate left turning traffic into the intersection,
- No dedicated pedestrian crossing is provided at the intersection,

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Figure 4: Geometric Configuration of Intersection C

1.7. Study Area

No informal settlement on the proposed site was identified during the site visit.

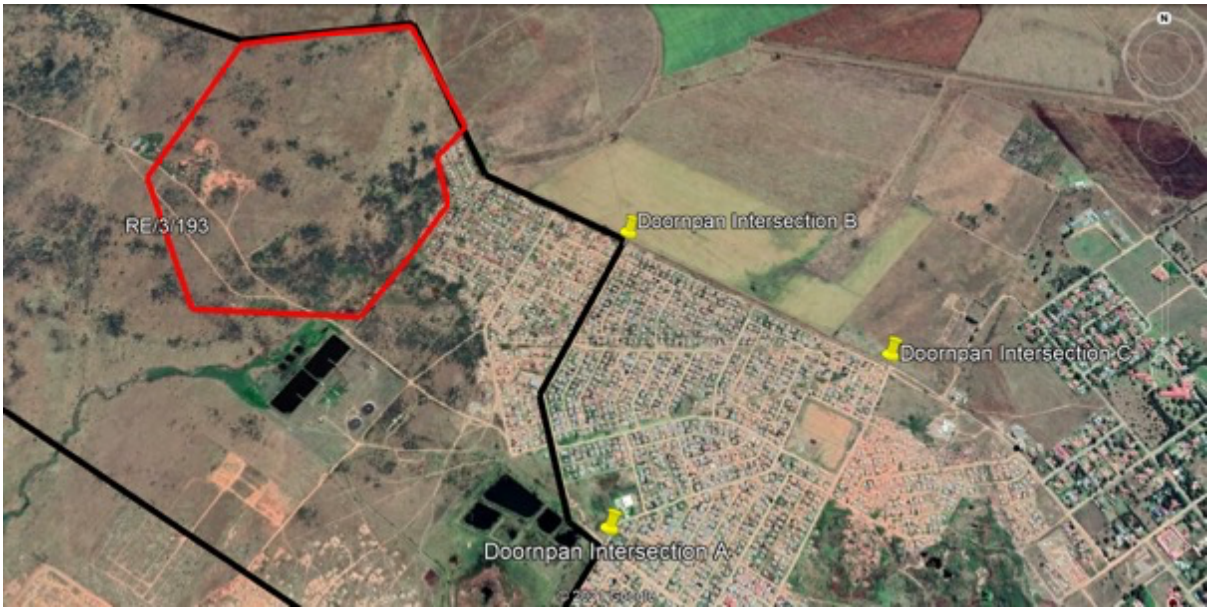

Figure 5: Intersection Overview and Layout

The proposed Doornpan project will be located on a property that is 88.46ha, which is zoned as follows:

- 819 No. Residential 1;
- 2 No. Residential 3
- 6 No. Business 1;

- 1 No. Institutional – School;
- 4 No. Institutional – Crèche;
- 4 No. Institutional – Public Worship;
- 1 No. Recreational;
- 1 No. Government;
- 2 No. Municipal Purposes; and
- 2 No. Public Open Space.

Doornpan is predominantly a residential area, with most of commercial activities taking place within Tshing Town. Doornpan will be accessed from **intersection A** being the road serving the proposed Settlement, with **Intersection B**, to be upgraded as an alternative main access. The Proposed development is currently accessible via Manaka Street at intersection A.

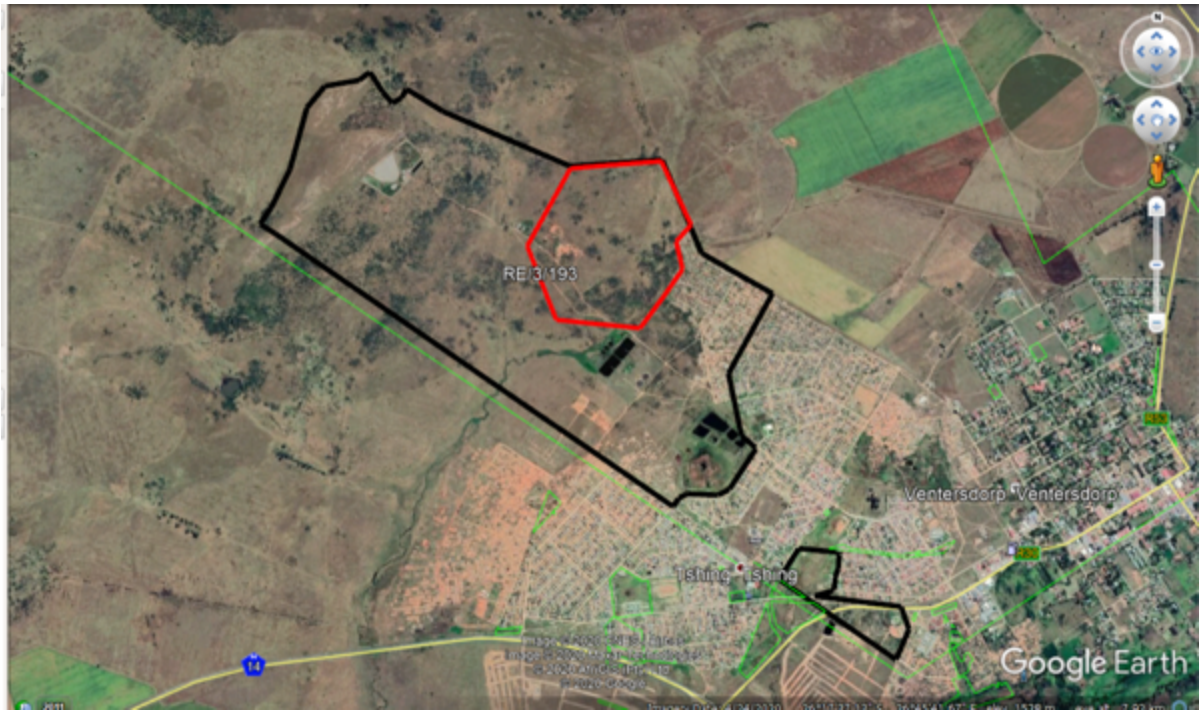

Figure 6– Locality Plan

Investigations conducted were mainly on Manaka Street (Intersection A) and Dock Street (Intersection B) which are the main access roads serving proposed Doornpan development and the greater part of Tshing Community.

In general, the area is currently being utilised for both residential and commercial purposes.

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2. EXISTING TRAFFIC AND OPERATION SCENARIO

Traffic counts over the two-day period were conducted along the intersections A, B & C on the 14th & 15th May 2021. The manual counts are attached on Annexure B and Sidra Analysis conducted attached as Annexure C. The traffic count was conducted for one weekday (Friday) and one weekend (Saturday).

Also noticed is the lack of a designated taxi rank, lack of drop-off zones esp. near schools, creches and communal amenities.

Also, to note is the absence of covered public transport facilities along all the roads within Doornpan, and we do recommend that Doornpan covered public transport facilities together with drop off zones as articulated in the planning development layout. **Figures 2 to 6** above illustrate the layout of the intersections together with associated facilities.

3. TRAFFIC DEMAND

3.1. Existing Traffic Condition

The effects of COVID 19 affect the existing traffic condition and we have applied a factor of 1.2 to take care of the lockdown effects. A factor of 1.2 has been adopted since the Doornpan community were on a relaxed mode of lockdown, there was minimum compliance to lockdown effects.

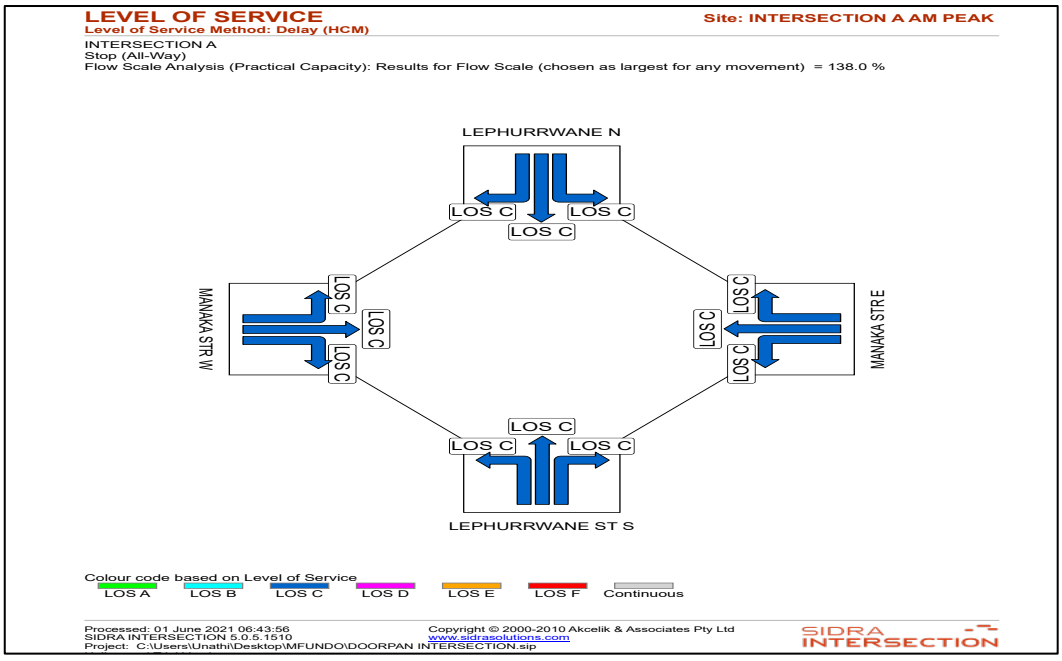

Figure 7.1– Intersection A Existing LOS Map

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There is a total of **42 veh/hr**. traversing on Manaka Street from Doornpan side and 28veh/hr with an average traffic flow of **70veh/hr**. on Lephurrwane Street, on intersection **A**. An average growth rate of 3,5% per annum for urban area is utilised in the general traffic analysis.

MOVEMENT SUMMARY

Site: INTERSECTION A AM PEAK

INTERSECTION A
Stop (All-Way)
Flow Scale Analysis (Practical Capacity): Results for Flow Scale (chosen as largest for any movement) = 138.0 %

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: LEPHURRWANE ST S											
1	L	3	0.0	0.024	20.6	LOS C	0.1	0.6	0.88	1.14	39.4
2	T	3	0.0	0.024	20.2	LOS C	0.1	0.6	0.88	1.14	39.6
3	R	3	0.0	0.024	20.4	LOS C	0.1	0.6	0.88	1.14	39.6
Approach		9	0.0	0.024	20.4	LOS C	0.1	0.6	0.88	1.14	39.5
East: MANAKA STR E											
4	L	4	0.0	0.037	16.9	LOS C	0.1	0.8	0.75	1.14	42.1
5	T	12	0.0	0.037	16.5	LOS C	0.1	0.8	0.75	1.14	42.4
6	R	6	0.0	0.037	16.7	LOS C	0.1	0.8	0.75	1.15	42.3
Approach		22	0.0	0.037	16.6	LOS C	0.1	0.8	0.75	1.14	42.3
North: LEPHURRWANE N											
7	L	7	0.0	0.046	19.6	LOS C	0.2	1.1	0.86	1.14	40.1
8	T	4	0.0	0.045	19.1	LOS C	0.2	1.1	0.86	1.14	40.4
9	R	7	0.0	0.046	19.4	LOS C	0.2	1.1	0.86	1.15	40.3
Approach		19	0.0	0.046	19.4	LOS C	0.2	1.1	0.86	1.14	40.3
West: MANAKA STR W											
10	L	6	0.0	0.036	17.1	LOS C	0.1	0.8	0.76	1.14	41.9
11	T	9	0.0	0.036	16.7	LOS C	0.1	0.8	0.76	1.14	42.2
12	R	6	0.0	0.036	16.9	LOS C	0.1	0.8	0.76	1.15	42.1
Approach		20	0.0	0.036	16.9	LOS C	0.1	0.8	0.76	1.14	42.1
All Vehicles		70	0.0	0.046	17.9	LOS C	0.2	1.1	0.80	1.14	41.3

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

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SIDRA INTERSECTION

Figure 8.2– Intersection A Existing Veh/hr

At intersection B, there is a total of **146 veh/hr**. traversing on Dock Street from Doornpan side and 22 veh/hr on Dingaka Street, towards the proposed development.

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MOVEMENT SUMMARY

Site: INTERSECTION B AM PEAK

INTERSECTION B
Stop (Two-Way)
Flow Scale Analysis (Practical Capacity): Results for Flow Scale (chosen as largest for any movement) = 138.0 %

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: DINGAKA STREET											
1	L	1	0.0	0.025	10.9	LOS B	0.1	0.8	0.13	0.86	46.3
3	R	20	0.0	0.025	10.7	LOS B	0.1	0.8	0.13	0.91	46.5
Approach		22	0.0	0.025	10.7	LOS B	0.1	0.8	0.13	0.91	46.5
East: DOCK STR E											
4	L	23	0.0	0.019	8.2	LOS A	0.0	0.0	0.00	0.77	49.0
5	T	13	0.0	0.019	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		36	0.0	0.019	5.2	LOS A	0.0	0.0	0.00	0.49	52.4
West: DOCK STR W											
11	T	9	0.0	0.006	0.1	LOS A	0.0	0.2	0.12	0.00	57.6
12	R	1	0.0	0.006	8.6	LOS A	0.0	0.2	0.12	0.98	48.7
Approach		10	0.0	0.006	1.3	LOS A	0.0	0.2	0.12	0.14	56.2
All Vehicles		68	0.0	0.025	6.4	NA	0.1	0.8	0.06	0.57	50.9

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

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SIDRA INTERSECTION

Figure 9.3 – Intersection B Existing Veh/hr

At intersection C, there is a total of **10 veh/hr**. traversing on Dock Street from Doornpan side and 5 veh/hr, Manaka Street towards the proposed development.

MOVEMENT SUMMARY

Site: INTERSECTION C AM PEAK

INTERSECTION B
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: MANAKA STREET											
1	L	2	0.0	0.004	10.7	LOS B	0.0	0.1	0.03	0.95	46.4
3	R	2	0.0	0.004	10.5	LOS B	0.0	0.1	0.03	1.00	46.5
Approach		4	0.0	0.004	10.6	LOS B	0.0	0.1	0.03	0.97	46.4
East: DOCK STR E											
4	L	3	0.0	0.002	8.2	LOS A	0.0	0.0	0.00	0.74	49.0
5	T	1	0.0	0.002	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		4	0.0	0.002	6.1	LOS A	0.0	0.0	0.00	0.55	51.3
West: DOCK STR W											
11	T	2	0.0	0.004	0.0	LOS A	0.0	0.2	0.03	0.00	59.2
12	R	4	0.0	0.004	8.5	LOS A	0.0	0.2	0.03	0.79	48.5
Approach		6	0.0	0.004	5.6	LOS A	0.0	0.2	0.03	0.52	51.7
All Vehicles		15	0.0	0.004	7.2	NA	0.0	0.2	0.02	0.66	50.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

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SIDRA INTERSECTION

Figure 10.4 - Intersection C Existing Veh/hr

3.2. Existing Road Condition

Intersection A is in a fair to poor condition, however though paved there are no road markings with a lot of gravel silting taking place, at all the intersections that were investigated.

Figure 11– Intersection A – Road Condition

In terms of cracking, Manaka Street is a paved road and can be classified, as low that is >0<4%. However, the gravel silting reduces the visual condition index to below 25%, and this VCI can be applied for all intersections as depicted in the images below.

The Visual Condition Index categorises the extent of pavement distress with low % indicating high and visible distress and 100% indicating no signs of visual distress and hence road pavement in fair to good condition with VCI>75%.

No AADT information obtained from a Permanent counting station within Doornpan, hence only the manual counts attached herein under Annexure B.

Figure 12– Intersection B – Road Condition

Intersection B is also paved but due to gravel silting taking place it can equally be classified as gravel intersection, and by extension with no stop signs.


Figure 13 – Intersection C – Road Condition

Intersection C is also in a poor to fair condition, with very poor road marking and without stop signs.

3.3. Planned Future Roads

3.3.1. Provincial and National Roads

During the development of the Traffic Impact Study, Dr Kenneth Kaunda District Municipality couldn't give information on the infrastructure projects for the District Municipality.

3.3.2. Municipal Roads

Planned new roads in the area will influence the distribution of the trips of the proposed developments and access points to the exiting road network. The development of a road master plan for JB Marks Local Municipality is still at inception stage, and the official only stated that a municipal road is earmarked for future development from N4 to R33. With the above said, though it will not interfere with the proposed boundary development footprint, the analysis was also supposed to cater for the traffic flow generated by such development. However, it is our utmost belief that a considerable analysis will be conducted at that stage.

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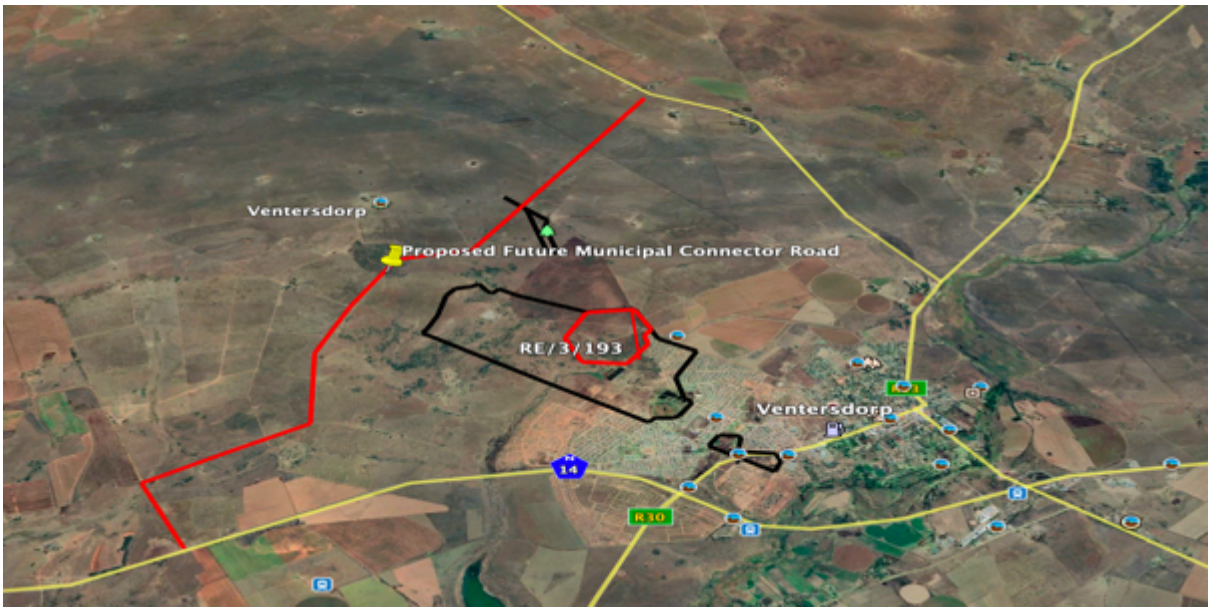

Figure 14.1 – Assumed Future Municipal Road

The red line in Figure 10.1 indicates our assumed proposed future municipal connector road, which has a potential to reduce traffic load within the Tshing/Ventersdorp Town.

3.3.3. Non–Motorised Transport, Disabled and Vulnerable Road Users

Pedestrian movement was observed along the three intersection (intersections A, B and C). It is highly recommended that raised zebra crossing be adopted as traffic calming measures at all junctions.

3.4. Trip Generation

The method used to determine trip generation rates are discussed below.

3.4.1. South African Trip Data Manual

Trip generation rates as specified in the TMH17 South African Trip data Manual, the applicable rates for a residential development are shown in the table 2 below.

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Table 2 – Trip generation Adjustment factors for a Low Vehicle development

	Land Use	Size Units	Percentage reduction for developments in areas with Mixed-use Development	Low vehicle Ownership	Very Low Ownership	Transit nodes or Corridors
100	**Industrial**					
110	Service Industry	100 sqm GLA	5%	20%	30%	15%
120	Heavy industry/manufacturing	100 sqm GLA	5%	20%	30%	15%
121	Mining	1 Employees	5%	20%	30%	15%
130	Industrial Area (Park)	100 sqm GLA	5%	20%	30%	15%
140	Manufacturing	100 sqm GLA	5%	20%	30%	15%
150	Warehousing and Distribution	100 sqm GLA	5%	20%	30%	15%
151	Mini-Warehousing	100 sqm GLA	5%	20%	30%	15%
200	**Residential**					
210	Single Dwelling Units	1 D/Unit	10%	40%	70%	15%
220	Apartments and Flats	1 D/Unit	15%	30%	50%	15%
225	Student Apartments and Flats	1 D/Unit	25%	50%	80%	15%
231	Townhouses (Simplexes and Duplexes)	1 D/Unit	15%	30%	50%	15%
232	Multi-Level Townhouses	1 D/Unit	15%	30%	50%	15%
251	Retirement Village	1 D/Unit	5%	50%	80%	15%
254	Old-Age Home	1 D/Unit	5%	50%	80%	15%
260	Recreational Homes	1 D/Unit	10%	20%	30%	15%
300	**Lodging**					
310	Hotel, Residential	1 Room	20%	20%	30%	15%
330	Hotel, Resort	1 Room	20%	20%	30%	15%
350	Guest House	1 Room	20%	30%	50%	15%
400	**Recreational and Sport**					
430	Golf Course	1 Course	5%	0%	0%	0%
473	Casino	100 sqm GLA	5%	20%	30%	15%
480	Amusement Park	1 ha	5%	30%	50%	15%
488	Sport Stadium	1000 Seat	5%	30%	50%	15%
492	Health and Fitness Centre	100 sqm GLA	15%	20%	30%	15%
500	**Institutional**					
520	Public Primary School	1 Student	30%	50%	80%	15%
530	Public Secondary School	1 Student	30%	50%	80%	15%
536	Private School	1 Student	30%	50%	80%	15%
550	University / College	1 Student	20%	40%	60%	15%
560	Places of Public Worship (Weekend)	1 Seat	10%	50%	80%	15%
561	Places of Public Worship (Weekday)	1 Seat	10%	50%	80%	15%
565	Pre-School (Day Care Centre)	1 Student	5%	50%	80%	15%
566	Cemetery	1 Ha	0%	30%	50%	15%
600	**Medical**					
611	Public Hospital	1 Bed	0%	50%	80%	15%
612	Private Hospital	100 sqm GLA	0%	20%	30%	15%
620	Nursing Home	1 Bed	0%	50%	80%	15%
630	Medical Clinic	100 sqm GLA	0%	50%	80%	15%
700	**Office**					
710	Offices	100 sqm GLA	20%	20%	30%	15%
713	Home offices and undertakings	1 House	10%	20%	30%	15%
720	Medical consulting rooms	100 sqm GLA	10%	30%	50%	15%
770	Business Centre (Park)	100 sqm GLA	15%	20%	30%	15%
780	Conference Centre	1 Seat	10%	20%	30%	10%

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Table 3 – Trip generation Adjustment factors for a Mixed Use development

Land Use (Assume Residetial 2 has 64 Flat Units)		Size Units	Peak Hour		Generated Trips		Trip Gen Adj. Factor (Very Low Vehicle Ownership)	Adjusted Generated Trips		AM Peak Split		PM Peak Split		AM Peak		PM Peak	
			Trip Rate - AM	Trip Rate - PM	AM Trips	PM Trips	%	AM Trips	PM Trips	In	Out	In	Out	In	Out	In	Out
210 Single Dwelling Units	883	1D / unit	1,0	1	883	883	70%	265	265	25%	75%	70%	30%	66	199	185	79
770 Business	23300	100 sqm GLA	0,6	0,6	140	140	30%	98	98	85%	15%	20%	80%	83	15	20	78
520 & 530 Primary & secondary School	1000	1 Student	0,85	0,3	850	300	80%	170	60	50%	50%	50%	50%	85	85	30	30
820 Municpal	7600	100 sqm GLA	1,5	1,5	114	114	60%	45,6	45,6	85%	15%	20%	80%	38,8	6,8	9,1	36,5
565 Creche (36 students)	288	1 Student	1	0,8	288	230	80%	58	46	50%	50%	50%	50%	29	29	23	23
561 Church (100 seats per church)	400	1 Seat	0,05	0,05	20	20	60%	8	8	50%	50%	50%	50%	4	4	4	4
720 Medical Consulting Rooms	4200	100 sqm GLA	8	8	336	336	50%	168,0	168,0	55%	45%	45%	55%	92,4	75,6	75,6	92,4
Total								**812**	**690**					**398**	**414**	**347**	**344**

Generated trips are hereby listed in the table above, with generated AM trips being used for analysis.

3.5. Traffic Analysis Criteria

Quantification of the traffic operational conditions has been undertaken using appropriate technology with the results of the analysis for the design peak periods under existing conditions being tabulated below showing the traffic volumes used in the analysis. The criteria for assessment are principally delay and volume to capacity ratio (V/C Ratio). A V/C ratio of say 0.5 would represent 50% spare capacity and a ratio of 1.0 would represent conditions where the road or movement is operating at its maximum capacity (i.e. actual volume equals capacity), hence suggesting an intersection upgrade.

The concept of *levels of service* uses qualitative measures that characterize operational conditions within a traffic stream and their perception by motorists and passengers

Delay is in turn expressed in terms of Level of Service (LOS). Level of service (LOS) is a commonly used traffic engineering criteria for assessing the quality of the traffic conditions on a road and can be applicable to two-way flow or specific single directional movements. Level of Service is a qualitative measure describing operational conditions with a traffic stream and their perception/tolerance by the driver and is stated in terms of a scale from A through F, with A displaying the highest quality and F the lowest, a point at which excessive delays occur. The LOS is dependent on certain average delay thresholds when applied to intersections.

3.5.1. Peak Hours

Peak Hours were noted to coincide with morning and afternoon peak periods as below:

- Morning Peak hour: 08:00 - 09:00hrs and
- Afternoon Peak hours: 16:00 – 17:30hrs, these peak periods will inevitably change during weekends especially from 10:30hrs until 16:00hrs.

3.5.2. Peak Hour Factor

A peak hour factor of 0.95 is utilised for analysis.

3.5.3. Scenarios

The following years are noted for this study:

- Scenario 0: 2021 which is base year of assessment
- Scenario 1: Five year after assessment year 2026 of which it is assumed that the development would reach 100% completion with full access to public roads.

- Scenario 2: Ten years after assessment. Year 2031 of which it is assumed that the development would be 5 years.
- Scenario 3: 20 years after assessment. Year 2041 of which it is assumed that the development would 15 years. Recommended geometric upgrades are based on scenario 3, and development traffic has been conducted to highlight the implications of the townships established.

3.5.4. Assumptions

Growth rate in background traffic = 3.0% for a low growth rural town

Table 4 – Typical Growth Rates (Table 1.1 TMH17)

Development Area	Growth rate
Low growth areas	0 - 3%
Average growth areas	3 - 4%
Above average growth areas	4 - 6%
Fast growing areas	6 - 8%
Exceptionally high growth areas	> 8%

Source: City Council of Pretoria (1998)

Traffic volume expansion factor = 1.2 (studies conducted under abnormal conditions-lockdown, factored in Sidra Analysis)

Trip distribution – surrogate method

A ten-year limit is intended for medium term planning, long term planning i.e. 20 years was also analysed.

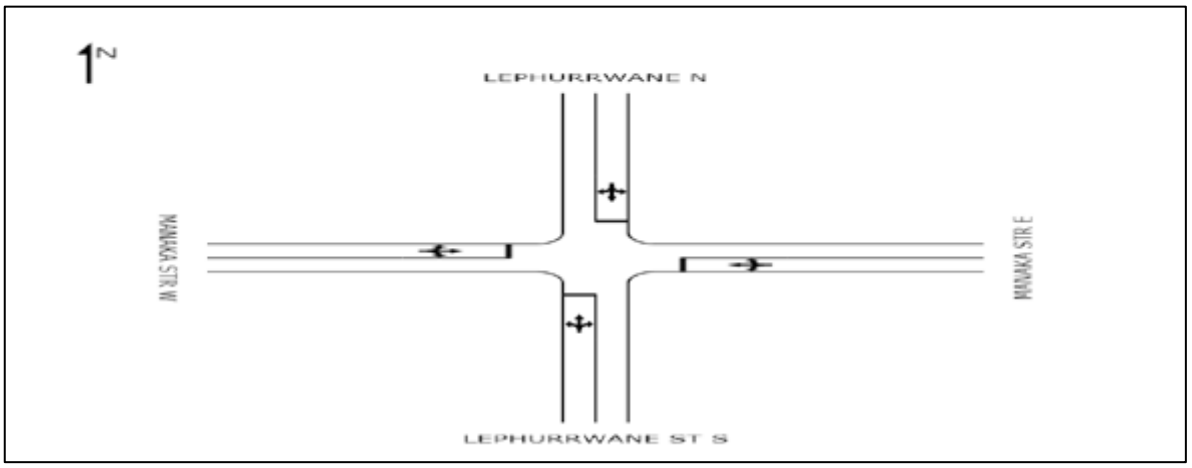

Figure 15– Lephurrwane Rd & Manaka Street- Existing intersection A Layout

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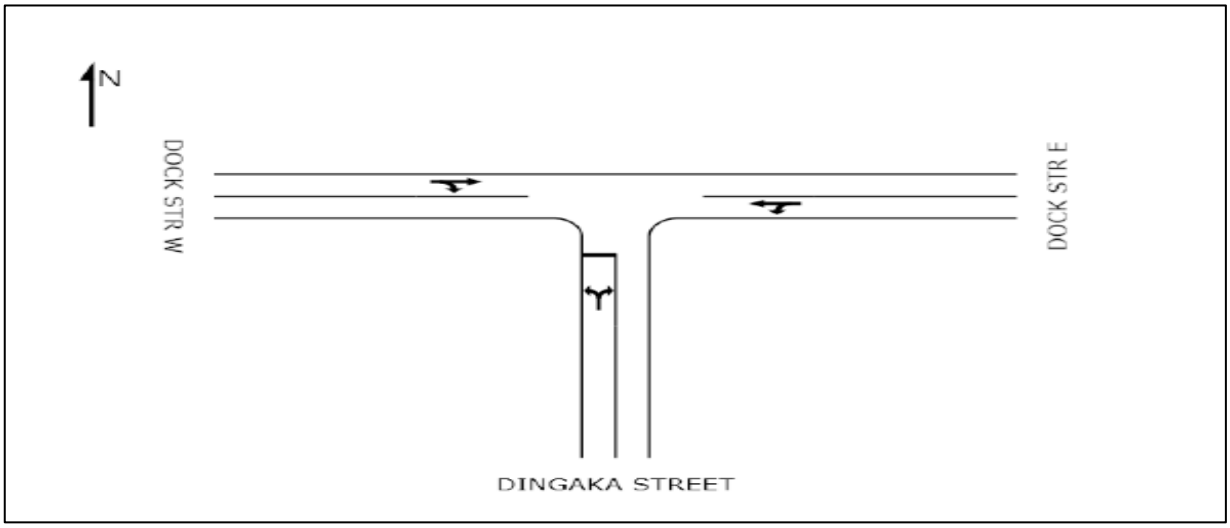

Figure 16– Dock Street and Manaka Street Existing intersection B Layout

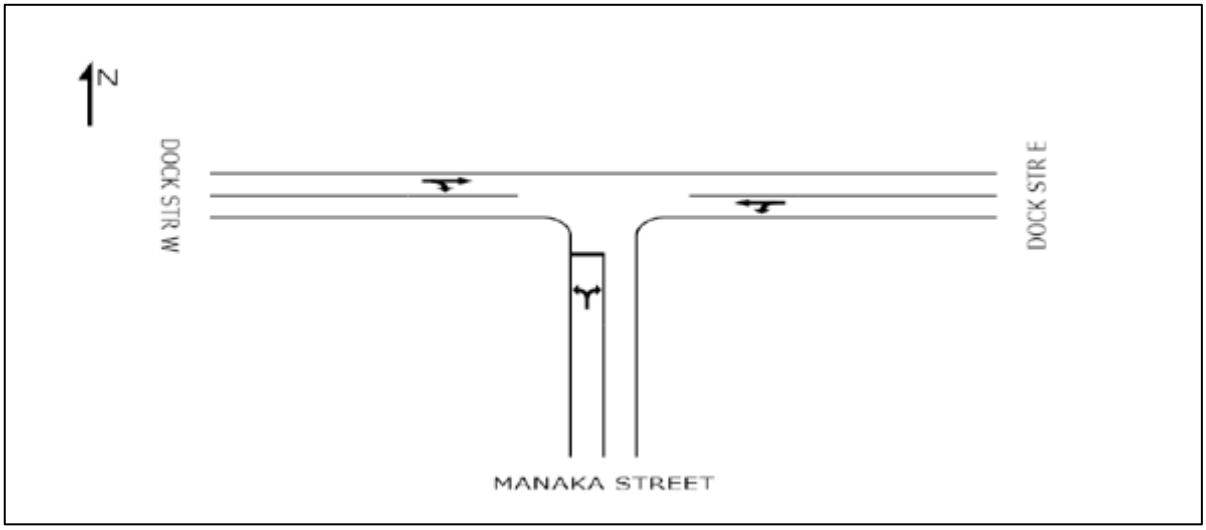

Figure 17– Dock Street and Dingaka Street - intersection C Existing Layout

It must be noted, specifically for the development, that Intersection A, must be prioritised as the main access and to be upgraded accordingly as a fourway stop controlled with slip lanes as detailed below. However, to further avoid traffic volumes with Manaka Street we further propose that the gravel part of Dock Street towards the development be upgraded to a surfaced road with an improved 3 way stop controlled with slip lanes intersection.

3.6. Existing Traffic Counts

The intersections were analysed in their current situation (layout). The results of the analysis of the operational efficiency of the selected intersections are tabulated below.

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MOVEMENT SUMMARY

Site: INTERSECTION A PM PEAK

INTERSECTION A
Stop (All-Way)
Flow Scale Analysis (Practical Capacity): Results for Flow Scale (chosen as largest for any movement) = 138.0 %

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: LEPHURRWANE ST S											
1	L	3	0.0	0.031	23.9	LOS C	0.1	0.8	0.93	1.14	37.3
2	T	3	0.0	0.031	23.4	LOS C	0.1	0.8	0.93	1.14	37.5
3	R	3	0.0	0.031	23.7	LOS C	0.1	0.8	0.93	1.14	37.5
Approach		9	0.0	0.031	23.6	LOS C	0.1	0.8	0.93	1.14	37.4
East: MANAKA STR E											
4	L	3	0.0	0.037	17.3	LOS C	0.1	0.8	0.77	1.14	41.8
5	T	10	0.0	0.037	16.9	LOS C	0.1	0.8	0.77	1.14	42.0
6	R	7	0.0	0.037	17.1	LOS C	0.1	0.8	0.77	1.15	42.0
Approach		20	0.0	0.037	17.0	LOS C	0.1	0.8	0.77	1.14	42.0
North: LEPHURRWANE N											
7	L	3	0.0	0.042	21.1	LOS C	0.1	1.0	0.89	1.14	39.1
8	T	6	0.0	0.041	20.7	LOS C	0.1	1.0	0.89	1.14	39.3
9	R	6	0.0	0.041	20.9	LOS C	0.1	1.0	0.89	1.15	39.2
Approach		15	0.0	0.041	20.9	LOS C	0.1	1.0	0.89	1.14	39.2
West: MANAKA STR W											
10	L	4	0.0	0.037	17.8	LOS C	0.1	0.8	0.79	1.14	41.4
11	T	9	0.0	0.037	17.4	LOS C	0.1	0.8	0.79	1.14	41.7
12	R	6	0.0	0.037	17.6	LOS C	0.1	0.8	0.79	1.15	41.6
Approach		19	0.0	0.037	17.6	LOS C	0.1	0.8	0.79	1.14	41.6
All Vehicles		62	0.0	0.041	19.0	LOS C	0.1	1.0	0.83	1.14	40.5

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

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SIDRA INTERSECTION

Table 4: Intersection A Movement Summary for existing traffic conditions PM peak.

The vehicle load rate is 62veh/hr for the PM peak approach , with an average delay of 19.0sec at 100% lane utilisation culminating to LOS C for all approaches. Intersection A requires an upgrade to cater for Pm Peak and generated traffic.

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MOVEMENT SUMMARY

Site: INTERSECTION B PM PEAK

INTERSECTION B
Stop (Two-Way)
Flow Scale Analysis (Practical Capacity): Results for Flow Scale (chosen as largest for any movement) = 138.0 %

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: DINGAKA STREET											
1	L	1	0.0	0.020	10.9	LOS B	0.1	0.7	0.12	0.87	46.3
3	R	16	0.0	0.020	10.7	LOS B	0.1	0.7	0.12	0.92	46.5
Approach		17	0.0	0.020	10.7	LOS B	0.1	0.7	0.12	0.92	46.5
East: DOCK STR E											
4	L	17	0.0	0.014	8.2	LOS A	0.0	0.0	0.00	0.76	49.0
5	T	9	0.0	0.014	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		26	0.0	0.014	5.5	LOS A	0.0	0.0	0.00	0.51	52.2
West: DOCK STR W											
11	T	10	0.0	0.007	0.1	LOS A	0.0	0.3	0.09	0.00	58.0
12	R	3	0.0	0.007	8.5	LOS A	0.0	0.3	0.09	0.95	48.6
Approach		13	0.0	0.007	2.0	LOS A	0.0	0.3	0.09	0.21	55.6
All Vehicles		57	0.0	0.020	6.3	NA	0.1	0.7	0.06	0.57	51.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

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SIDRA INTERSECTION

Table 5: Intersection B Movement Summary for existing traffic conditions PM peak.

The vehicle load rate is 57veh/hr for the PM peak approach, with an average delay of 6.3sec at 100% lane utilisation culminating to LOS B for Dingaka Street, though still having LOS A for Dock street.

Table 6: Intersection B Movement Summary for existing traffic conditions PM peak.

MOVEMENT SUMMARY

Site: INTERSECTION C PM PEAK

INTERSECTION B
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: MANAKA STREET											
1	L	1	0.0	0.002	10.7	LOS B	0.0	0.1	0.03	0.95	46.4
3	R	1	0.0	0.002	10.5	LOS B	0.0	0.1	0.03	1.00	46.5
Approach		2	0.0	0.002	10.6	LOS B	0.0	0.1	0.03	0.97	46.4
East: DOCK STR E											
4	L	3	0.0	0.002	8.2	LOS A	0.0	0.0	0.00	0.74	49.0
5	T	1	0.0	0.002	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		4	0.0	0.002	6.1	LOS A	0.0	0.0	0.00	0.55	51.3
West: DOCK STR W											
11	T	1	0.0	0.002	0.0	LOS A	0.0	0.1	0.03	0.00	59.2
12	R	2	0.0	0.002	8.5	LOS A	0.0	0.1	0.03	0.79	48.5
Approach		3	0.0	0.002	5.6	LOS A	0.0	0.1	0.03	0.52	51.7
All Vehicles		9	0.0	0.002	7.0	NA	0.0	0.1	0.02	0.64	50.3

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

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SIDRA INTERSECTION 5.0.5.1510
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SIDRA INTERSECTION

Table 8: **Intersection C Movement Summary for existing traffic conditions PM peak.**

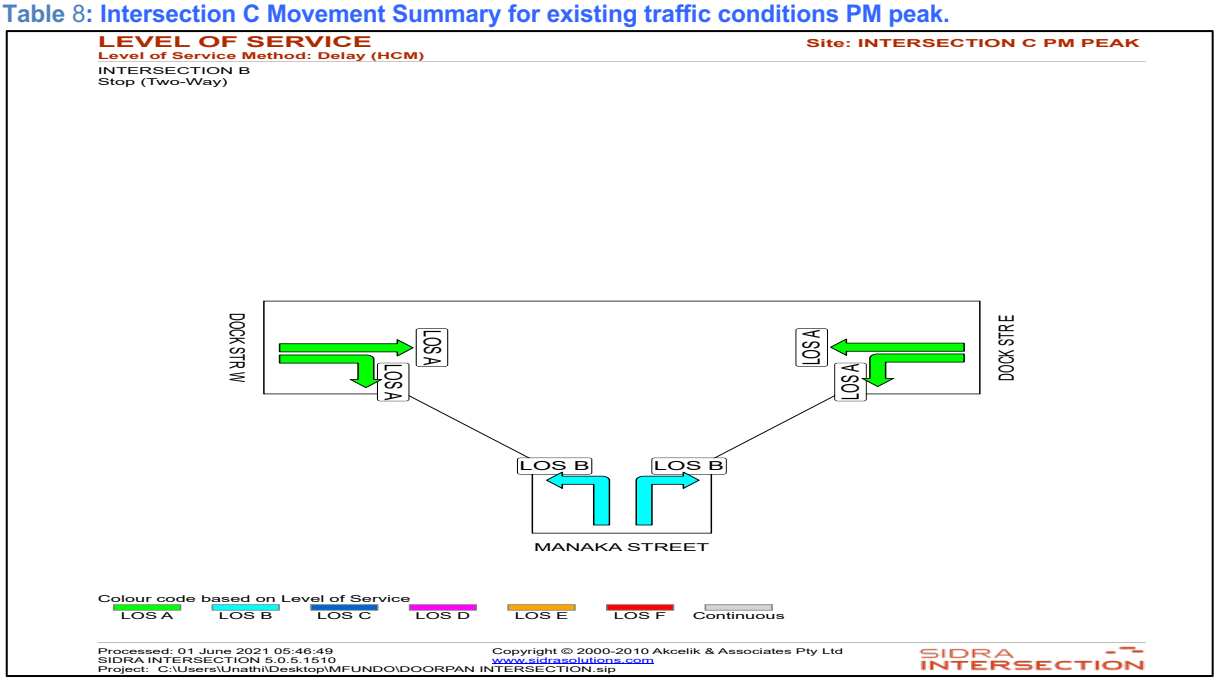

Table 8: **Intersection C LOS Summary for existing traffic conditions PM peak.**

The vehicle load rate is 9veh/hr for the PM peak, with an average delay of 7.0sec culminating to LOS B on Manaka Street.

From the Sidra analysis for the existing traffic, there is need to upgrade the intersections however, there is need to upgrade the road pavement condition as it is in poor to very poor state especially intersection B considered as the main access.

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4. FUTURE OPERATING CONDITIONS OF INTERSECTION

These assumptions were adopted:

- A phf factor of 0,95 for capacity analysis
- Queue lengths indicated are actually average lengths.

For signalised intersections the following will apply:

Table 7: Performance measures for Signalised intersections.

Period	Maximum Volume/Capacity	Minimum Level of Service
	Left Turn /Through (Straight)	Right Turn
15min Peak	90%	95%

4.1. Traffic Growth

The land along N14 Provincial Road and R30 Road is identified for node development. This land comprises of three farms, Elandskuil RE 206, RE 3/205 and RE 205 and it approximately covers an area of 242ha. Ventersdorp Municipal area is said to be an area of “high density” and “medium accessibility”. This implies that, there is a high concentration of people in Ventersdorp and the surrounding rural areas traveling at least thirty (30) minutes to gain urban access, either travelling to Potchestrom of Klerksdorp. Therefore, the proposed node development will have a great impact on the economic growth of Ventersdorp.

Whilst traffic growth has been steady in recent years it is likely to continue at this rate in the medium to long-term. For this assessment, Doornpan falls within average growth areas of less than 3%, and a 3,5% traffic growth over a 20-year horizon (2021 to 2041) has been applied to the existing traffic in line with TMH17-Trip Data Manual.

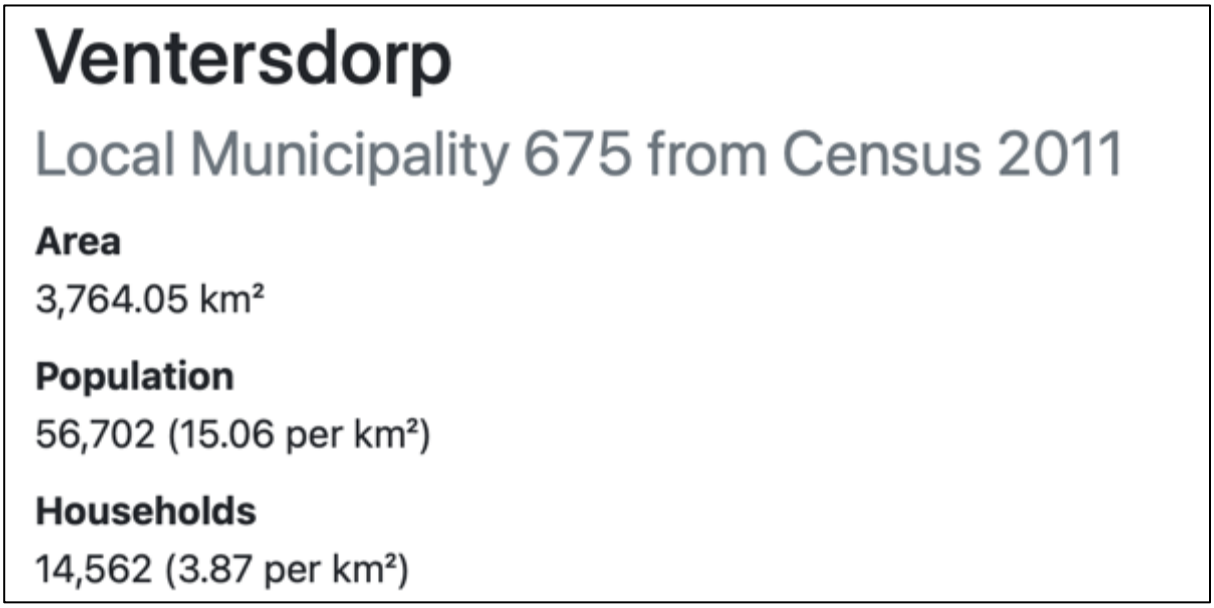

Figure 18– Social Economic Demographics SDF 2018/2019

As extracted from Master Integrated Plan for JB Marks LM, Doornpan area is earmarked for mixed use residential development.

Table 8: Typical Traffic Growth Rates

Table 1.1: Typical Traffic Growth Rates

Development Area	Growth rate
Low growth areas	0 - 3%
Average growth areas	3 - 4%
Above average growth areas	4 - 6%
Fast growing areas	6 - 8%
Exceptionally high growth areas	> 8%

Source: City Council of Pretoria (1998)

It was noted that the traffic trends going forward will be much the same as at present with the addition of traffic growth. Only traffic for the days (Friday and Saturday) were obtained and the higher value was considered for future traffic interpolation.

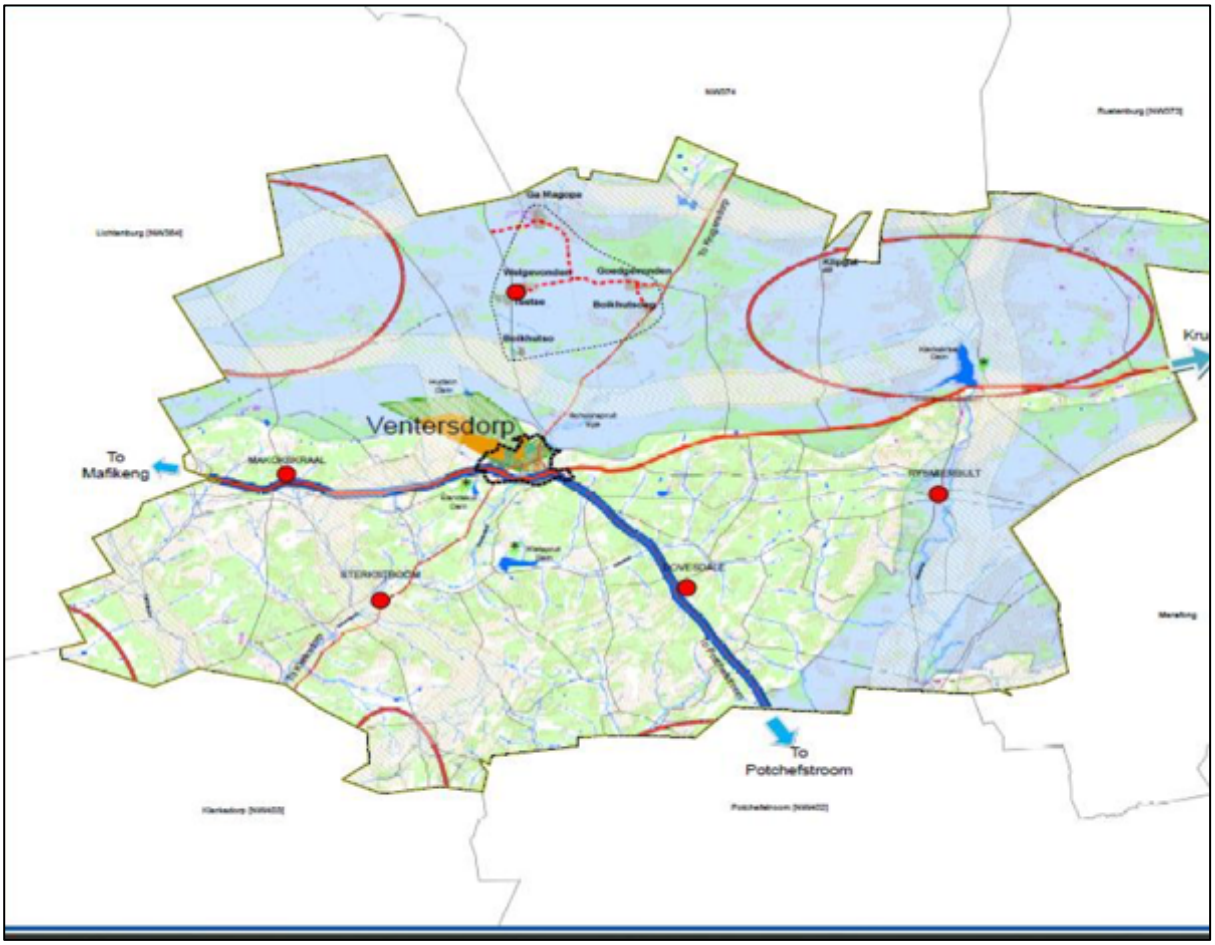

Figure 19 – Proposed Node Developments (Source: IDP review 2014/15)

There are proposed Mixed use development mainly residential for Doornpan under JB Marks Local Municipality.

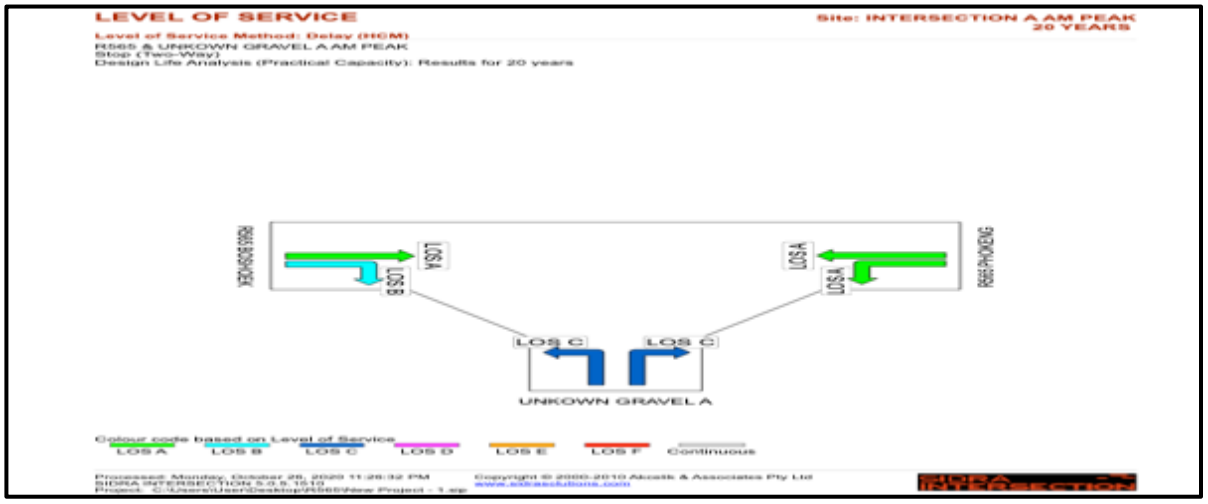

Table 9: 2041 Traffic Analysis (Intersection A).

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Intersection A, was analysed as a 3-way stop controlled junction, however, there is need to upgrade the intersection to cater for PM peaks and generated traffic.

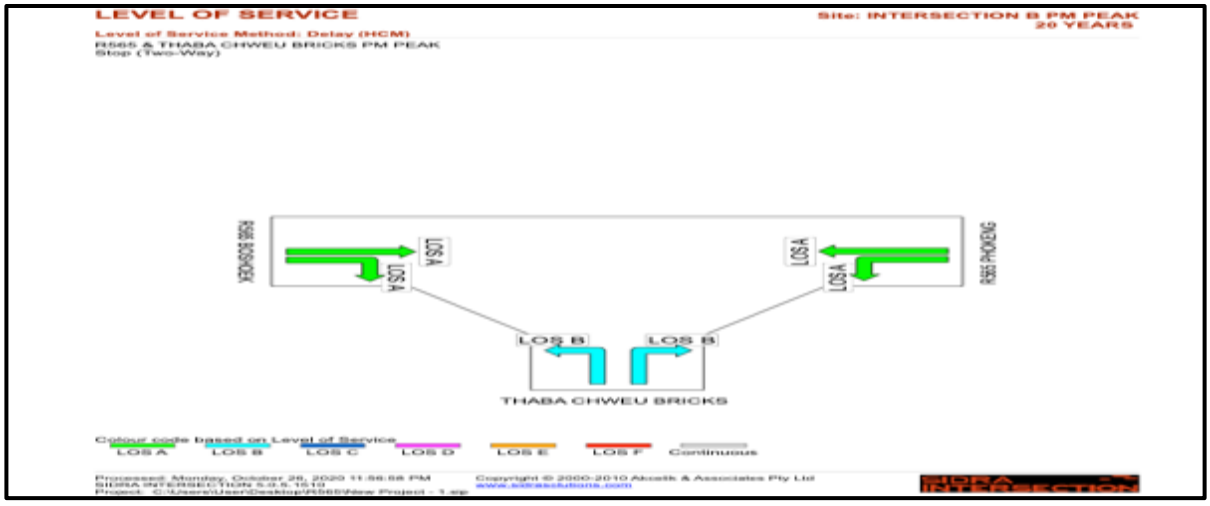

Table 13: 2041 Traffic Analysis (Intersection B).

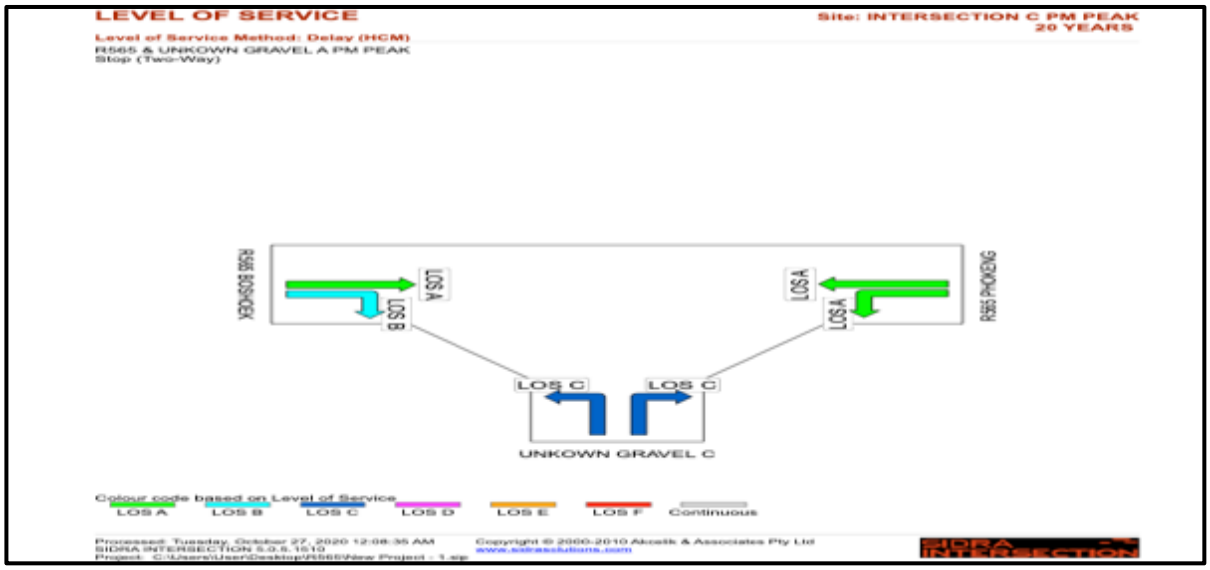

Table 14: 2041 Traffic Analysis (Intersection C).

5. PUBLIC TRANSPORT AND PARKING

5.1. 2021 Estimated Background Traffic

The AM and PM estimated traffic for the peak hours are indicated in tables above. The horizon year selected for the study is 2026.

5.2. Horizon Year

Based on information provided, the intension is to develop the proposed townships within a period of 5 years.

5.3. Latent Rights

For the purpose of the study no latent trips could be obtained stemming from the latest township applications and approvals.

5.4. Public Transport Drop Off Zones

The proposed project will generate and attract public transport and provision must be made especially along Dock and Manaka Street (provincial road), and within the development in the manner of provision for Drop off zones close to schools, creche, places of worship etc. In that effect 3No. business and 2No. Municipal to have Bus drop off zones within the proposed spatial development in conjunction with Municipal's SDPs.

5.5. Road Reserve

It must be noted that the current situation does allow for 10m road reserve, and we recommend 10m streets on the proposed development.

Figure 20: Roads Infrastructure around the Development

Pedestrian movement is currently not catered for on the intersections, no paved walkways for pedestrians and cyclists and no Zebra Crossing on all intersections.

5.6. Road Classification

Dock and Manaka Street is classified as Minor Distributor (Class 5) linking the Doornpan to the new development.

5.7. Access Throat Length

The queuing of vehicles on a roadway whilst waiting to enter a development could limit the capacity of a road. Developers should ensure that their development make provision, away from the municipal road network, for the queuing/storage of vehicles which want to enter their properties. The access throat lengths of 100m – 120m need to be provided for this development. The standard calculation methodology for access throat length prescribed in COTO – TMH 16, 2012 Volume 2, Chapter 10, need to be applied for this purpose. The proposed access road to provide acceptable throat lengths within the development.

5.8. Proposed Road Improvements

There is need for minor improvements on and along Intersection A, and B:

- **Four way stop junction upgrade to Intersection A with slip turning lanes;**
- **Three way stop junction upgrade to Intersection B;**
- **Upgrade of 1.2km gravel road from Intersection B to the proposed development;**
- All culverts to have a raised wing-wall;
- Bus bays rather than taxi rank be constructed in close proximity to schools and places of worship and municipal offices;
- Proper road markings and signage to be installed.

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| **Website:** www.abidia.com |

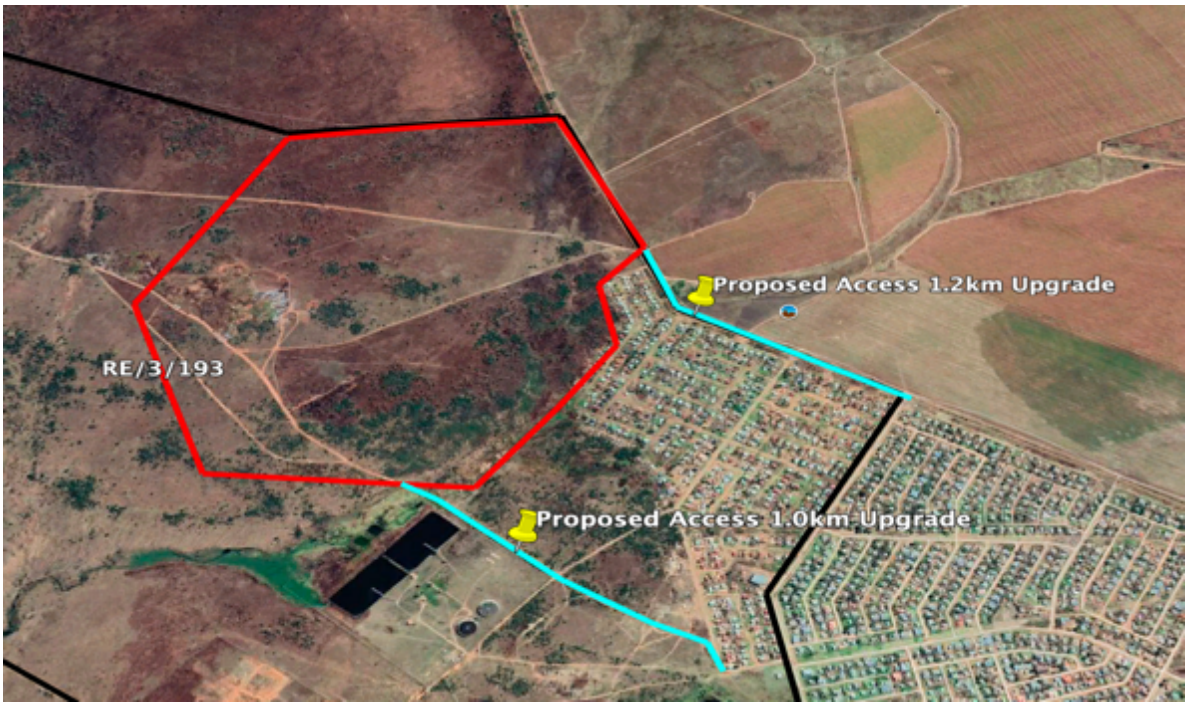

Figure 21: Proposed Main Accesses (Intersection A and B)

6. TRAFFIC ASSESSMENT

6.1. Traffic Operations

For safe operations, Doornpan Development will require upgrade from gravel to a paved road if funds permit and regular routine maintenance in the form of appropriate sidewalk, signage and road markings.

The issue of the impact of construction-traffic during construction must be considered. During the construction phase large, heavy trucks, plant and equipment will be accessing the site. The impact on traffic operations will be that these vehicles, being large, take up the majority of the available roadway, particularly on roads that are only 3.0m wide. Opposing traffic will be faced with a reduction in safety and will be forced onto the verge. Whilst this condition cannot be quantified the situation will present itself to existing users on random basis. Construction traffic should where possible utilise the proposed *(along the proposed main access side)* detour during morning and afternoon off-peaks.

6.2. Access

6.2.1. Sight Distances and Visibility

When positioning an access it is important that the shoulder sight distance is adequate and meets or exceeds the minimum requirements for traffic safety reasons.

Normally the main item of concern for an un-signalised intersection is that of adequate shoulder sight distance (SSD**),** for this intersection shoulder sight distance isn't a concern since no new access is proposed. This is the distance along the road, which the driver of a vehicle exiting the access or turning right into the site needs to be able to see before pulling off from the stop line. The following table depicts the minimum shoulder sight distance requirements for light vehicles, a rigid truck (refuse vehicle, bus) and a heavy articulated truck for the two listed speeds below.

Table 15:Shoulder sight distance requirements (metres)

Vehicle Type	For Through Road Speed of:	
	40km/h	60km/h
Light vehicle (car, LDV, taxi)	75	115
Rigid vehicle (truck, bus)	130	180
Articulated truck	150	230

7. CONCLUSIONS AND RECOMMENDATIONS

The proposed development can be supported from a traffic flow perspective.

7.1. Recommendations

Based on the conclusions above, it is further recommended that:

- To ensure safe and satisfactory operations, upgrade and routine maintenance for all roads and at intersections be identified along with improvements to road markings and signage;
- Proposed Main Access (Intersection A and B)to have preferably a stop controlled intersection with dedicated left and right turning lanes from the proposed developments, together with acceleration and deceleration 60m lanes, due to space constraints.

- The potential of the 2041 traffic growth will **require** upgrades to intersections A and B;
- It must be noted that, **Intersection A, and B** are all viable options for alternative access and traffic tributaries.
- That the proposed development will generate **812** trips for AM peak, and **690** trips for PM peak, the same was used for traffic flow analysis.
- **Provided the above recommendations are adopted there is no reason of a traffic engineering nature why the proposed residential development should not be permitted to proceed.**

7.1.1. Development Particulars

The proposed development comprises of a green field mixed-use development that will be developed within the next 5 years and is known as:

- Doornpan Township development.
- The estimated number of new trips that will be generated from the proposed developments are **812 for AM trips** and **690 for PM trips** in total and apportioned per development phase.

7.1.2. Capacity Analysis

The capacity analysis was done for the base year 2021 and the 2026 horizon year without and with development traffic. The capacity analysis resulted in acceptable LOS for both intersections.

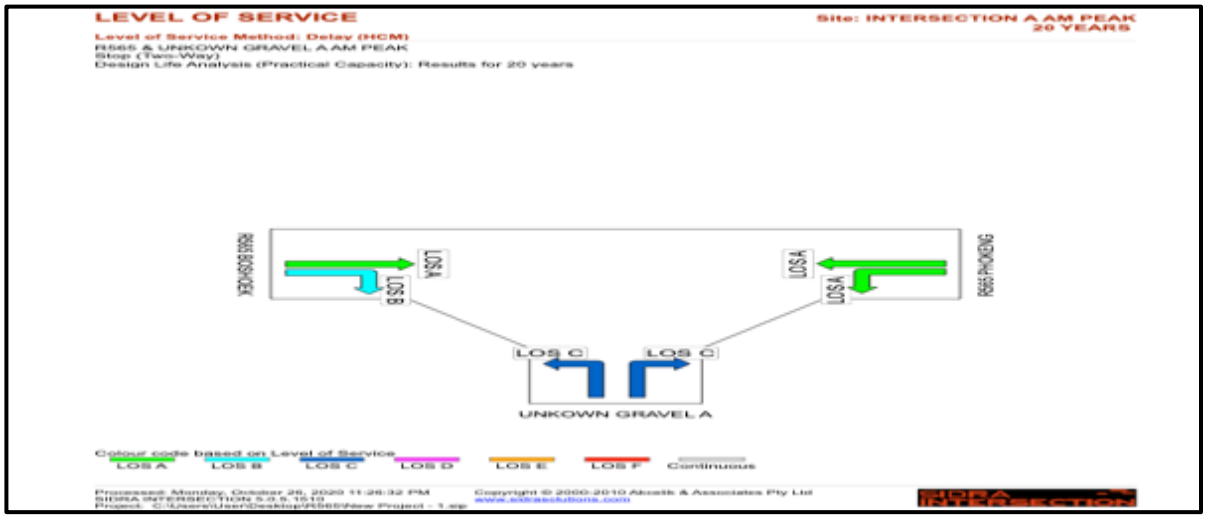

Figure 21: Capacity Analysis (Intersection A)

7.1.3. Road Reserve

The required road reserves are allowed for in the proposed township layouts.

7.1.4. Site Specific Recommendations

- **Public transport** facilities to be provided
- **Pedestrian Facilities**: It is recommended that a pedestrian walkway of 1.5-2.0m is provided along the Class U4b roads within the proposed developments to facilitate pedestrian movement. However, if funds do not permit, a 15m road reserve to provide pedestrian space and avoid conflict with traffic vehicles.

It is thus recommended that the proposed development be supported from a traffic engineering point of view given the above recommendations are implemented.

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ANNEXURE A – ON SITE PHOTOS

Intersection A

Intersection A

Intersection B

Intersection B

Intersection C

Intersection C

Tshing Library

Tshing Library

Church

Disability Centre

Tavern

Tshing Public School

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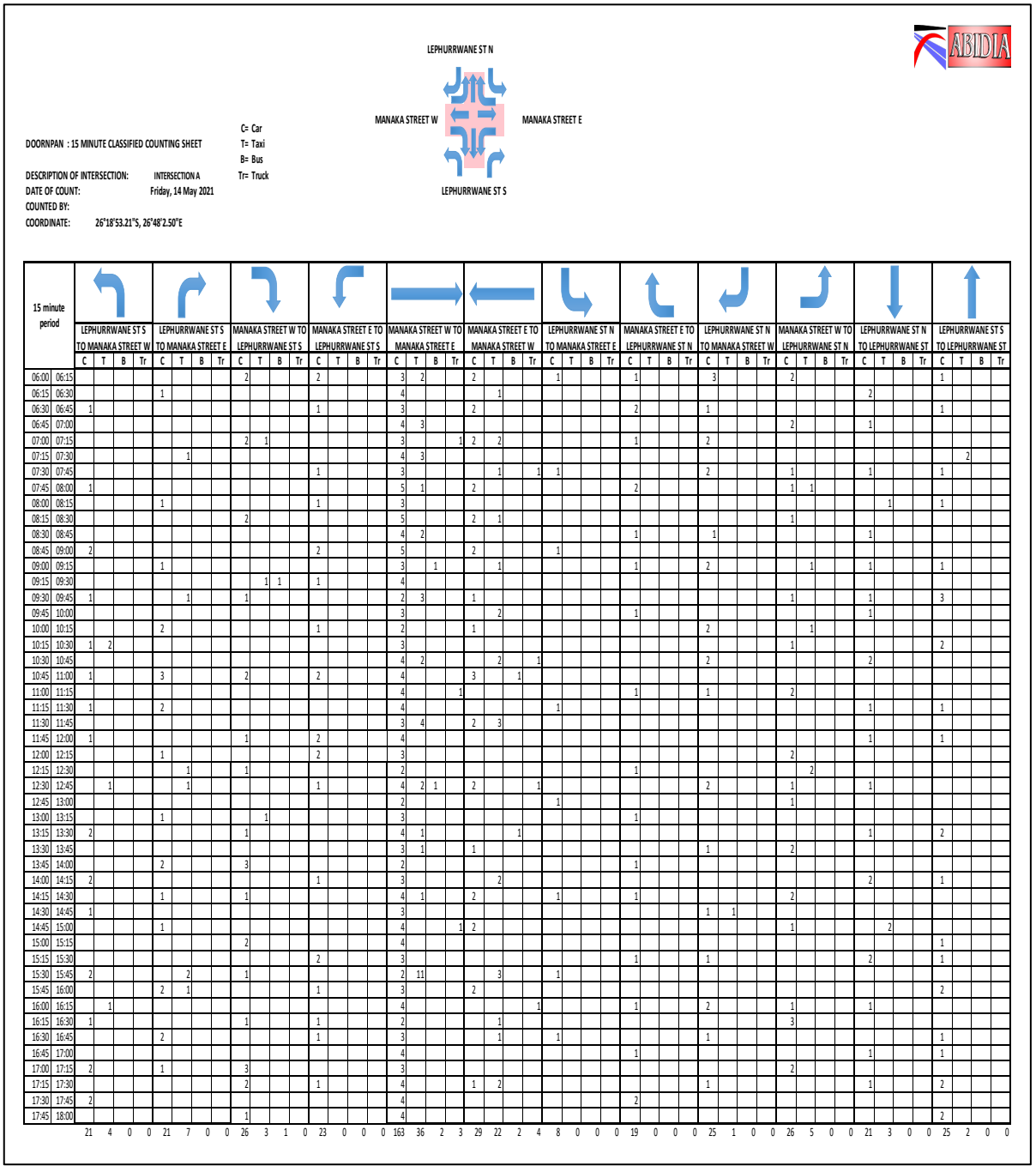
ANNEXURE B – MANUAL COUNTS



LEPHURRWANE ST N

MANAKA STREET W

MANAKA STREET E

LEPHURRWANE ST S

C= Car
T= Taxi
B= Bus
Tr= Truck

DOORNPAN : 15 MINUTE CLASSIFIED COUNTING SHEET

DESCRIPTION OF INTERSECTION: INTERSECTION A
DATE OF COUNT: Friday, 14 May 2021
COUNTED BY:
COORDINATE: 26°18'53.21"S, 26°48'2.50"E

15 minute period		LEPHURRWANE ST S TO MANAKA STREET W				LEPHURRWANE ST S TO MANAKA STREET E				MANAKA STREET W TO LEPHURRWANE ST S				MANAKA STREET E TO LEPHURRWANE ST S				MANAKA STREET W TO MANAKA STREET E				MANAKA STREET E TO MANAKA STREET W				LEPHURRWANE ST N TO MANAKA STREET E				MANAKA STREET E TO LEPHURRWANE ST N				LEPHURRWANE ST N TO MANAKA STREET W				MANAKA STREET W TO LEPHURRWANE ST N				LEPHURRWANE ST N TO LEPHURRWANE ST				LEPHURRWANE ST S TO LEPHURRWANE ST			
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DOORNPAN : 15 MINUTE CLASSIFIED COUNTING SHEET

DESCRIPTION OF INTERSECTION: INTERSECTION B
DATE OF COUNT: 14 MAY 2021
COUNTED BY:
COORDINATE: 26°18'22.43"S, 26°48'5.36"E

C= Car
T= Taxi
B= Bus
Tr= Truck

15 minute period		MANAKA STREET TO DOCK STREET W				MANAKA STREET TO DOCK STREET E				DOCK STREET W TO MANAKA STREET				DOCK STREET E TO MANAKA STREET				DOCK STREET E				DOCK STREET W			
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DOORNPAN : 15 MINUTE CLASSIFIED COUNTING SHEET

DESCRIPTION OF INTERSECTION: INTERSECTION C
DATE OF COUNT: 14 MAY 2021
COUNTED BY:
COORDINATE: 26°18'36.56"S, 26°48'33.83"E

C= Car
T= Taxi
B= Bus
Tr= Truck

15 minute period		DINGAKA STREET TO DOCK STREET W				DINGAKA STREET TO DOCK STREET E				DOCK STREET W TO DINGAKA STREET				DOCK STREET E TO DINGAKA STREET				DOCK STREET E				DOCK STREET W			
		C	T	B	Tr	C	T	B	Tr	C	T	B	Tr	C	T	B	Tr	C	T	B	Tr	C	T	B	Tr
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10:30	10:45					9				1				8	1		4	3	1		1	4	2		
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DOORNPAN : 15 MINUTE CLASSIFIED COUNTING SHEET

C= Car
T= Taxi
B= Bus
Tr= Truck

DESCRIPTION OF INTERSECTION: INTERSECTION A
DATE OF COUNT: Saturday, 15 May 2021
COUNTED BY:
COORDINATE: 26°18'53.21"S, 26°48'2.58"E

15 minute period	LEPHURRIWANE ST S TO MANAKA STREET W				LEPHURRIWANE ST S TO MANAKA STREET E				MANAKA STREET W TO LEPHURRIWANE ST S				MANAKA STREET E TO LEPHURRIWANE ST S				MANAKA STREET W TO MANAKA STREET E				MANAKA STREET E TO MANAKA STREET W				LEPHURRIWANE ST N TO MANAKA STREET E				MANAKA STREET E TO LEPHURRIWANE ST N				LEPHURRIWANE ST N TO MANAKA STREET W				MANAKA STREET W TO LEPHURRIWANE ST N				LEPHURRIWANE ST N TO LEPHURRIWANE ST				LEPHURRIWANE ST S TO LEPHURRIWANE ST			
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12:15 12:30										1			1				4	2			5				4				3												1							
12:30 12:45	1								1	1							2				3				4				1				2	1			1	1			4							
12:45 13:00						2			1								6				5				2				3				3					1							1			
13:00 13:15					1				1				2				3				3	1			2				2				4				2											
13:15 13:30																	2				5				1				4				1								1							
13:30 13:45										1				1			2	1			6				1				3	1			4				1								2			
13:45 14:00	2								2				1				6				2	1			1				1				3															
14:00 14:15					2												3	1			5				2	1			2				4				2				2							
14:15 14:30						2			1				1				4				4				2				3				3								1							
14:30 14:45																	2				6				1				1				2	1							1							
14:45 15:00										1			1	1			4				4	1			1				1	1			4				2											
15:00 15:15	1								2								2				4					1			2				3				1				1							
15:15 15:30					1												6				4				2				2				4								1							
15:30 15:45						1			1	1							4	2			2				3				3	1			1				2											
15:45 16:00	2								1				2				6				2				3				1				1	1														
16:00 16:15																	2				6	1			1				2				3					1			1							
16:15 16:30	1																5				5				2				4				2				1											
16:30 16:45					2				2	1			3				4				3				1				3				3	2			1				2				1			
16:45 17:00	1																6				2				4				3				1				2								1			
17:00 17:15						1			1								3				2				1				4	1			4															
17:15 17:30	2				1				2	2			3				6				2				2				3				3				2											
17:30 17:45	1								1								5	1			6	1			5				2				3								1							
17:45 18:00					1				2				1	2			2				4				1	1			2				1				2				4							
	20	0	0	0	16	11	0	0	29	13	0	0	32	7	0	0	168	14	0	0	186	9	0	0	90	8	0	0	117	7	0	0	119	10	0	0	34	10	0	0	37	0	0	0	21	0	0	0

| **Physical:** 10 Cedarwood Crescent, Nelspruit 1201|
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DOORNPAN : 15 MINUTE CLASSIFIED COUNTING SHEET

DESCRIPTION OF INTERSECTION: INTERSECTION B
DATE OF COUNT: 15 MAY 2021
COUNTED BY:
COORDINATE: 26°18'22.43"S, 26°48'5.36"E

C= Car
T= Taxi
B= Bus
Tr= Truck

15 minute period	MANAKA STREET TO DOCK STREET W				MANAKA STREET TO DOCK STREET E				DOCK STREET W TO MANAKA STREET				DOCK STREET E TO MANAKA STREET				DOCK STREET E				DOCK STREET W			
	C	T	B	Tr	C	T	B	Tr	C	T	B	Tr	C	T	B	Tr	C	T	B	Tr	C	T	B	Tr
06:00 06:15																								
06:15 06:30	1								1															
06:30 06:45										1														
06:45 07:00																					1			
07:00 07:15																								
07:15 07:30														1										
07:30 07:45	1								1				2											
07:45 08:00					1				1				2			1	1				1			
08:00 08:15													2				1				1			
08:15 08:30									2												1			
08:30 08:45					2												2				1			
08:45 09:00													1											
09:00 09:15	1																1				1			
09:15 09:30																								
09:30 09:45					1					1			2								1			
09:45 10:00	1			1										1							1			
10:00 10:15										1											1			
10:15 10:30						1																		
10:30 10:45									2	2											1			
10:45 11:00									2												1			
11:00 11:15																					1			
11:15 11:30					1												1				1			
11:30 11:45																								
11:45 12:00																					1			
12:00 12:15													1								1			
12:15 12:30																	1							
12:30 12:45	1				1																			
12:45 13:00									1								1							
13:00 13:15													1											
13:15 13:30																	1							
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13:45 14:00																	1							
14:00 14:15													1											
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14:30 14:45																					1			
14:45 15:00																								
15:00 15:15																					1			
15:15 15:30																					1			
15:30 15:45													1				1	1						
15:45 16:00	1																1				1	1		
16:00 16:15																								
16:15 16:30													1											
16:30 16:45					1																1			
16:45 17:00					1								1				1							
17:00 17:15													1								1			
17:15 17:30	1																							
17:30 17:45					1				1								2				1			
17:45 18:00	2				1				2				1											
	9	0	0	1	10	1	0	0	13	5	0	0	18	2	0	1	15	1	0	0	22	1	0	0

| **Physical:** 10 Cedarwood Crescent, Nelspruit 1201|
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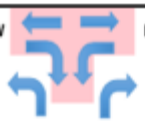
| **Website:** www.abidia.com |

DOORNPAN : 15 MINUTE CLASSIFIED COUNTING SHEET

DESCRIPTION OF INTERSECTION: INTERSECTION C
DATE OF COUNT: 15 MAY 2021
COUNTED BY:
COORDINATE: 26°18'36.56"S, 26°48'33.83"E

C= Car
T= Taxi
B= Bus
Tr= Truck



15 minute period		DINGAKA STREET TO DOCK STREET W				DINGAKA STREET TO DOCK STREET E				DOCK STREET W TO DINGAKA STREET				DOCK STREET E TO DINGAKA STREET				DOCK STREET E				DOCK STREET W			
		C	T	B	Tr	C	T	B	Tr	C	T	B	Tr	C	T	B	Tr	C	T	B	Tr	C	T	B	Tr
06:00	06:15					4								3			1								
06:15	06:30					1								1	1		1	2	1			3			
06:30	06:45					2								4	1		1	3				3			
06:45	07:00	1				7								1	1		1	3				2			
07:00	07:15					2								2	1			5				1			
07:15	07:30					2								5								3			
07:30	07:45					5	2			1				2	1			1				4			
07:45	08:00					5								3				6				1			
08:00	08:15					3								6	1		1	3				2			
08:15	08:30					5								3								1			
08:30	08:45	1				8	1							4				2				8	1		
08:45	09:00					5	2							2	1						1	3			
09:00	09:15					4	2			1				3	2		1	3				1			
09:15	09:30					5								1	2		1	2				3	1		
09:30	09:45					2	2		1					11	3			6				1	1		
09:45	10:00					2								3	3			4				3			
10:00	10:15	1				3	1		1					2	1			1	1			5			
10:15	10:30					9								2	2			4				2			
10:30	10:45					4	1		1	1				1			1					3			
10:45	11:00					4	3							2	1			3				4	1		
11:00	11:15					12	2							3	1		1	4				2			
11:15	11:30					6	2							6				4				4			
11:30	11:45	1				8				1				2	1			2			1	3			
11:45	12:00	1				4								10	4			2	1			2			
12:00	12:15					8	2		1					5	1			4				1			
12:15	12:30					6								5	1			4				2			
12:30	12:45					4	1							5			2	3				2			
12:45	13:00					8								9				5				4			
13:00	13:15					7	1							8				2				1			
13:15	13:30					6								7	2			2	1			5			
13:30	13:45					6			1	2				7				7				4			
13:45	14:00					4								6	3		1	2				4			
14:00	14:15	2				7	2							5			1	6				4	1		1
14:15	14:30					4								6				2				3			1
14:30	14:45					5	1		1					6	1			4				2			
14:45	15:00					3								5			1	2	1			4			
15:00	15:15		1			9	1							8	1			4	1			3			
15:15	15:30					5			1					2	1			5				4			
15:30	15:45					6			1	1				2	1		1	3							
15:45	16:00					3								4				1				5			
16:00	16:15					5								7								3			
16:15	16:30	1				5								8								4	1		
16:30	16:45					7								5	1			3			1	3			
16:45	17:00	1				8								5			1	3				2			
17:00	17:15					5								12				5				2			
17:15	17:30					4				1				8	1			4				4			
17:30	17:45					4								7				2				3			
17:45	18:00					6								6				3				2			
		9	1	0	0	247	26	0	8	8	0	0	0	230	40	0	16	136	6	0	3	135	6	0	2

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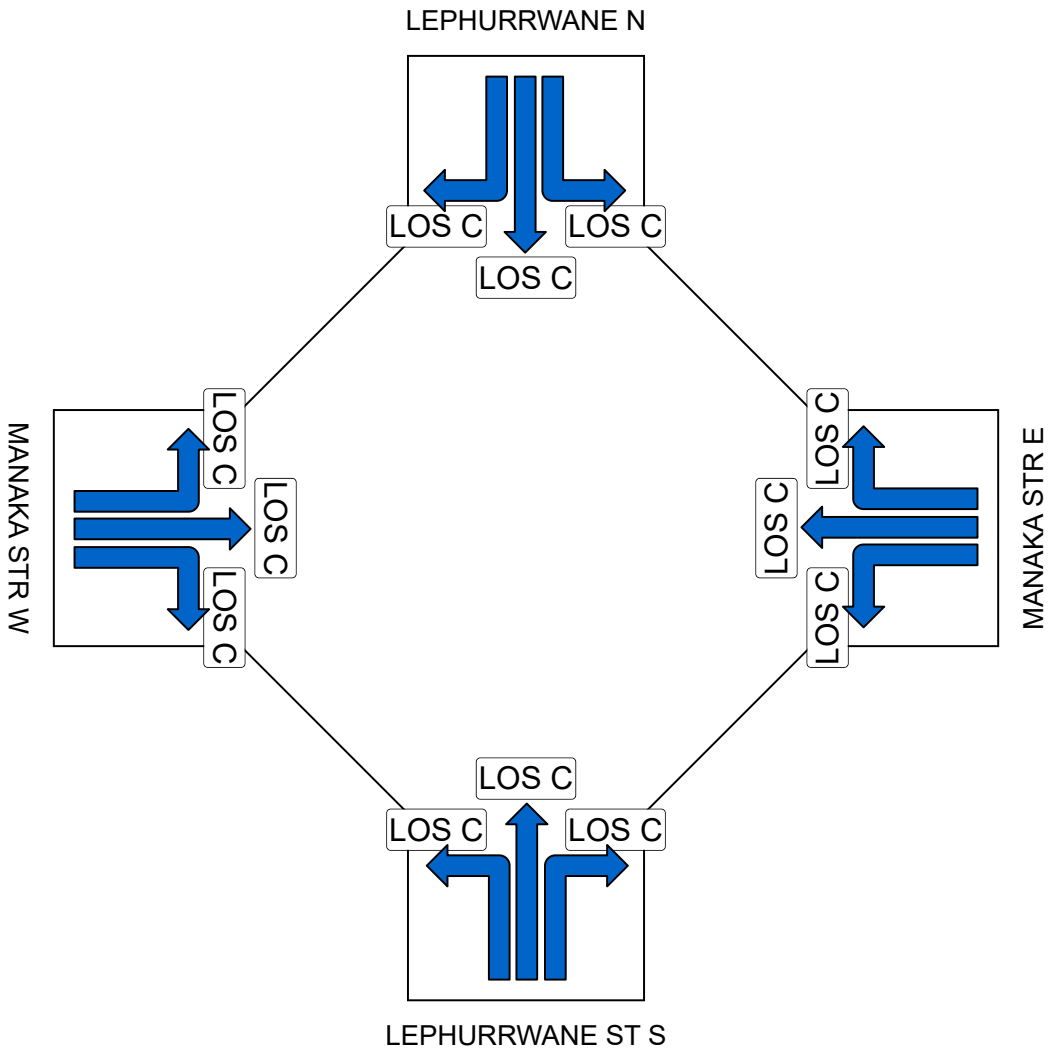
ANNEXURE C – SIDRA ANALYSIS

INTERSECTION A
Stop (All-Way)
Flow Scale Analysis (Practical Capacity): Results for Flow Scale (chosen as largest for any movement) = 138.0 %



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F | Continuous

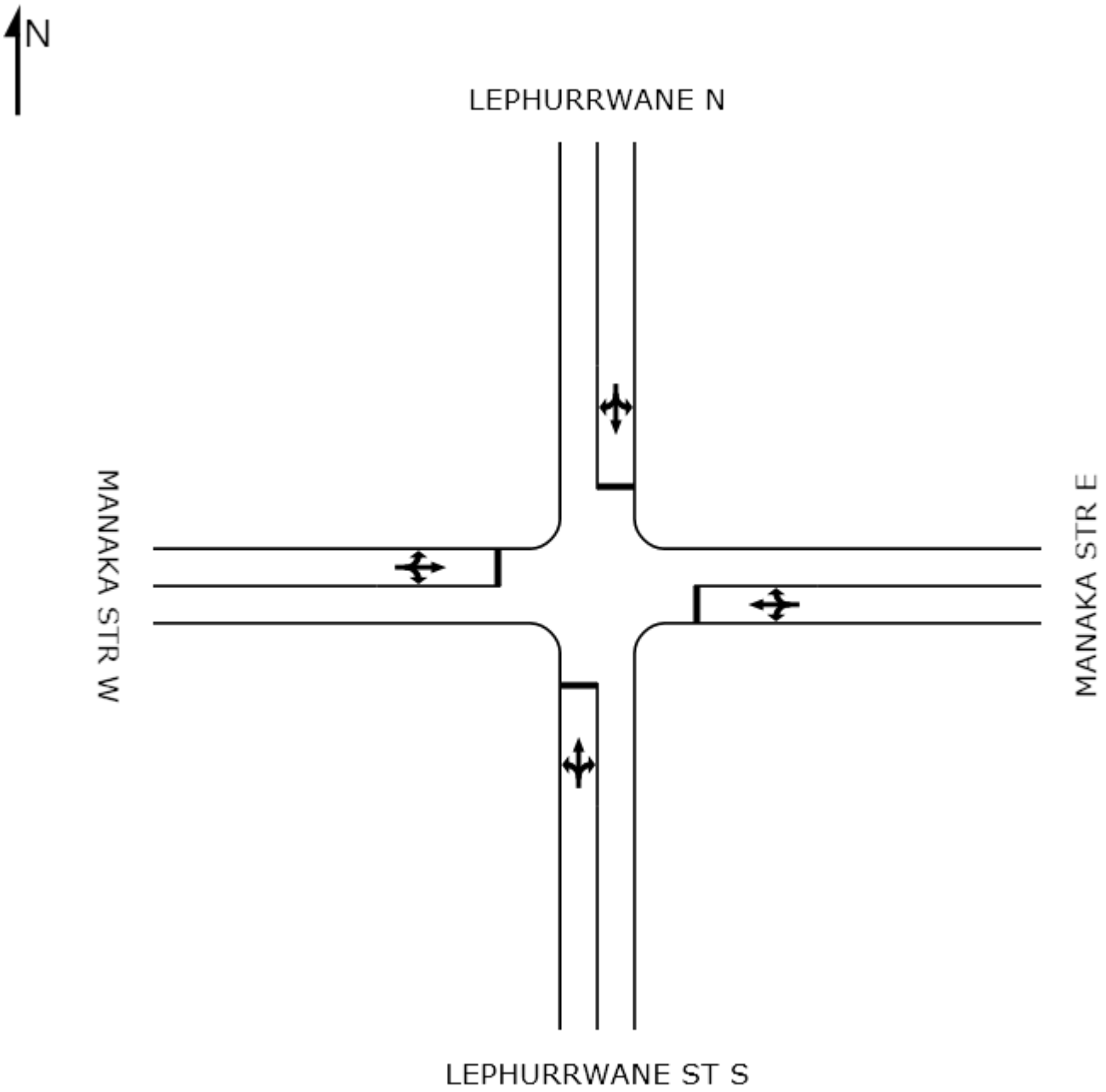
MOVEMENT SUMMARY

INTERSECTION A
Stop (All-Way)
Flow Scale Analysis (Practical Capacity): Results for Flow Scale (chosen as largest for any movement) = 138.0 %

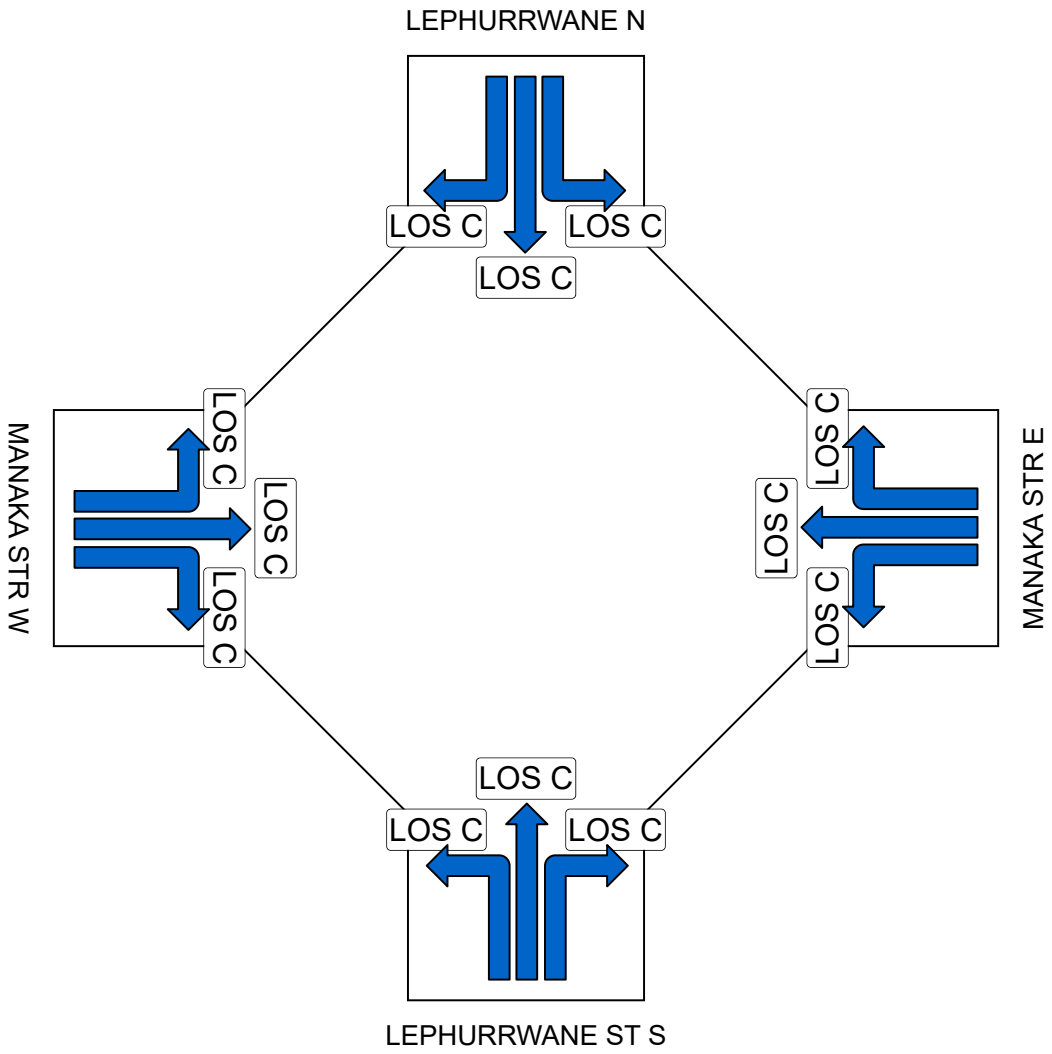
Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: LEPHURRWANE ST S											
1	L	3	0.0	0.024	20.6	LOS C	0.1	0.6	0.88	1.14	39.4
2	T	3	0.0	0.024	20.2	LOS C	0.1	0.6	0.88	1.14	39.6
3	R	3	0.0	0.024	20.4	LOS C	0.1	0.6	0.88	1.14	39.6
Approach		9	0.0	0.024	20.4	LOS C	0.1	0.6	0.88	1.14	39.5
East: MANAKA STR E											
4	L	4	0.0	0.037	16.9	LOS C	0.1	0.8	0.75	1.14	42.1
5	T	12	0.0	0.037	16.5	LOS C	0.1	0.8	0.75	1.14	42.4
6	R	6	0.0	0.037	16.7	LOS C	0.1	0.8	0.75	1.15	42.3
Approach		22	0.0	0.037	16.6	LOS C	0.1	0.8	0.75	1.14	42.3
North: LEPHURRWANE N											
7	L	7	0.0	0.046	19.6	LOS C	0.2	1.1	0.86	1.14	40.1
8	T	4	0.0	0.045	19.1	LOS C	0.2	1.1	0.86	1.14	40.4
9	R	7	0.0	0.046	19.4	LOS C	0.2	1.1	0.86	1.15	40.3
Approach		19	0.0	0.046	19.4	LOS C	0.2	1.1	0.86	1.14	40.3
West: MANAKA STR W											
10	L	6	0.0	0.036	17.1	LOS C	0.1	0.8	0.76	1.14	41.9
11	T	9	0.0	0.036	16.7	LOS C	0.1	0.8	0.76	1.14	42.2
12	R	6	0.0	0.036	16.9	LOS C	0.1	0.8	0.76	1.15	42.1
Approach		20	0.0	0.036	16.9	LOS C	0.1	0.8	0.76	1.14	42.1
All Vehicles		70	0.0	0.046	17.9	LOS C	0.2	1.1	0.80	1.14	41.3

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.


N
LEPHURRWANE N
MANAKA STR W
MANAKA STR E
LEPHURRWANE ST S

INTERSECTION A
Stop (All-Way)
Flow Scale Analysis (Practical Capacity): Results for Flow Scale (chosen as largest for any movement) = 138.0 %



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F	Continuous

MOVEMENT SUMMARY

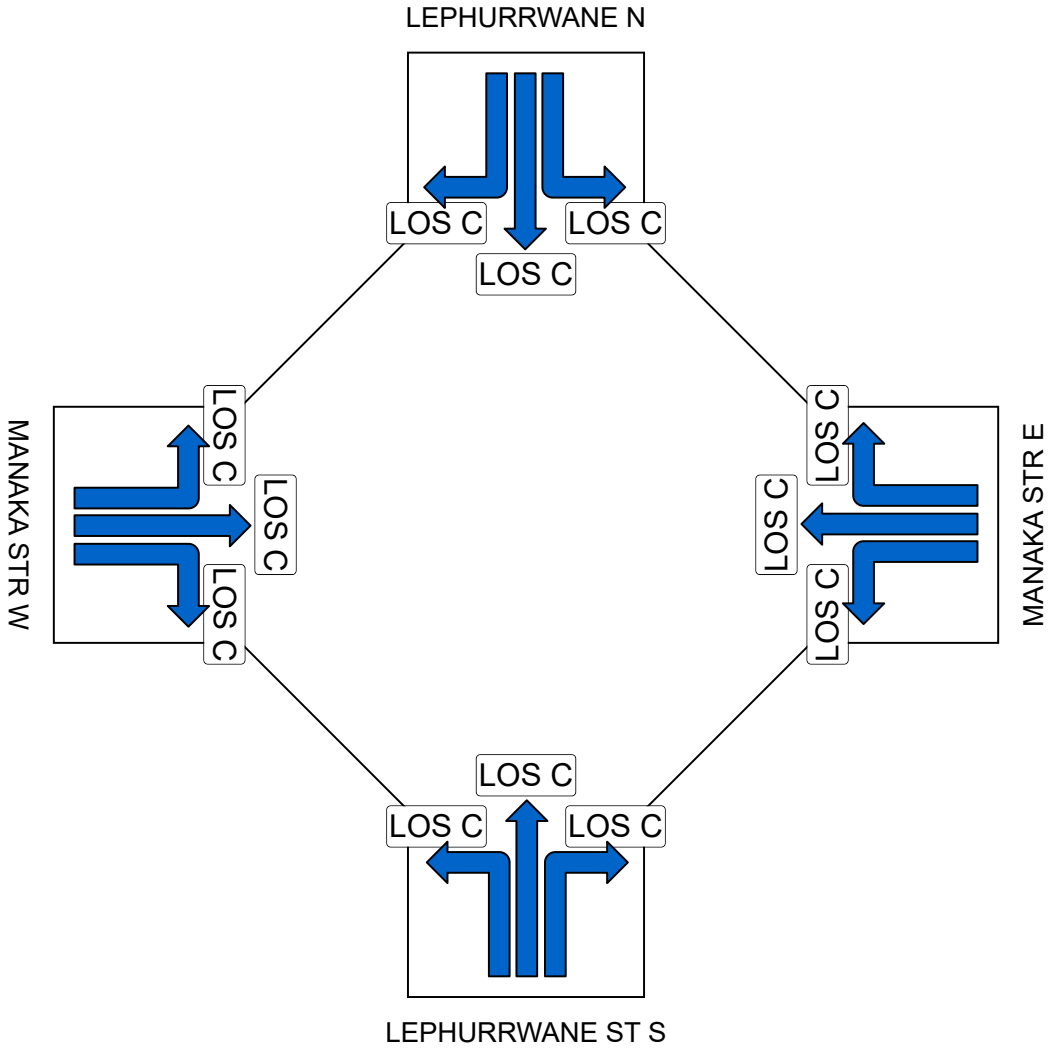
INTERSECTION A
Stop (All-Way)
Flow Scale Analysis (Practical Capacity): Results for Flow Scale (chosen as largest for any movement) = 138.0 %

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: LEPHURRWANE ST S											
1	L	3	0.0	0.031	23.9	LOS C	0.1	0.8	0.93	1.14	37.3
2	T	3	0.0	0.031	23.4	LOS C	0.1	0.8	0.93	1.14	37.5
3	R	3	0.0	0.031	23.7	LOS C	0.1	0.8	0.93	1.14	37.5
Approach		9	0.0	0.031	23.6	LOS C	0.1	0.8	0.93	1.14	37.4
East: MANAKA STR E											
4	L	3	0.0	0.037	17.3	LOS C	0.1	0.8	0.77	1.14	41.8
5	T	10	0.0	0.037	16.9	LOS C	0.1	0.8	0.77	1.14	42.0
6	R	7	0.0	0.037	17.1	LOS C	0.1	0.8	0.77	1.15	42.0
Approach		20	0.0	0.037	17.0	LOS C	0.1	0.8	0.77	1.14	42.0
North: LEPHURRWANE N											
7	L	3	0.0	0.042	21.1	LOS C	0.1	1.0	0.89	1.14	39.1
8	T	6	0.0	0.041	20.7	LOS C	0.1	1.0	0.89	1.14	39.3
9	R	6	0.0	0.041	20.9	LOS C	0.1	1.0	0.89	1.15	39.2
Approach		15	0.0	0.041	20.9	LOS C	0.1	1.0	0.89	1.14	39.2
West: MANAKA STR W											
10	L	4	0.0	0.037	17.8	LOS C	0.1	0.8	0.79	1.14	41.4
11	T	9	0.0	0.037	17.4	LOS C	0.1	0.8	0.79	1.14	41.7
12	R	6	0.0	0.037	17.6	LOS C	0.1	0.8	0.79	1.15	41.6
Approach		19	0.0	0.037	17.6	LOS C	0.1	0.8	0.79	1.14	41.6
All Vehicles		62	0.0	0.041	19.0	LOS C	0.1	1.0	0.83	1.14	40.5

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

INTERSECTION A
Stop (All-Way)
Design Life Analysis (Practical Capacity): Results for 5 years



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F	Continuous

MOVEMENT SUMMARY

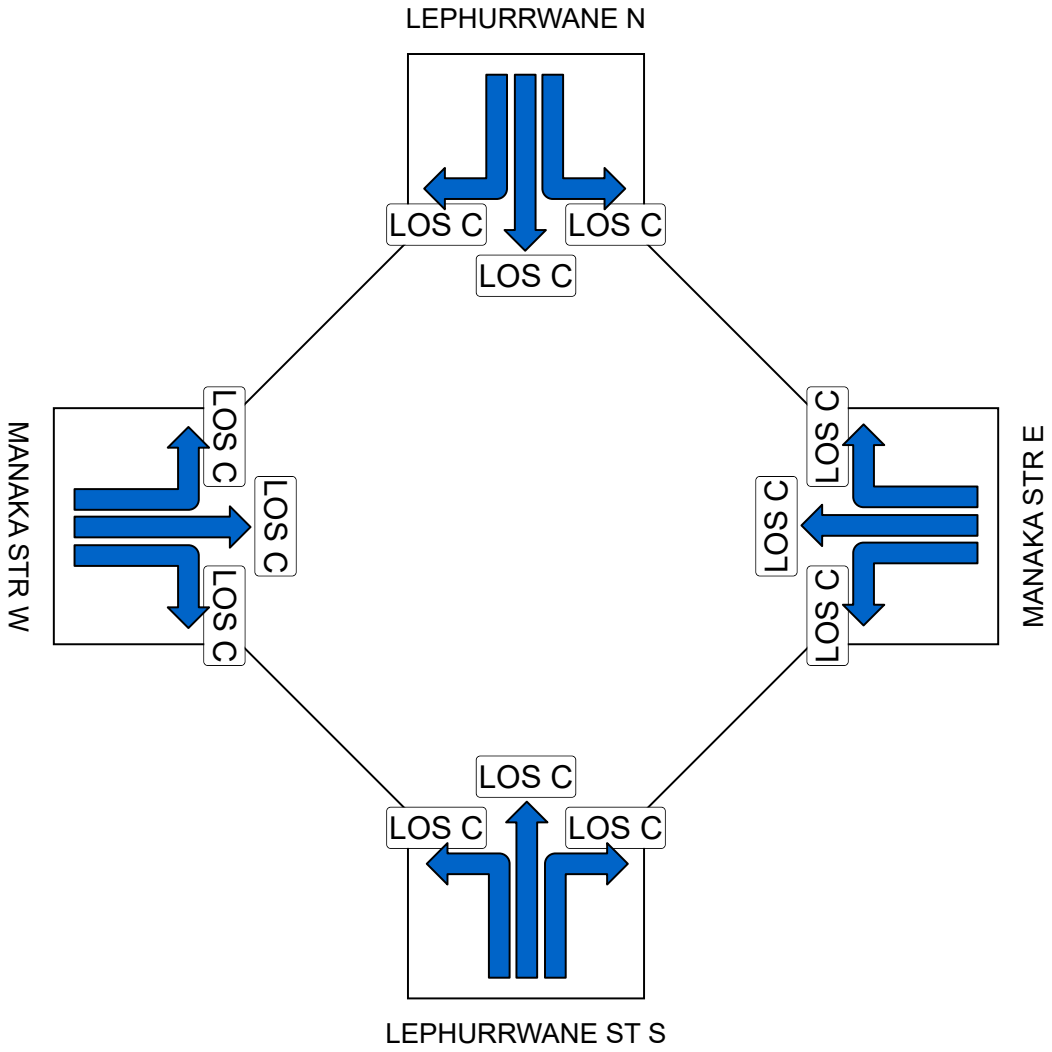
INTERSECTION A
Stop (All-Way)
Design Life Analysis (Practical Capacity): Results for 5 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: LEPHURRWANE ST S											
1	L	4	0.0	0.027	20.0	LOS C	0.1	0.6	0.87	1.14	39.8
2	T	3	0.0	0.027	19.6	LOS C	0.1	0.6	0.87	1.14	40.1
3	R	3	0.0	0.027	19.8	LOS C	0.1	0.6	0.87	1.14	40.0
Approach		11	0.0	0.027	19.8	LOS C	0.1	0.6	0.87	1.14	40.0
East: MANAKA STR E											
4	L	5	0.0	0.037	17.1	LOS C	0.1	0.8	0.76	1.14	41.9
5	T	10	0.0	0.037	16.7	LOS C	0.1	0.8	0.76	1.14	42.2
6	R	6	0.0	0.037	16.9	LOS C	0.1	0.8	0.76	1.15	42.1
Approach		21	0.0	0.037	16.8	LOS C	0.1	0.8	0.76	1.14	42.1
North: LEPHURRWANE N											
7	L	7	0.0	0.043	19.2	LOS C	0.1	1.0	0.84	1.14	40.4
8	T	5	0.0	0.043	18.8	LOS C	0.1	1.0	0.84	1.14	40.6
9	R	7	0.0	0.043	19.0	LOS C	0.1	1.0	0.84	1.15	40.6
Approach		19	0.0	0.043	19.0	LOS C	0.1	1.0	0.84	1.14	40.5
West: MANAKA STR W											
10	L	6	0.0	0.036	17.3	LOS C	0.1	0.8	0.77	1.14	41.8
11	T	8	0.0	0.036	16.9	LOS C	0.1	0.8	0.77	1.14	42.1
12	R	6	0.0	0.036	17.1	LOS C	0.1	0.8	0.77	1.15	42.0
Approach		20	0.0	0.035	17.0	LOS C	0.1	0.8	0.77	1.14	42.0
All Vehicles		70	0.0	0.043	17.9	LOS C	0.1	1.0	0.80	1.14	41.3

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.
The specified Design Life Target was not reached by the final year in the Design Life Analysis. Results are reported for the final year.

INTERSECTION A
Stop (All-Way)



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F	Continuous

MOVEMENT SUMMARY

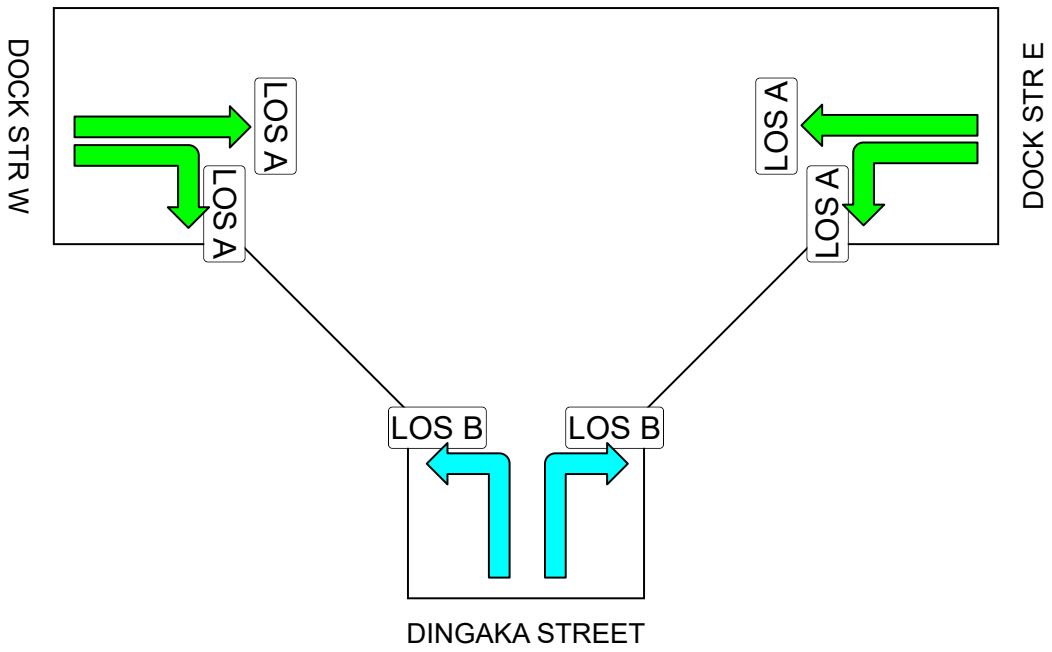
INTERSECTION A
Stop (All-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: LEPHURRWANE ST S											
1	L	3	2.0	0.029	21.8	LOS C	0.1	0.7	0.90	1.14	38.6
2	T	3	0.0	0.029	21.4	LOS C	0.1	0.7	0.90	1.14	38.8
3	R	3	0.0	0.029	21.6	LOS C	0.1	0.7	0.90	1.14	38.8
Approach		9	0.7	0.029	21.6	LOS C	0.1	0.7	0.90	1.14	38.8
East: MANAKA STR E											
4	L	3	0.0	0.034	17.5	LOS C	0.1	0.8	0.78	1.14	41.6
5	T	8	2.0	0.033	17.2	LOS C	0.1	0.8	0.78	1.14	41.9
6	R	6	0.0	0.033	17.3	LOS C	0.1	0.8	0.78	1.15	41.8
Approach		18	0.9	0.033	17.3	LOS C	0.1	0.8	0.78	1.14	41.8
North: LEPHURRWANE N											
7	L	3	0.0	0.035	20.2	LOS C	0.1	0.8	0.87	1.14	39.7
8	T	5	0.0	0.035	19.7	LOS C	0.1	0.8	0.87	1.14	40.0
9	R	5	2.0	0.035	20.1	LOS C	0.1	0.8	0.87	1.15	39.9
Approach		14	0.8	0.035	20.0	LOS C	0.1	0.8	0.87	1.14	39.9
West: MANAKA STR W											
10	L	4	2.0	0.032	18.0	LOS C	0.1	0.7	0.80	1.14	41.3
11	T	6	0.0	0.032	17.6	LOS C	0.1	0.7	0.80	1.14	41.5
12	R	5	2.0	0.032	17.9	LOS C	0.1	0.7	0.80	1.15	41.5
Approach		16	1.2	0.032	17.8	LOS C	0.1	0.7	0.80	1.14	41.4
All Vehicles		57	0.9	0.035	18.8	LOS C	0.1	0.8	0.83	1.14	40.7

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

INTERSECTION B
Stop (Two-Way)
Flow Scale Analysis (Practical Capacity): Results for Flow Scale (chosen as largest for any movement) = 138.0 %



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F | Continuous

MOVEMENT SUMMARY

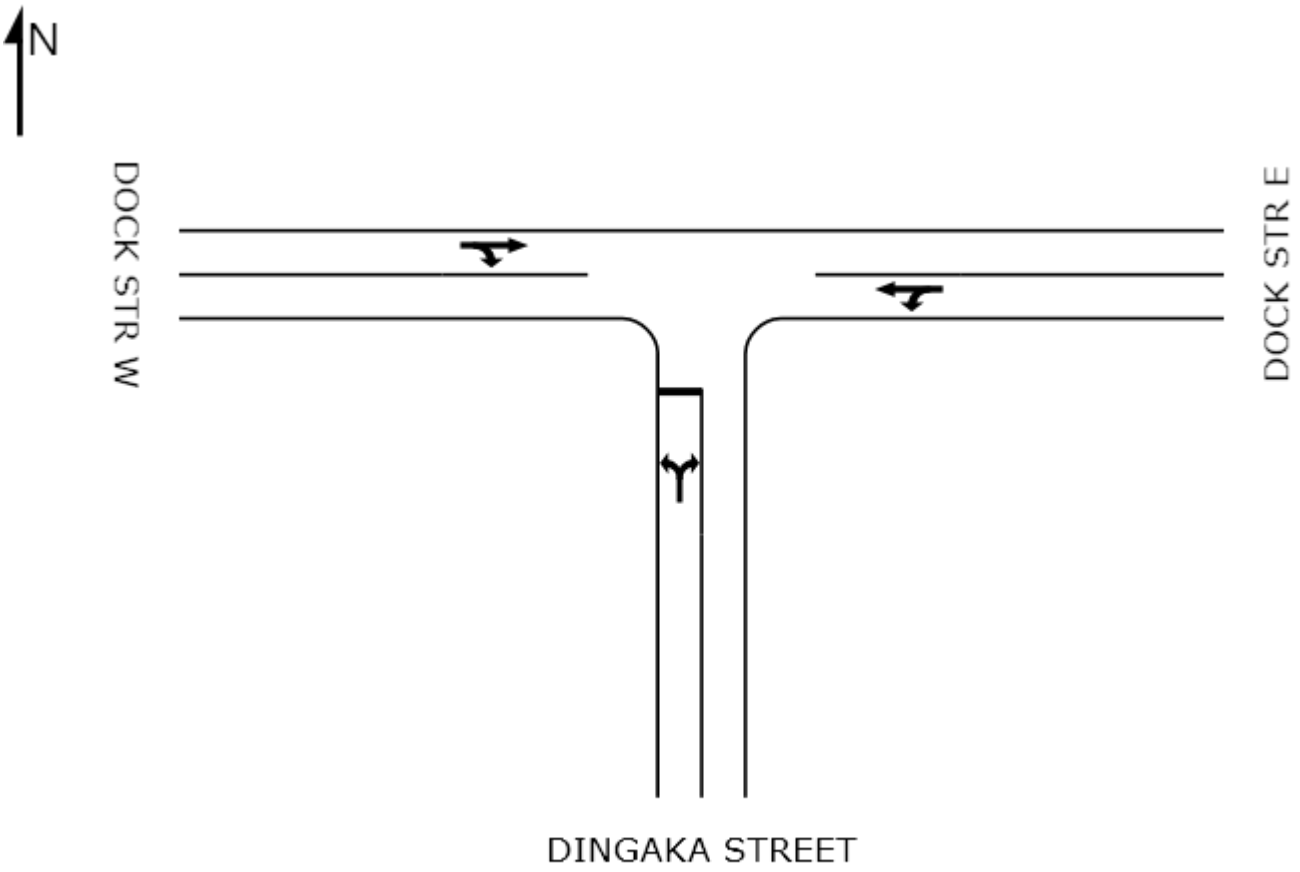
Site: INTERSECTION B AM PEAK

INTERSECTION B
Stop (Two-Way)
Flow Scale Analysis (Practical Capacity): Results for Flow Scale (chosen as largest for any movement) = 138.0 %

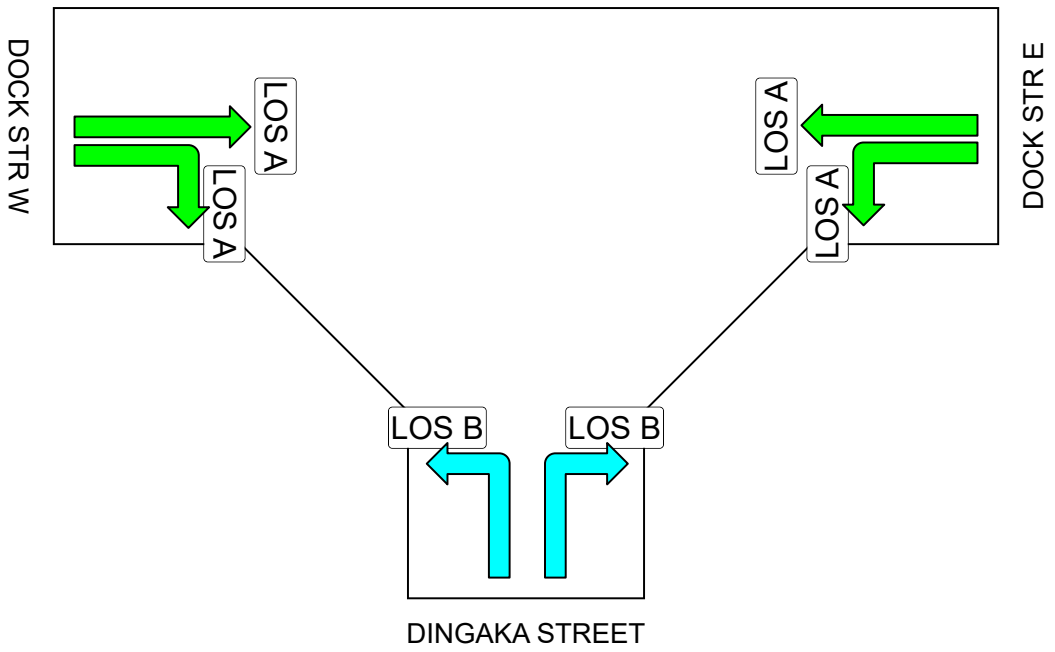
Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: DINGAKA STREET											
1	L	1	0.0	0.025	10.9	LOS B	0.1	0.8	0.13	0.86	46.3
3	R	20	0.0	0.025	10.7	LOS B	0.1	0.8	0.13	0.91	46.5
Approach		22	0.0	0.025	10.7	LOS B	0.1	0.8	0.13	0.91	46.5
East: DOCK STR E											
4	L	23	0.0	0.019	8.2	LOS A	0.0	0.0	0.00	0.77	49.0
5	T	13	0.0	0.019	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		36	0.0	0.019	5.2	LOS A	0.0	0.0	0.00	0.49	52.4
West: DOCK STR W											
11	T	9	0.0	0.006	0.1	LOS A	0.0	0.2	0.12	0.00	57.6
12	R	1	0.0	0.006	8.6	LOS A	0.0	0.2	0.12	0.98	48.7
Approach		10	0.0	0.006	1.3	LOS A	0.0	0.2	0.12	0.14	56.2
All Vehicles		68	0.0	0.025	6.4	NA	0.1	0.8	0.06	0.57	50.9

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.


N
DOCK STR W
DOCK STR E
DINGAKA STREET

INTERSECTION B
Stop (Two-Way)
Flow Scale Analysis (Practical Capacity): Results for Flow Scale (chosen as largest for any movement) = 138.0 %



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F | Continuous

MOVEMENT SUMMARY

Site: INTERSECTION B PM PEAK

INTERSECTION B
Stop (Two-Way)
Flow Scale Analysis (Practical Capacity): Results for Flow Scale (chosen as largest for any movement) = 138.0 %

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: DINGAKA STREET											
1	L	1	0.0	0.020	10.9	LOS B	0.1	0.7	0.12	0.87	46.3
3	R	16	0.0	0.020	10.7	LOS B	0.1	0.7	0.12	0.92	46.5
Approach		17	0.0	0.020	10.7	LOS B	0.1	0.7	0.12	0.92	46.5
East: DOCK STR E											
4	L	17	0.0	0.014	8.2	LOS A	0.0	0.0	0.00	0.76	49.0
5	T	9	0.0	0.014	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		26	0.0	0.014	5.5	LOS A	0.0	0.0	0.00	0.51	52.2
West: DOCK STR W											
11	T	10	0.0	0.007	0.1	LOS A	0.0	0.3	0.09	0.00	58.0
12	R	3	0.0	0.007	8.5	LOS A	0.0	0.3	0.09	0.95	48.6
Approach		13	0.0	0.007	2.0	LOS A	0.0	0.3	0.09	0.21	55.6
All Vehicles		57	0.0	0.020	6.3	NA	0.1	0.7	0.06	0.57	51.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: INTERSECTION B AM PEAK - 5 YEARS

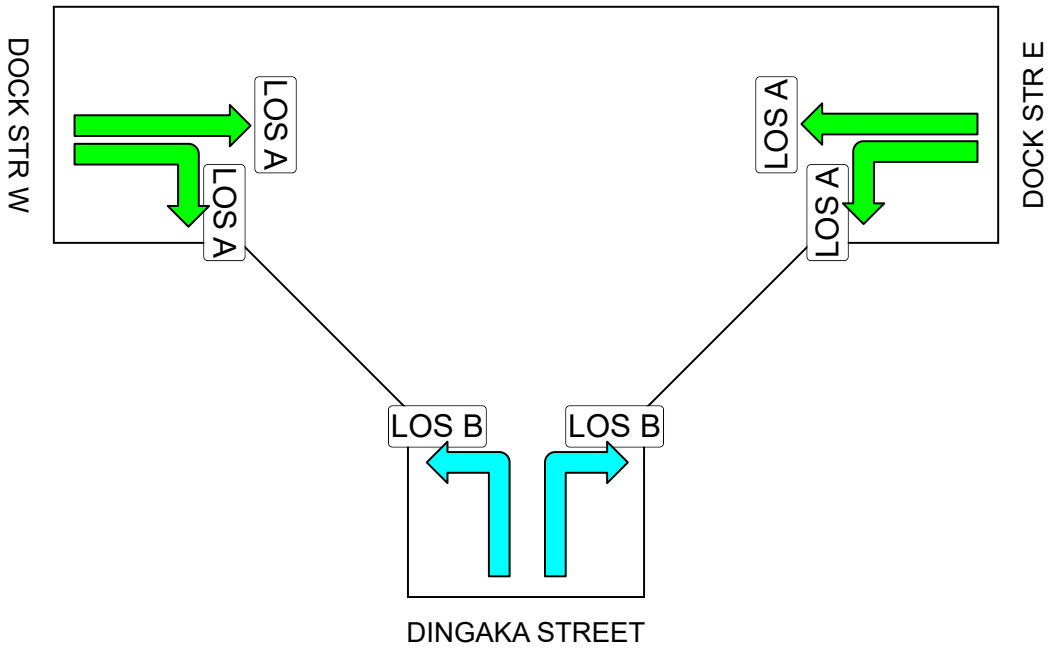
INTERSECTION B
Stop (Two-Way)
Design Life Analysis (Practical Capacity): Results for 5 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: DINGAKA STREET											
1	L	2	2.0	0.023	10.9	LOS B	0.1	0.8	0.12	0.87	46.3
3	R	19	2.0	0.023	10.8	LOS B	0.1	0.8	0.12	0.92	46.5
Approach		21	2.0	0.023	10.8	LOS B	0.1	0.8	0.12	0.91	46.5
East: DOCK STR E											
4	L	21	2.0	0.017	8.2	LOS A	0.0	0.0	0.00	0.76	49.0
5	T	10	0.0	0.017	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		31	1.3	0.017	5.5	LOS A	0.0	0.0	0.00	0.51	52.2
West: DOCK STR W											
11	T	8	2.0	0.006	0.1	LOS A	0.0	0.3	0.10	0.00	57.8
12	R	2	2.0	0.006	8.5	LOS A	0.0	0.3	0.10	0.94	48.6
Approach		10	2.0	0.006	2.0	LOS A	0.0	0.3	0.10	0.21	55.4
All Vehicles		63	1.7	0.023	6.7	NA	0.1	0.8	0.06	0.59	50.6

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.
The specified Design Life Target was not reached by the final year in the Design Life Analysis. Results are reported for the final year.

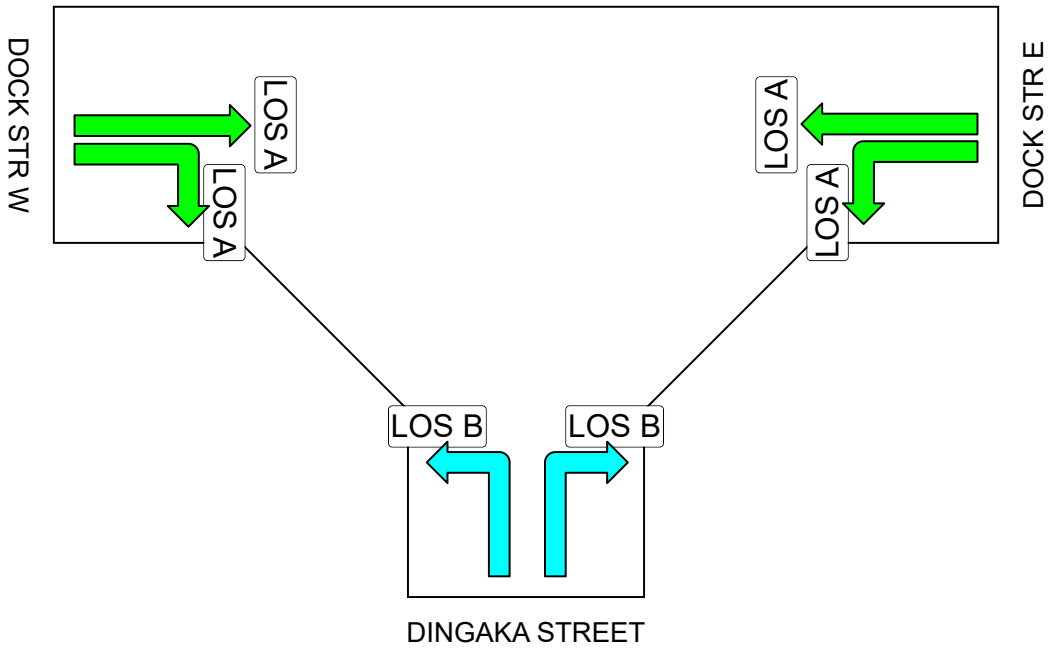
INTERSECTION B
Stop (Two-Way)
Design Life Analysis (Practical Capacity): Results for 5 years



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F | Continuous

INTERSECTION B
Stop (Two-Way)
Design Life Analysis (Practical Capacity): Results for 5 years



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F | Continuous

MOVEMENT SUMMARY

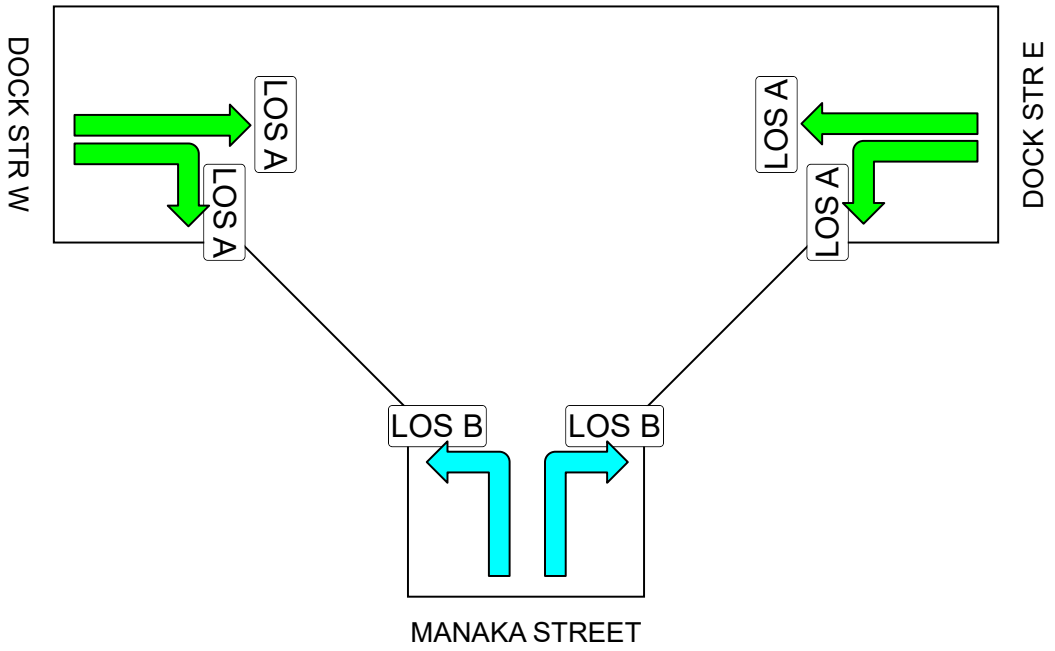
INTERSECTION B
Stop (Two-Way)
Design Life Analysis (Practical Capacity): Results for 5 years

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: DINGAKA STREET											
1	L	2	2.0	0.019	10.9	LOS B	0.1	0.6	0.11	0.87	46.3
3	R	14	2.0	0.019	10.8	LOS B	0.1	0.6	0.11	0.93	46.5
Approach		17	2.0	0.018	10.8	LOS B	0.1	0.6	0.11	0.92	46.5
East: DOCK STR E											
4	L	17	2.0	0.014	8.2	LOS A	0.0	0.0	0.00	0.77	49.0
5	T	9	2.0	0.014	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		26	2.0	0.014	5.2	LOS A	0.0	0.0	0.00	0.49	52.5
West: DOCK STR W											
11	T	9	2.0	0.007	0.1	LOS A	0.0	0.3	0.09	0.00	58.0
12	R	4	2.0	0.007	8.5	LOS A	0.0	0.3	0.09	0.92	48.6
Approach		13	2.0	0.007	2.4	LOS A	0.0	0.3	0.09	0.25	55.1
All Vehicles		56	2.0	0.018	6.2	NA	0.1	0.6	0.06	0.56	51.1

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.
The specified Design Life Target was not reached by the final year in the Design Life Analysis. Results are reported for the final year.

INTERSECTION B
Stop (Two-Way)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F | Continuous

MOVEMENT SUMMARY

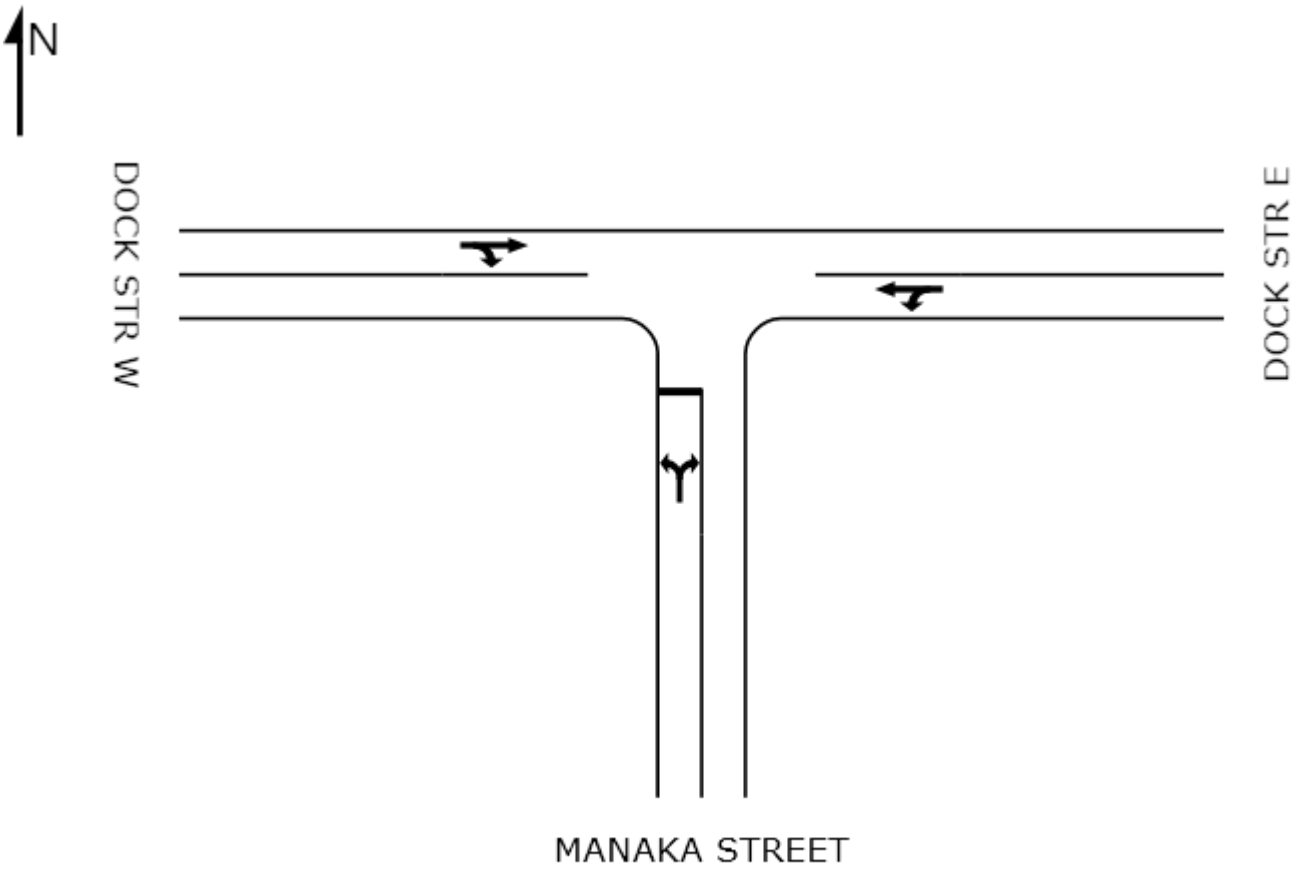
INTERSECTION B
Stop (Two-Way)

Movement Performance - Vehicles

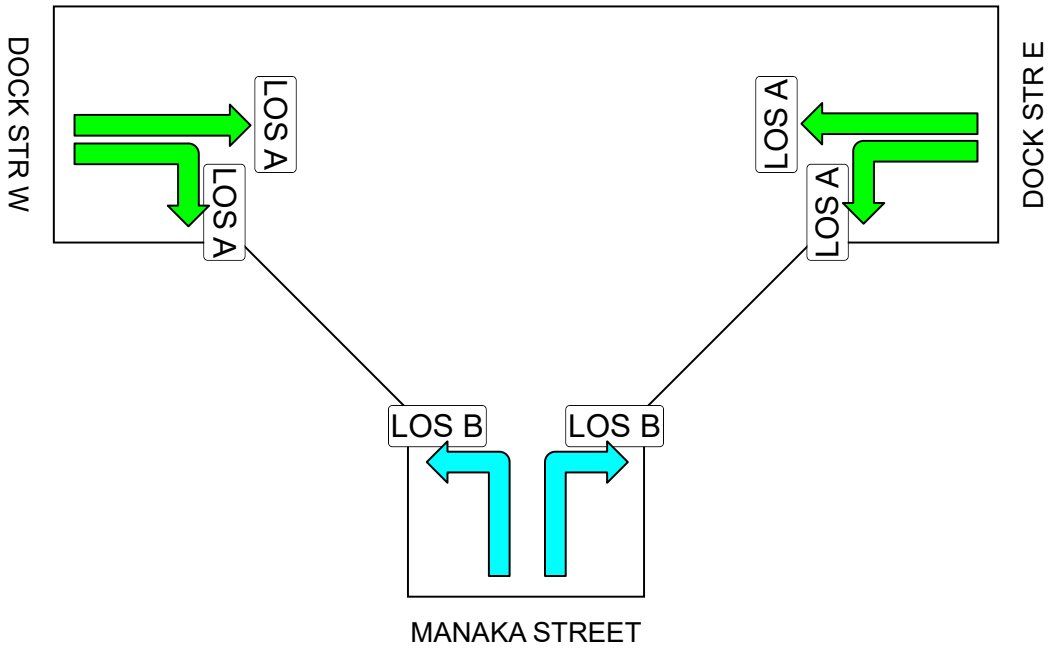
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: MANAKA STREET											
1	L	2	0.0	0.004	10.7	LOS B	0.0	0.1	0.03	0.95	46.4
3	R	2	0.0	0.004	10.5	LOS B	0.0	0.1	0.03	1.00	46.5
Approach		4	0.0	0.004	10.6	LOS B	0.0	0.1	0.03	0.97	46.4
East: DOCK STR E											
4	L	3	0.0	0.002	8.2	LOS A	0.0	0.0	0.00	0.74	49.0
5	T	1	0.0	0.002	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		4	0.0	0.002	6.1	LOS A	0.0	0.0	0.00	0.55	51.3
West: DOCK STR W											
11	T	2	0.0	0.004	0.0	LOS A	0.0	0.2	0.03	0.00	59.2
12	R	4	0.0	0.004	8.5	LOS A	0.0	0.2	0.03	0.79	48.5
Approach		6	0.0	0.004	5.6	LOS A	0.0	0.2	0.03	0.52	51.7
All Vehicles		15	0.0	0.004	7.2	NA	0.0	0.2	0.02	0.66	50.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION


N
DOCK STR W
DOCK STR E
MANAKA STREET

INTERSECTION B
Stop (Two-Way)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F | Continuous

MOVEMENT SUMMARY

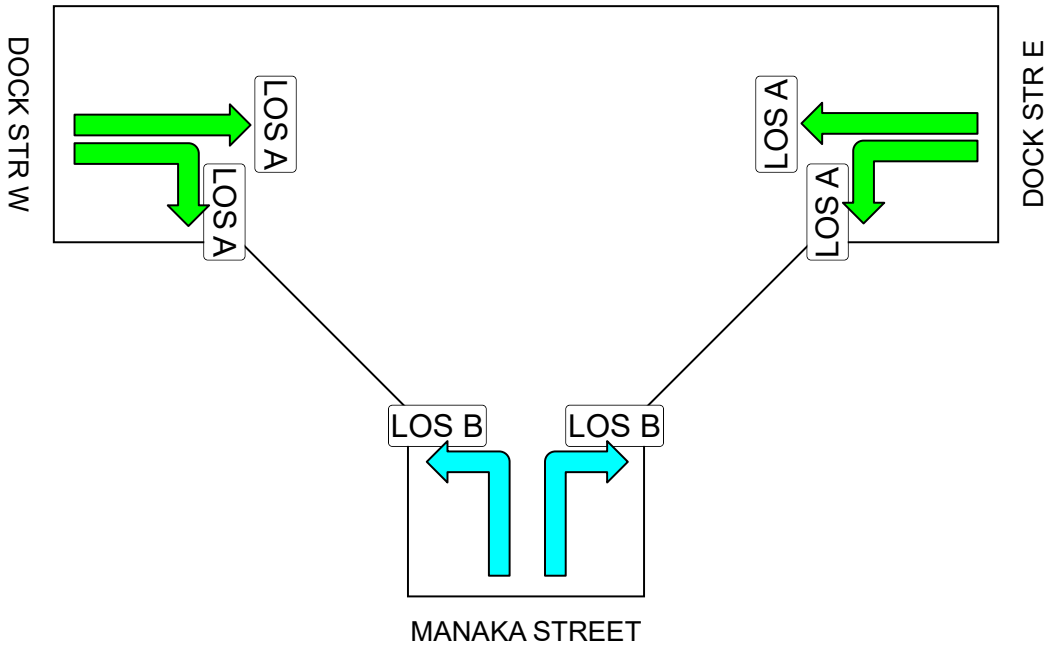
INTERSECTION B
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: MANAKA STREET											
1	L	1	0.0	0.002	10.7	LOS B	0.0	0.1	0.03	0.95	46.4
3	R	1	0.0	0.002	10.5	LOS B	0.0	0.1	0.03	1.00	46.5
Approach		2	0.0	0.002	10.6	LOS B	0.0	0.1	0.03	0.97	46.4
East: DOCK STR E											
4	L	3	0.0	0.002	8.2	LOS A	0.0	0.0	0.00	0.74	49.0
5	T	1	0.0	0.002	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		4	0.0	0.002	6.1	LOS A	0.0	0.0	0.00	0.55	51.3
West: DOCK STR W											
11	T	1	0.0	0.002	0.0	LOS A	0.0	0.1	0.03	0.00	59.2
12	R	2	0.0	0.002	8.5	LOS A	0.0	0.1	0.03	0.79	48.5
Approach		3	0.0	0.002	5.6	LOS A	0.0	0.1	0.03	0.52	51.7
All Vehicles		9	0.0	0.002	7.0	NA	0.0	0.1	0.02	0.64	50.3

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.

INTERSECTION B
Stop (Two-Way)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F | Continuous

INTERSECTION B
Stop (Two-Way)

Movement Performance - Vehicles

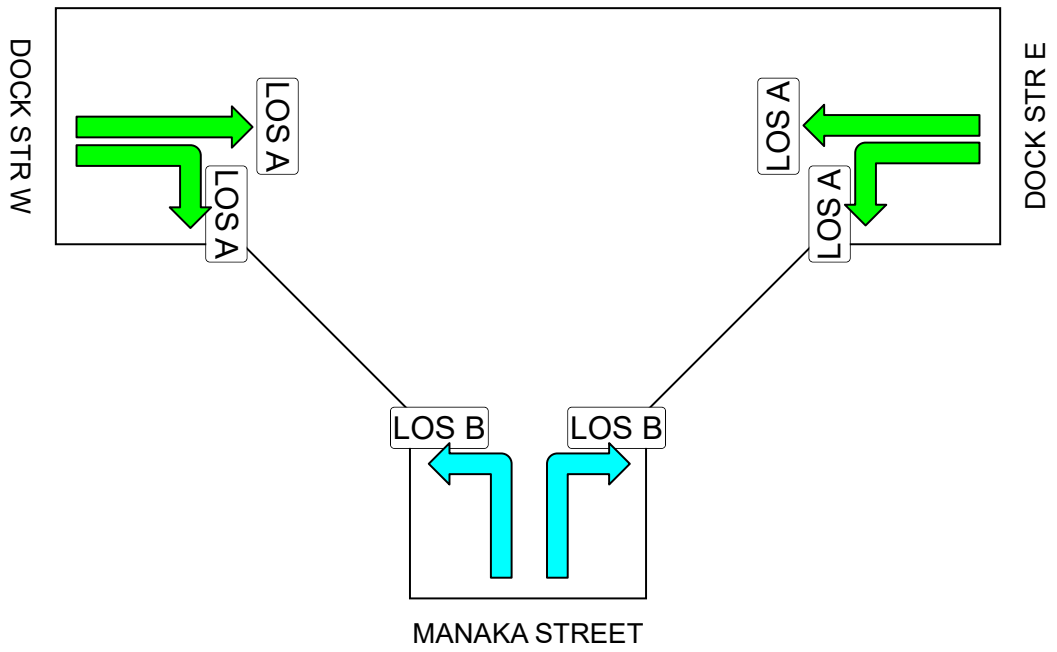
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: MANAKA STREET											
1	L	3	2.0	0.006	10.8	LOS B	0.0	0.2	0.07	0.92	46.4
3	R	3	2.0	0.006	10.6	LOS B	0.0	0.2	0.07	0.97	46.5
Approach		6	2.0	0.006	10.7	LOS B	0.0	0.2	0.07	0.95	46.4
East: DOCK STR E											
4	L	4	2.0	0.007	8.2	LOS A	0.0	0.0	0.00	0.89	49.0
5	T	8	2.0	0.007	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		13	2.0	0.007	2.7	LOS A	0.0	0.0	0.00	0.30	55.8
West: DOCK STR W											
11	T	7	2.0	0.008	0.0	LOS A	0.0	0.3	0.06	0.00	58.6
12	R	5	2.0	0.008	8.6	LOS A	0.0	0.3	0.06	0.87	48.6
Approach		13	2.0	0.008	3.6	LOS A	0.0	0.3	0.06	0.36	54.0
All Vehicles		32	2.0	0.008	4.7	NA	0.0	0.3	0.04	0.45	53.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

INTERSECTION B
Stop (Two-Way)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F | Continuous

INTERSECTION B
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: MANAKA STREET											
1	L	2	2.0	0.004	10.7	LOS B	0.0	0.1	0.06	0.93	46.4
3	R	2	2.0	0.004	10.5	LOS B	0.0	0.1	0.06	0.98	46.5
Approach		4	2.0	0.004	10.6	LOS B	0.0	0.1	0.06	0.95	46.4
East: DOCK STR E											
4	L	4	2.0	0.006	8.2	LOS A	0.0	0.0	0.00	0.86	49.0
5	T	6	2.0	0.006	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		11	2.0	0.006	3.3	LOS A	0.0	0.0	0.00	0.35	55.0
West: DOCK STR W											
11	T	5	2.5	0.005	0.0	LOS A	0.0	0.2	0.05	0.00	58.8
12	R	3	2.0	0.005	8.5	LOS A	0.0	0.2	0.05	0.89	48.6
Approach		8	2.3	0.005	3.2	LOS A	0.0	0.2	0.05	0.34	54.5
All Vehicles		23	2.1	0.006	4.6	NA	0.0	0.2	0.03	0.45	53.1

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.