N2/N3 FREEWAY UPGRADE PROGRAM

THE DRIVE FOR

WORLD-CLASS INFRASTRUCTURE

Traffic Management Plan (TMP):

High-Level and Regional Analyses

Version 1 (February 2022)

Client: The South African National Roads Agency SOC Limited
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TABLE OF CONTENTS

FIGURES

TABLES

1. INTRODUCTION

1.1 Background

The N2 and N3 are integral to the economic growth of Southern Africa. A growing Southern African population has placed this strategic corridor under severe pressure, requiring substantial upgrading to portions of the corridor. This corridor, also referred to as the Durban - Free State - Gauteng Corridor, is South Africa's key infrastructure development project and is one of the SA Governments key strategic integrated projects (SIP2) that forms part of the National Development Plan. Some of the project packages were gazetted under SIP2 in July 2020 through Infrastructure South Africa and the Presidency as Strategic Transport projects. Funding is to be provided through the Presidency's stimulus infrastructure fund for these identified projects.

The need for the identified upgrades arose from increased traffic volumes resulting in declining levels of service on the freeways and all Interchanges. The freeway between Pietermaritzburg and Durban currently operates at a Level of Service exceeding the SANRAL density triggers for the peak hour and 30th Highest Hourly Volume respectively.

The upgrade of the N2 will focus on a 55 km length, from Lovu River, on the South Coast, to Umdloti, on the North Coast. The N3 upgrade will focus on an 80 km section from Durban to Pietermaritzburg. Refer to Figure 1-1 for a locality map.

The need for this Traffic Management Plan (TMP) arose during design development of the packages. During this stage SANRAL made a decision to maintain the same number of lanes on the N2 and N3 during construction as existed prior to construction, wherever practical and economically feasible. The reasoning was chiefly led by the need to maintain mobility and reduce congestion due to construction activities on this important national economic artery. The designed intention is thus to maintain all traffic on the N2 and N3 during the construction activities. Nevertheless, some traffic may naturally divert to alternative routes during normal operations. This will be accentuated during emergency operations, for example when a breakdown or crash has occurred and especially when these have occurred during peak travel times.

The intention of this TMP is to understand the traffic impacts on the greater road network during all operation conditions and proactively put plans in place to minimise the impact on the general road users travel time. As traffic modelling outputs become available, further construction projects come on board and traffic accommodation conditions change on existing construction projects the TMP will be updated and re-issued as a later version. To avoid release of an uncontrollably high number of TMP's updates will be done at intervals no less than 6 months.

The TMP has been developed in consultation with several stakeholders and partners. Regular meetings have been held at about 2 to 3 week intervals since February 2021, attended by SANRAL, KwaZulu-Natal Department of Transport (KZNDOT) and eThekwini Municipality officials. These sessions have since been expanded to include other strategic partners such as Transnet, Airports Company South Africa (ACSA), Dube Trade Port (DTP), members of the communications and marketing team.

An introductory meeting was held with Msunduzi Municipality in September 2021. Further engagements expected to continue with the municipality as more analysis and assessments are completed. There has not yet been an engagement with Mkhambathini on the TMP. Arrangements will be made to also engage Mkhambathini on the TMP.

There has also been presentations with other stakeholders, such as the road freight industry, the Durban Port De-congest forum. Further presentations are expected with several other stakeholders and partners as the program develops.

This version of the TMP reports on the status at the time of writing – refer to the version date on the cover page.

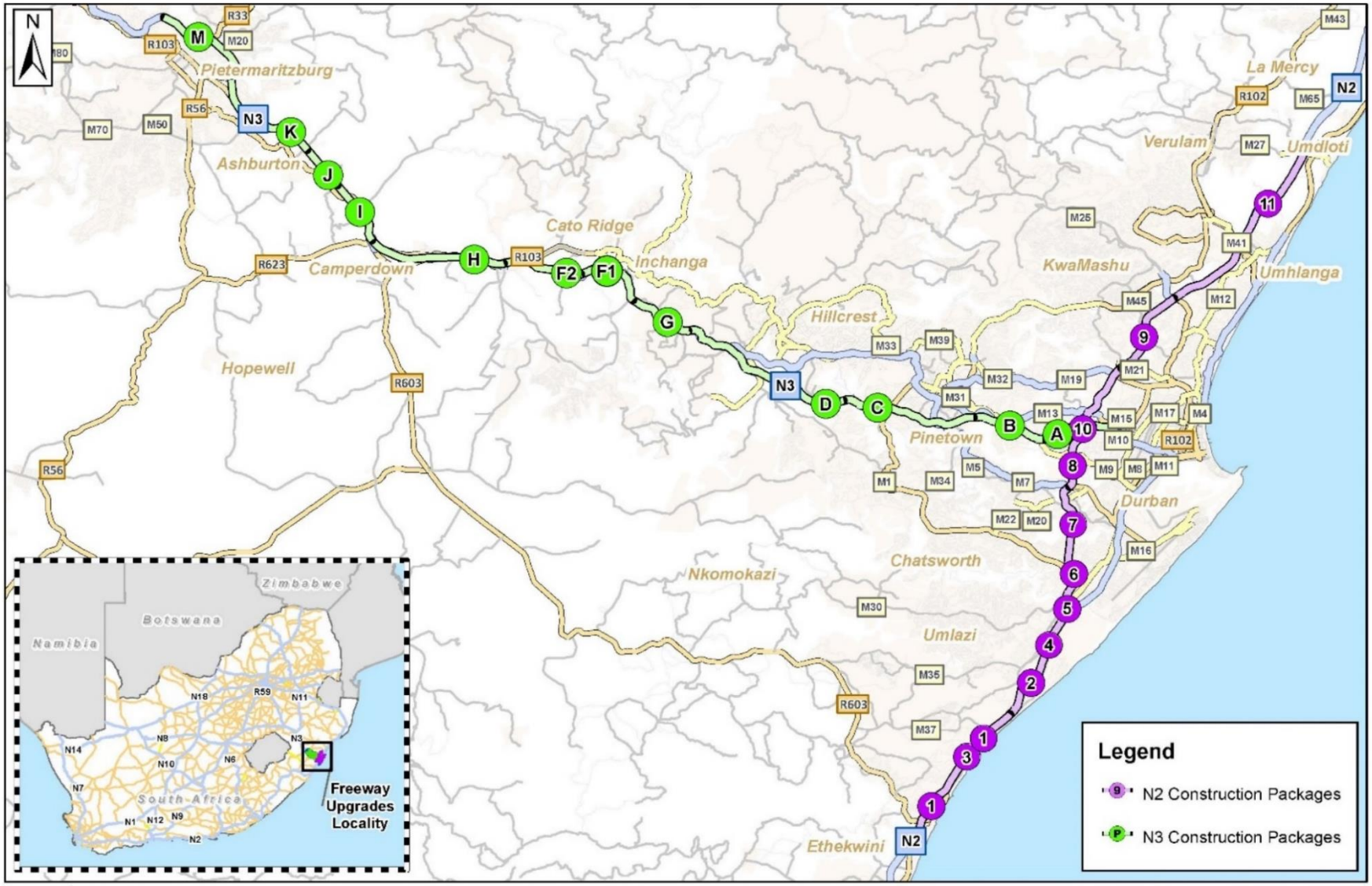


Figure 1-1: Locality Map

1.2 Project packages

The project packages on the N2 and N3 are listed in Table 1-1 and Table 1-2. The locations of the packages are also shown in Figure 1-1.

Table 1-1: N2 Project Packages

No	Project Location	Key Features	Current phase & estimated programmed construction start date
1	Lovu to Moss Kolnick	The upgrade will be over a distance of 7.7 km and includes the addition of lanes and widening/lengthening/replacement of bridges. Continuous street lighting will be included to improve safety	Detailed design (70%) & November 2023
2	Moss Kolnick to Isipingo	The upgrade will be over a distance of 7.3 km and includes the addition of lanes, widening/lengthening/replacement of bridges and major upgrades to the interchanges within the project limits. Continuous street lighting will be included to improve safety	Detailed design (70%) & November 2023
3	Adams Road Interchange	An upgraded parclo interchange will improve the geometrics and traffic capacity	Detailed design (100%) & future planning only
4	Isipingo Interchange	Apart from accommodating current traffic demand, the design will make allowance for future expansion including that for the anticipated Durban dig out port.	Detailed design (100%) and included under package 2
5	Isipingo to Higginson Interchange	This section which carries high volumes of light and heavy vehicles will be widened from a three- to a four/five-lane dual carriageway and includes the widening/lengthening/replacement of bridges and minor amendments to the interchanges within the project limits. Continuous street lighting will be included to improve safety	Detailed design (80%) & September 2024

No	Project Location	Key Features	Current phase & estimated programmed construction start date
6	Higginson Interchange	The project comprises a multi- level interchange, including fly-over directional ramps as well as loops to allow high mobility through the interchange. This interchange provides an important link to the future port expansion freight traffic and improves capacity to and from the residential areas to the West. Continuous street lighting will be included to improve safety	Concept design (80%) & November 2025
7	Higginson Interchange to Edwin Swales Interchange	This section which carries high volumes of light and heavy vehicles will be widened from a three- to a four/five-lane dual carriageway and includes the widening/lengthening/replacement of bridges. Continuous street lighting will be included to improve safety	Detailed design (80%) & September 2024
8	Edwin Swales to south of EB Cloete	The Edwin Swales Interchange will consist of a three-level interchange with fly-over directional ramps and loops to cater for high volumes of traffic from the port. Additional lanes will be added to the N2 towards EB Cloete interchange including widening/lengthening/replacement of bridges. Continuous street lighting will be included to improve safety	Detailed design (100%) & March 2022 (51 months)
9	Mgeni to KwaMashu Interchange	Improvements to the N2 between Mgeni and KwaMashu Interchange will consist of 26 structures, additional through lanes, the addition of auxiliary lanes between interchanges, addition of climbing lanes where warranted as well as major improvements to the KwaMashu Interchange. This will improve road safety and reduce congestion. Continuous street lighting will be included to improve safety.	Detailed design (90%) & October 2024 (51 months)

No	Project Location	Key Features	Current phase & estimated programmed construction start date
10	EB Cloete Interchange incl. the N2 and N3 approaches	Capacity will be added to the existing interchange by way of addition of lanes to both the N2 and N3 on the approaches to- and within the interchange. To enable the addition of lanes within the interchange a major steel arch is required to support the existing structures. Continuous street lighting will be included to improve safety	Detailed design (100%) & March 2022 (63 months)
11	KwaMashu Interchange to Umdloti Interchange	Approximately 13,7km section of the N2 will be upgraded from a two-lane dual carriageway to an eight-lane dual carriageway and includes the addition of lanes and widening/lengthening/replacement of bridges. Continuous street lighting will be included to improve safety	Detailed design (100%) & Commenced (October 2021 for 40 months)

Table 1-2: N3 Project Packages

No	Project Location	Key Features	Current phase & estimated programmed construction start date
A	EB Cloete Interchange incl. the N2 and N3 approaches	Refer to N2 package 10	Refer to N2 package 10
B	Westville Viaduct to Paradise Valley	This project comprises the addition of lanes to the N3 and upgrade of both the Westville and Paradise Valley (M13) interchanges. Included will be the construction of the first ever network arch bridge in South Africa. The structure will allow the bridge to span across the entire N3 without any support piers, thereby creating space for additional lanes without major adjustments to the levels on St	Detailed design (100%) & January 2023 (51 months)

No	Project Location	Key Features	Current phase & estimated programmed construction start date
		James Avenue (due to a substantially reduced deck depth). Continuous street lighting will be included to improve safety	
C	Paradise Valley to Mariannhill Toll Plaza	This project comprises the addition of lanes and upgrading of interchanges, including Farningham Ridge and Richmond Road. Richmond Road Interchange requires a 300m long flyover bridge which will add a third level to the existing diamond type interchange. Continuous street lighting will be included to improve safety	Detailed design (90%) & TBC (toll funding dependant)
D	Mariannhill Toll Plaza to Key Ridge	The project will entail approximately 11kms of N3 being widened to a 10-lane dual carriageway, including the widening of the Mhlathuzana viaduct. Extensive retaining structures are required due to the steep nature of the existing terrain. Continuous street lighting will be included to improve safety	Detailed design (85%) & TBC (toll funding dependant)
E	Hammarsdale Interchange	The existing simple diamond interchange has been upgraded to a partial clover leaf free-flow interchange, which includes the construction of a new bridge and six new on- and off ramps. These allow the interchange to accommodate increased volumes of traffic resulting from the development of the area as a distribution node for freight logistics companies. Continuous street lighting has been included to improve safety	Complete
F1	Hammarsdale to BP Oasis	This project comprises the addition of 1 to 2 lanes to each of the N3 carriageways and includes extensive median retaining walls due to the split nature of the existing carriageways. Continuous street lighting will be included to improve safety	Detailed design (70%) & August 2023
F2	BP Oasis to Cato Ridge	This project comprises the addition of 1 to 3 lanes to each of the N3 carriageways. The Cato Ridge rail bridge will be realigned since the existing pier position conflicts with the upgrade widening. The realigned bridge needs to be built adjacent to the	Detailed design (50%) & February 2024

No	Project Location	Key Features	Current phase & estimated programmed construction start date
		existing bridge to maintain rail operations during construction. The existing bridge will be demolished once the new bridge is completed. A new interchange at D12 will likely be built as part of eThekwini's Local Area Plan. Cato Ridge is part of a major metropolitan industrial growth node by virtue of its location on the strategic N3 logistics corridor (SIP2). Continuous street lighting will be included to improve safety	
G	Key Ridge to Hammarsdale	This project comprises the upgrade of the existing N3 to a 10-lane dual carriageway cross section. The existing N3 between Key Ridge and Cliffdale has steep grades and tight horizontal curves. These, coupled with the presence of the Peacevale Interchange contribute to a high crash rate within this section of the N3. The upgrade project allows for a ±1,7 km realignment of the N3 to reduce the steep grades and remove the tight curves, ultimately resulting in improved traffic operation and road user safety. Continuous street lighting will be included to improve safety	Detailed design (100%) & November 2022 (51 months)
H	Cato Ridge to Dardanelles	The existing horizontal and vertical alignment will be upgraded and 2 additional lanes added per carriageway. These interventions will improve capacity and road safety, especially in prevailing misty conditions. Portions of the future Camperdown interchange will be constructed as well as a new section of the R103, which will significantly reduce the current travel time delays experienced in the Camperdown area. Street lighting will be included to improve safety	Detailed design (100%) & commenced (January 2021 for 51 months)
I	Dardanelles to Lynnfield Park	Two additional lanes will be added per carriageway as well as an additional climbing lane on the southbound carriageway. Due to the proximity of the rail line, the R103 and the R603,	Detailed design (100%) & commenced

No	Project Location	Key Features	Current phase & estimated programmed construction start date
		the upgraded Dardanelles Interchange will have an unusual layout with long loop ramps on the western side of the N3. Continuous street lighting will be included to improve safety	(October 2020 for 45 months)
J	Lynnfield Park to Ashburton	Two additional lanes will be added per carriageway. Minor capacity improvements will be made to the Lynnfield Park Interchange including one additional lane in each direction on the R103 and a dedicated right turning lane. Continuous street lighting will be included to improve safety	Detailed design (100%) & commenced (February 2021 for 43 months)
K	Ashburton Interchange to Gladys Manzi Road	Two additional lanes will be added per carriageway. The Ashburton Interchange will be significantly upgraded to meet current standards for the loop ramps and terminal layouts. Continuous street lighting will be included to improve safety	Detailed design (100%) & March 2022 (45 months)
L	Gladys Manzi Road to New England Road	This project comprises the reconfiguration of the Market Road to Alan Paton Avenue portion of the N3 to combine these two interchanges to one. This removes the skew structure at Alan Paton southbound onramp as well as the non-standard right hand onramp merge. The project includes construction of a diverging diamond interchange at Market Road Interchange and a network arch bridge at the Blackburrow overpass to allow minimal regrade of Blackburrow Road. This project also includes a new link from Market Road to Cleland Road which supports the City's planned extension of Bellevue. Continuous street lighting will be included to improve safety	Detailed design (100%) & March 2022 (44 months)
M	New England Road to Twickenham Road	A new 2 lane per direction Collector Distributor (CD) road will be added parallel to the N3 from the Blackburrow Road overpass bridge to after Armitage Road Interchange. This will separate local traffic from national and ensure the N3's mobility through Pmb as well as provide improved access to	Detailed design (50%) & April 2025

No	Project Location	Key Features	Current phase & estimated programmed construction start date
		the City's numerous interchanges. The New England Road Interchange will be reconfigured to a diverging diamond interchange, capacity improvements will be made to the Chota Motala and Armitage interchanges and Twickenham overpass will be upgraded to an interchange to provide further access to the City and support the planned government precinct development adjacent to Town Bush Road. The Russom Street Railway Bridge will be replaced to accommodate the upgrades. Continuous street lighting will be included to improve safety	

1.3 Construction programme

The latest estimated N2 construction programme is summarised in Figure 1-2.

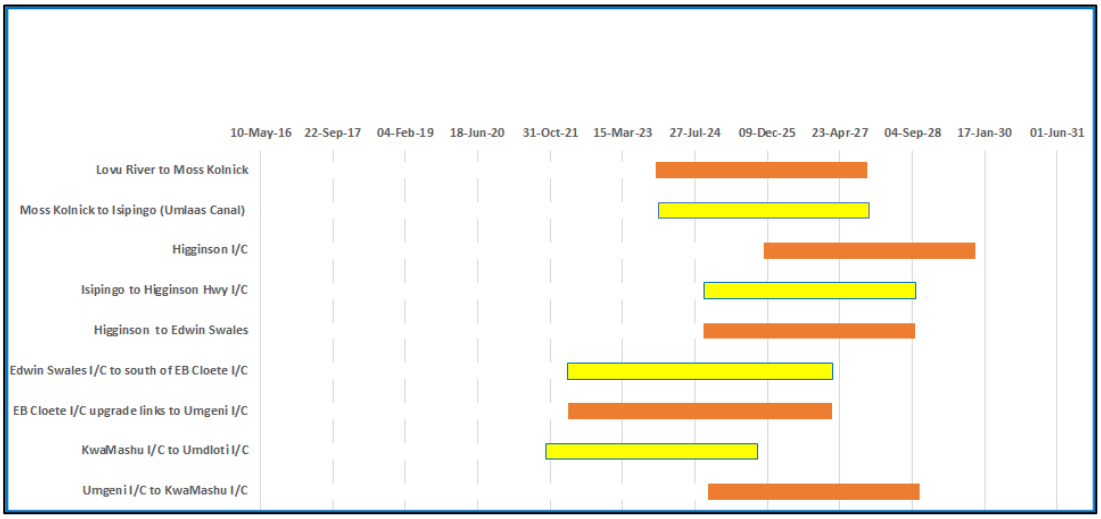


Figure 1-2: N2 construction programme (estimate, as of September 2021)

The KwaMashu to uMdloti (Package 11) was awarded in July 2021 and physical construction is expected to commence in February 2022. Construction tenders Award for Edwin Swales and EB Cloete interchange were eminent at the time of preparing this report, and physical construction is expected to start in March 2022.

The latest estimated N3 construction programme is summarised in Figure 1-3.

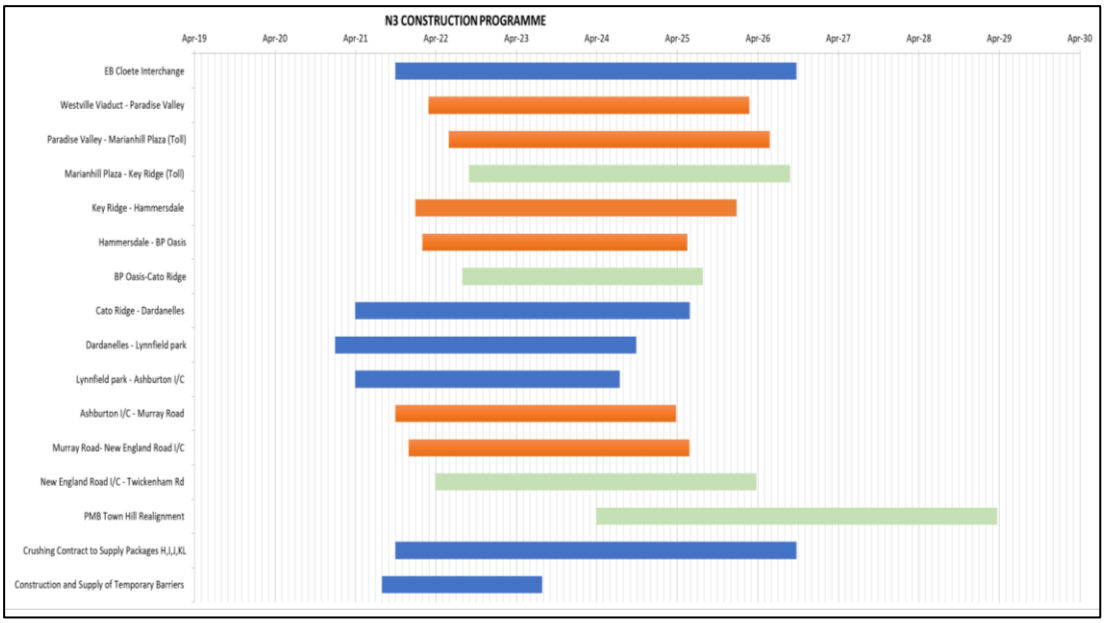


Figure 1-3: N3 construction programme (estimate, as of September 2021)

The following packages are currently in construction:

- Package H: Cato Ridge to Dardenelles
- Package I: Dardenelles to Lynnfield Park
- Package J: Lynnfield Park to Ashburton
- Package AB: Provision of construction materials
- Package AC: Provision of temporary barriers.

Packages 8 (Edwin Swales), 10 (EB Cloete), K (Ashburton to Gladys Manzi) and L (Gladys Manzi to New England) construction awards were imminent at the time of preparing this report. Package M (Pietermaritzburg Ring Road) was at advanced conceptual / route determination stage and expected to begin the EIA, public participation and preliminary design phase in third quarter of 2022

1.4 Traffic Management Plan (TMP) area

The TMP area is along the N3 from Pietermaritzburg to Durban and on the N2 from Lovu River to Umdloti. The expected alternative and diversion routes are included in the TMP area and traffic impacts on these will be included in future revisions of this report. The alternative routes include class 1, 2 and 3 routes within the eThekwini, Mkhambathini and Msunduzi Municipalities.

1.5 Purpose and scope of report

The purpose of this report is to document the expected impact on the traffic flow on national routes N2 and N3 as well as the provincial and municipal road networks due to the N2 and N3 corridor upgrades. Given the enormity of the required analysis only parts of the analysis have been concluded and their results are included in this version of the report. The report will be updated on a periodic basis to include updated construction project information and additional traffic modelling results and issued as a new version.

The packages (including alternative and diversion routes) included in this version are as follows:

- N2 Packages 1 to 11 from Umdloti to Lovu River; and
- N3 Packages A to M between Pietermaritzburg and Durban.

The location of these packages is shown in Figure 1-1. Considering the expected impact, proposals and recommendations are made to mitigate the impact on the supporting road network. This document is seen as the overarching Traffic Management Plan for these, and all future construction packages.

The scope of this report is to conduct a wider area/regional analysis of the expected capacity characteristics on both the N2 and N3 freeways, as well as the potential mitigating possibilities on the adjacent/supporting road network. The focus is not to attempt localised project level capacity analysis or any detailed traffic accommodation measures.

2. METHODOLOGY

The following methodology was followed in the compilation of this Traffic Management Plan:

- Data collection;
- Review of proposed traffic accommodation;
- Comparing capacity vs demand on mainline (N2 & N3);
- Estimating queue lengths;
- Identify main alternative routes;
- Determine spare capacity on alternative routes;
- Estimate traffic diversion volume based on estimated spare capacity on alternative route;
- Determine impact of additional traffic demand on alternative routes;
- Identify typical mitigations measures for alternative routes; and
- Propose mitigation measures for alternative routes for discussion and acceptance by the route owner and then for ultimate inclusion in the relevant packages construction scope.

3. DATA COLLECTION

3.1 CTO station link volumes

CTO Station link volumes were collected from SANRAL and KwaZulu-Natal Department of Transport. Traffic data was collected from a total of 103 CTO Stations within the TMP area as shown in Figure 3-1.

3.2 Intersection volume data

Intersection traffic volume data was collected from eThekwini Municipality and KwaZulu-Natal Department of Transport within the TMP area. A total of 316 intersection traffic data was collected. The locations of these intersections are shown in Figure 3-2.

3.3 Traffic Counts

Traffic counts were conducted at 17 intersections in Pietermaritzburg and 13 intersections in Pinetown. The Pinetown intersections are shown in Figure 3-2. The locations of the Pietermaritzburg intersections are shown in Figure 3-3.

3.4 eThekwini Municipality intersection traffic signal plans

Intersection traffic signal plans were collected from eThekwini Municipality within the study area. A total of 192 intersection traffic signal plans were collected. The locations of these intersections are shown in Figure 3-4.

3.5 Msunduzi Municipality intersection traffic signal plans

Intersection traffic signal plans were collected from Msunduzi Municipality within the study area. A total of 54 intersection traffic signal plans were collected. The locations of these intersections are shown in Figure 3-5.

Figure 3-1: CTO Stations used for traffic data collection

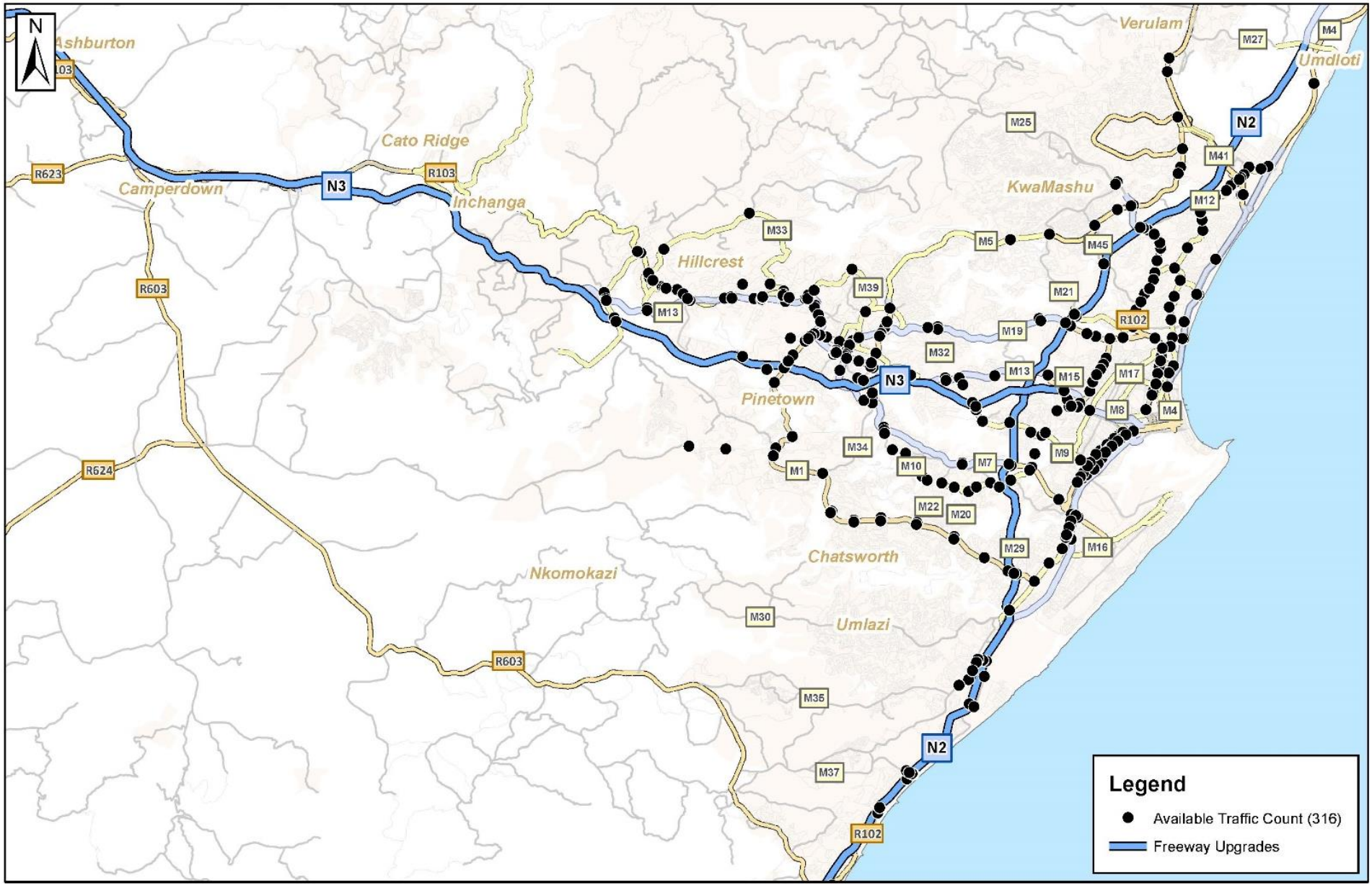


Figure 3-2: Intersection traffic volume data collected

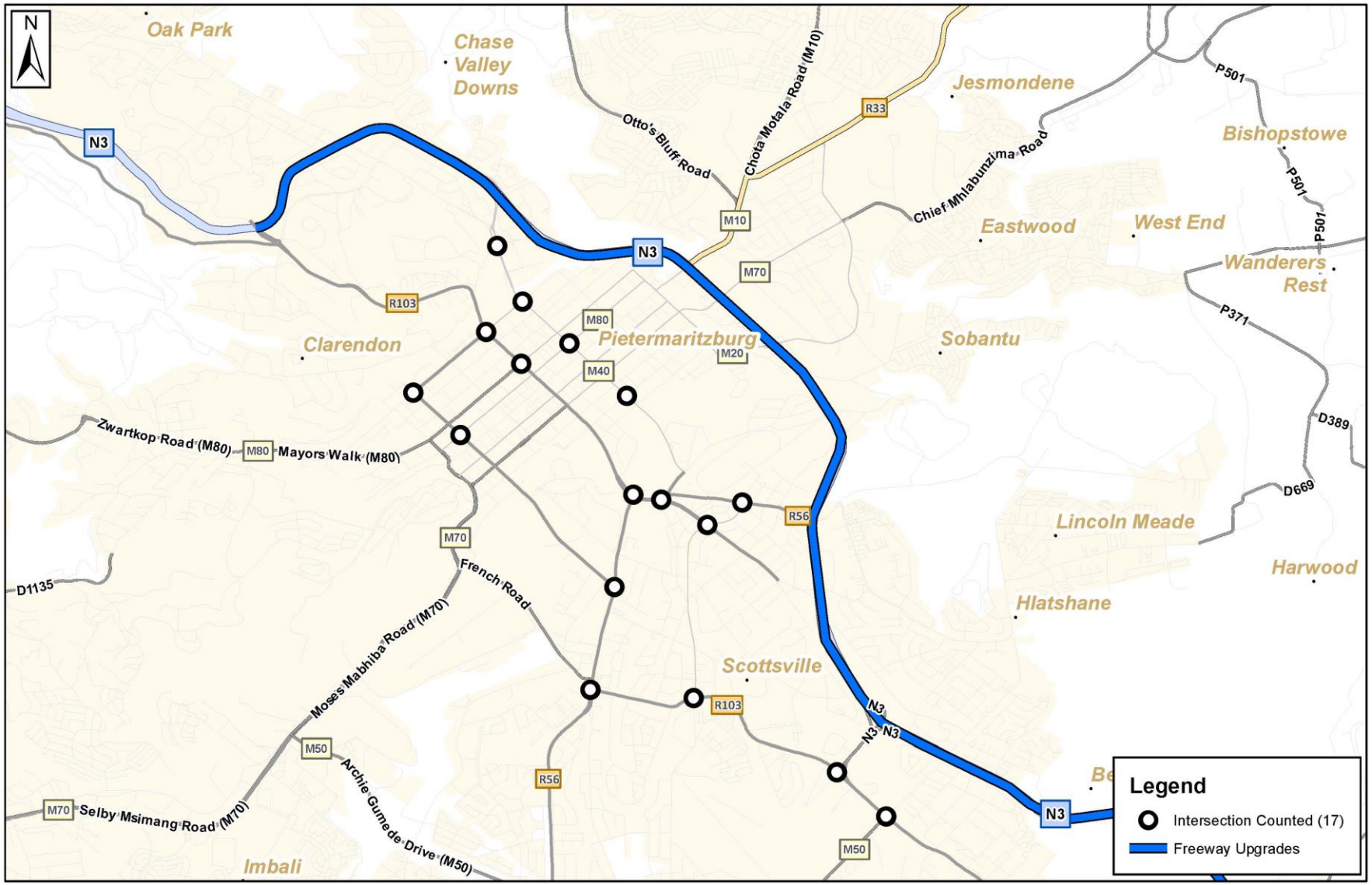


Figure 3-3: Traffic counts conducted in Pietermaritzburg

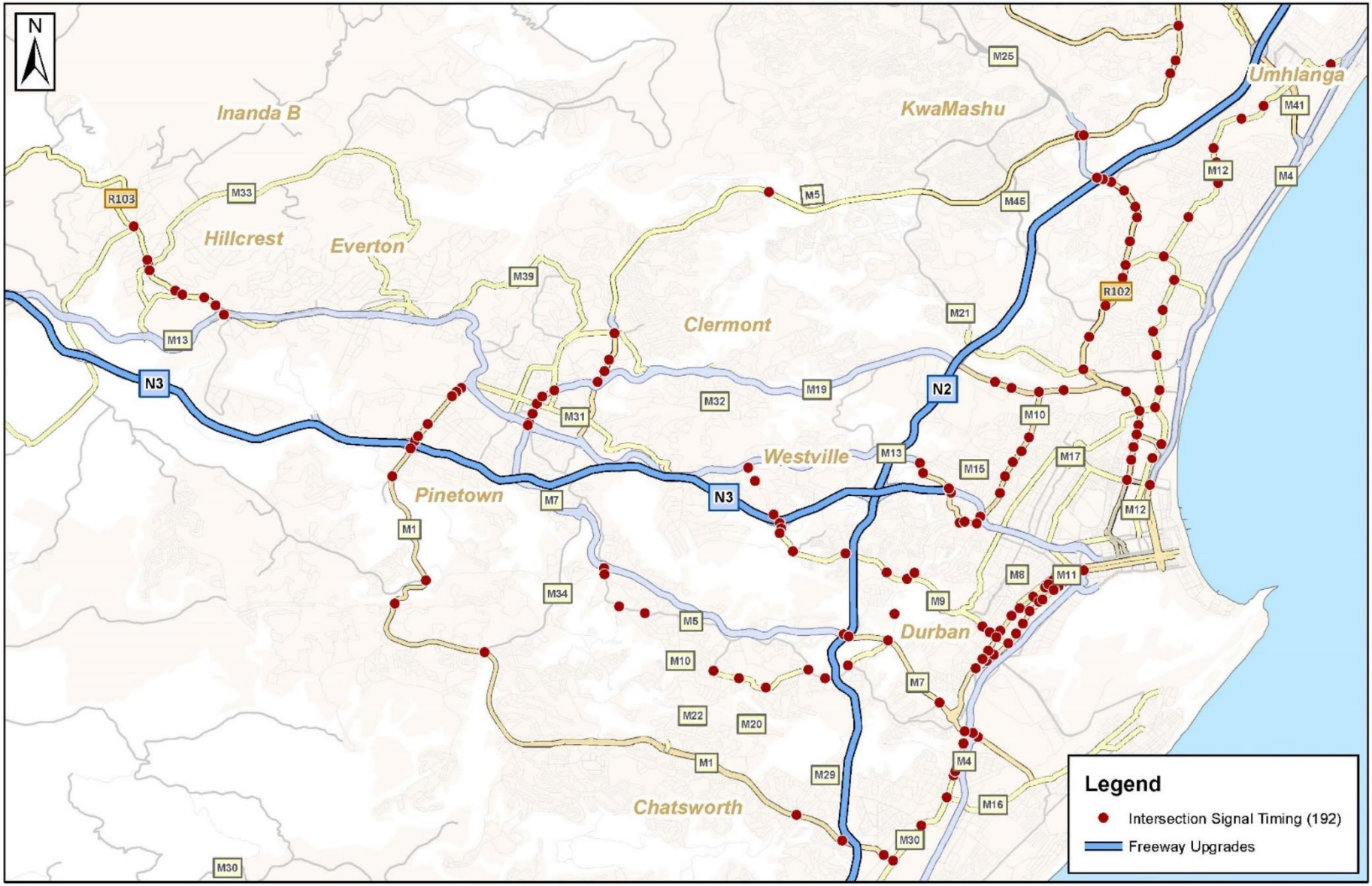


Figure 3-4: Signal timings collected from eThekwini Municipality

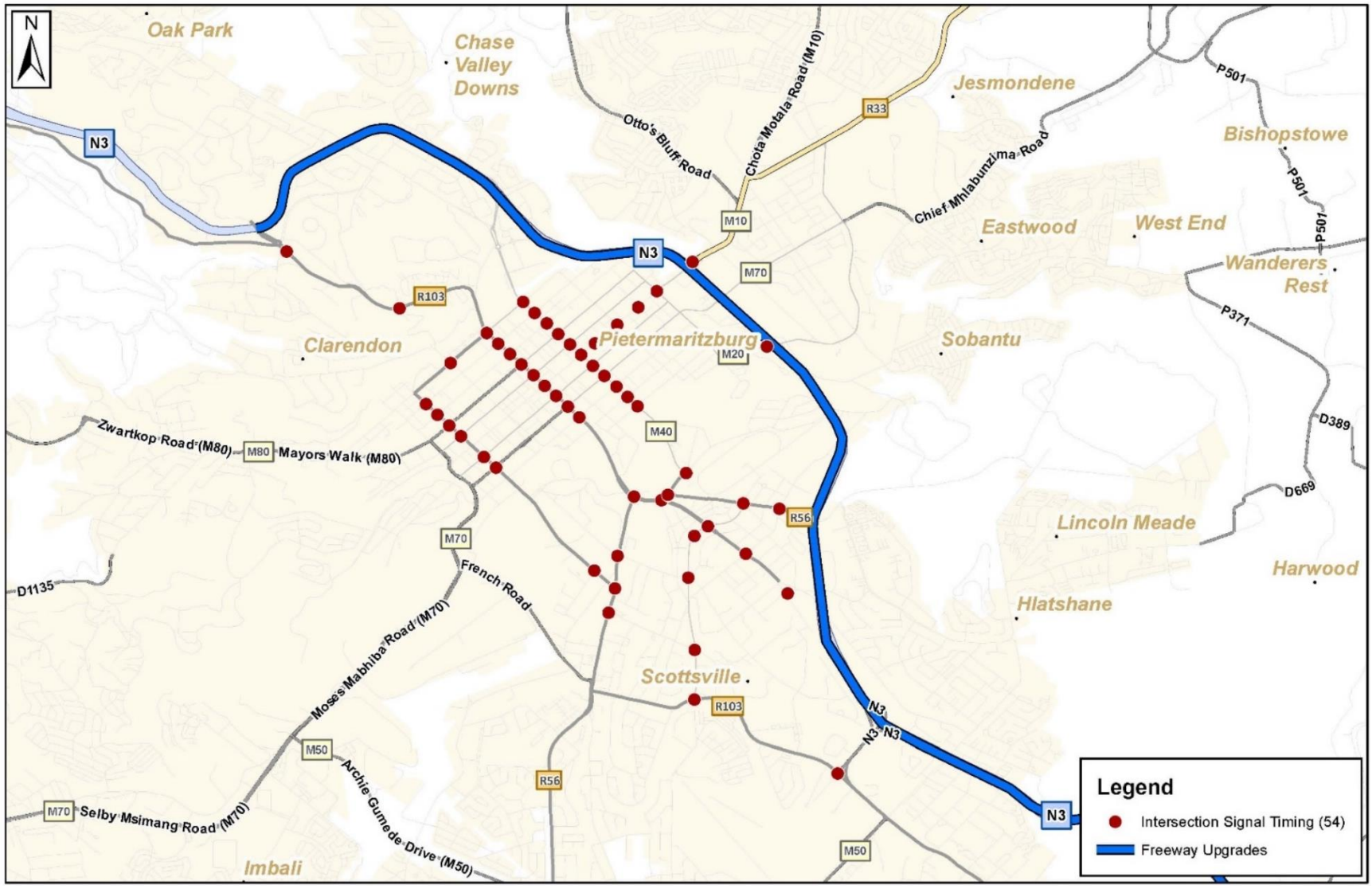


Figure 3-5: Signal timings collected from Msunduzi Municipality

4. PROPOSED TRAFFIC ACCOMMODATION

The N2 and N3 upgrade will require traffic accommodation to direct motorists safely through and/or around the work zones. The traffic accommodation specifications as per the latest tender/detailed design documentation is in line with volume 2 chapter 13 of the latest edition of the South African Road Traffic Signs Manual (SARTSM) for use in the accommodation of traffic and was extracted per package and is given below.

4.1 Package A: EB Cloete incl. N2 North (Package 6) & N3 West

4.1.1 Long term works in median

The work shall be programmed that roadworks in the median and the outside shoulders does not take place simultaneously, if applicable. The following conditions must be adhered to:

- Traffic shall be moved to the outside by changing of the lane marking to maintain the existing number of through lanes.
- A temporary barrier shall be placed between the construction area and traffic, inside the fast lane and next to the middle lane.
- The re-striped fast lane can be closed temporarily only in off peak hours and the start shall be indicated with a flashing illuminated arrow board, also during day time.
- The speed shall be reduced to 80 km/h.
- Only one entrance to the construction area shall be provided.
- Construction vehicles will only be allowed to exit the construction area at the end of the closure in order to allow for acceleration in the fast lane.
- Should construction in the median during night hours be required, the contractor shall make use of alternative lighting and flashing illuminated arrow boards.

4.1.2 Short-term diversions of carriageway if applicable

This will typically be required during the placing of precast bridge beams and the erection of gantry structures. This will entail a slow lane drop in the one carriageway to be closed and a fast lane drop on the opposite carriageway. The following conditions must be adhered to:

- A minimum of two lanes with 3.3 m lane widths must be provided in both directions. This will require that certain widenings must be completed to provide a wide enough road surface.
- The speed shall be reduced to 60 km/h or 80 km/h in both directions.
- Temporary barriers shall be used to separate the traffic.
- Double flashing illuminated arrow boards shall be placed as the lane drops.
- This type of closure or diversion must be approved by the Engineer and may occur during Saturdays from 14:00 to sunset and Sundays from 08:00 to 15:00, or any other time approved by the Engineer.
- The travelling public shall be informed by the information signs.
- The public shall also be informed through the media of the planned closure 7 days before in advance of the closure or diversion.

4.1.3 Long-term shoulder closures at bridges

The following conditions shall be adhered to:

- Temporary barriers must be in place on the shoulder 1 m away from the slow lane.
- A flashing illuminated arrow board must be placed at the start of the closure.
- The speed must be reduced to 80 km/h.
- Construction vehicles will only be allowed to exit the construction area at the end of the closure in order to allow for acceleration on the shoulder.
- Entrance to the construction area shall only be provided at the start of the closure.

4.1.4 Short-term lane closure

Short term lane closures shall typically be required during the surfacing overlay of the existing national road, application of lane markings and roads studs, parking of concrete truck during the pour of the road concrete pavement, etc. The following conditions must be adhered to:

- The approximate time periods for short term lane closures and construction of the works shall be as follows:
- Day Shifts: 09:00 – 15:00
- Night Shifts: 20:00 – 05:00
- The day prior to a long weekend the full road width shall be re-opened not later than 14:00.

- For night shifts, the maximum reflection shall be used on road signs and LED lights shall be used with reflective lighting.
- A minimum of 2 lanes within the interchange and 3 lanes outside the interchange widths shall be provided at all times. The lane widths shall be minimum 3.3 m wide. During nigh time the number may be reduced to 2 outside of the interchange.
- Flashing illuminated arrow boards must be placed at the start of the closure.
- Delineators shall be used to demarcate the construction area.
- The maximum length of lane closure is 2.0 km.
- The maximum number of closures is one per direction of traffic flow.
- Information signs as detailed with variable dates and time of a lane closure shall be erected at positions as directed by the engineer. The travelling public shall be informed of the lane closure at least 7 days in advance by displaying the information on the sign.

4.1.5 Very-short term full closure of a carriageway

Full closure of a carriageway will typically be required for the time of blasting, for heavy rigs to cross over the median and back, etc. The following conditions must be adhered to:

- The public must be informed through the radio the day preceding and the day of the closure.
- Information of the closure must be displayed on the Variable Message Signs 7 days in advance.
- Full closure will only be permitted during day time between peak hours.
- Closure must not occur on a Friday or the day preceding a long weekend.
- The assistance of the traffic authorities shall be acquired.
- The time of closure must be limited not to exceed 15 minutes.
- The carriageway shall be opened only after declared safe by the contractor.

4.1.6 Works on crossroads and ramps

Whilst construction work on ramps and crossroads is conducted the following conditions shall be adhered to:

- All road signs used shall be high visibility rectangular signs.
- Excavations shall be demarcated with temporary steel and/or concrete barriers at areas causing a safety hazard, else delineators can be used.

- At least half of the road or ramp shall be open to accommodate traffic.

4.2 Package B: Westville Viaduct / Paradise Valley

4.2.1 Works on / outside the shoulders for the widenings

During this stage of construction, no slow lane may be closed for the purpose of providing working space and the contractor shall always provide the existing number of through lanes. The following conditions must be adhered to:

- Temporary barriers are to be used on the widening of the project roads between the existing road and new construction and reflectors shall be fixed to the sides to increase visibility during night time.
- The number of entrances that nay be provided into any continuous working space shall be restricted to a maximum of two.
- Construction vehicles will only be allowed to exit the construction area at the end of the section under construction.
- Flashing lights shall be erected at the start for the closure for the entire construction period of each section, and shall also be operational during night time.
- The speed restriction must be reduced to 80 km/h in the vicinity of the closure.

4.2.2 Long-term works in median

The work shall be programmed that roadworks in the median and the outside shoulders does not take place simultaneously, if applicable. The following conditions must be adhered to:

- Traffic shall be moved to the outside by changing of the lane marking to maintain the existing number of through lanes.
- The fast lane can be closed temporarily and the start shall be indicated with a flashing illuminated arrow board, also during day time.
- A temporary barrier shall be placed between the construction area and traffic, inside the fast lane and next to the middle lane.
- The speed shall be restricted to 80 km/h.
- Only one entrance to the construction area shall be provided.
- Construction vehicles will only be allowed to exit the construction area at the end of the closure in order to allow for acceleration in the fast lane.

- Should construction in the median during night hours be required, the contractor shall make use of alternative lighting and flashing illuminated arrow boards.

4.2.3 Short-term diversions of carriageway

This will typically be required during the placing of precast bridge beams and the erection of gantry structures. This will entail a slow lane drop in the one carriageway to be closed and a fast lane drop on the opposite carriageway. The following conditions must be adhered to:

- A minimum of two lanes with 3.3 m lane widths must be provided in both directions. This will require that certain widenings must be completed to provide a wide enough road surface.
- The speed shall be restricted to 80 km/h in both directions.
- Temporary barriers shall be used to separate the traffic.
- Double flashing illuminated arrow boards shall be placed as the lane drops.
- This type of closure or diversion must be approved by the Engineer and may occur during Saturdays from 14:00 to sunset and Sundays from 08:00 to 15:00, or any other time approved by the Engineer.
- The travelling public shall be informed by the information signs.
- The public shall also be informed through the media of the planned closure 7 days before in advance of the closure or diversion.

4.2.4 Long-term shoulder closures at bridges

The following conditions shall be adhered to:

- Temporary barriers must be in place on the shoulder 1 m away from the slow lane.
- A flashing illuminated arrow board must be placed at the start of the closure.
- The speed must be reduced to 80 km/h.
- Construction vehicles will only be allowed to exit the construction area at the end of the closure in order to allow for acceleration on the shoulder.
- Entrance to the construction area shall only be provided at the start of the closure.

4.2.5 Short-term lane closure

Short term lane closures shall typically be required during the surfacing overlay of the existing road(s), application of lane markings and roads studs, parking of concrete truck during the pour of the road concrete pavement, etc. The following conditions must be adhered to:

- The approximate time periods for short term lane closures and construction of the works shall be as follows:
- Day Shifts: 09:00 – 15:00
- Night Shifts: 20:00 – 05:00
- The day prior to a long weekend the full road width shall be re-opened not later than 14:00.
- For night shifts, the maximum reflection shall be used on road signs and LED lights shall be used with reflective lighting.
- A minimum of 2 lanes within the interchange and 3 lanes outside the interchange widths shall be provided at all times. The lane widths shall be 3.3 m wide. During nigh time the number may be reduced to 2 outside of the interchange.
- Flashing illuminated arrow boards must be placed at the start of the closure.
- Delineators shall be used to demarcate the construction area.
- The maximum length of lane closure is 2.0 km.
- The maximum number of closures is one per direction of traffic flow.
- Information signs as detailed with variable dates and time of a lane closure shall be erected at positions as directed by the engineer. The travelling public shall be informed of the lane closure at least 7 days in advance by displaying the information on the sign.

4.2.6 Very short -term full closure of a carriageway

Full closure of a carriageway will typically be required for the time of blasting, for heavy rigs to cross over the median and back, etc. The following conditions must be adhered to:

- The public must be informed over commercial / identified radio station(s) the day preceding and the day of the closure.
- Information of the closure must be displayed on the Variable Message Signs 7 days in advance.
- Full closure will only be permitted during day time between peak hours.
- Closure must not occur on a Friday or the day preceding a long weekend.

- The assistance of the traffic authorities shall be acquired.
- The time of closure must be limited not to exceed 15 minutes.
- The carriageway shall be opened only after declared safe by the contractor.

4.2.7 Works on crossroads and ramps

Whilst construction work on ramps and crossroads is conducted the following conditions shall be adhered to:

- All road signs used shall be high visibility rectangular signs.
- Excavations shall be demarcated with temporary steel and/or concrete barriers at areas causing a safety hazard, else delineators can be used.
- At least half of the road or ramp shall be open to accommodate traffic.

4.3 Other N3 packages

The impact of the traffic accommodation strategies for the remainder of the N3 packages is only assessed at very high level. This report will be updated in future drafts to take account of all packages. The sections below provide high-level details as contained in the design reports.

Where no detailed traffic accommodation plans are provided, the generic approach, as shall be as summarised below:

- Minor repair on the existing lanes, where required to accommodate traffic during construction.
- Minor improvements on alternative routes.
- Stage 1 works will include median widening to provide additional lanes, install median barriers and upgrade median drainage infrastructure.
- Stage 2 will include contra-flow arrangement, where one carriageway will be closed and shifting all traffic to the remaining carriageway. Temporary change over lanes (ramps) will be provided at start and end point of the contraflow sections.
- Stage 3 will require a shift from Stage 2 active carriageway to the recently completed carriageway. Change over lanes (ramps) will be reconfigured.
- Stage 4 will see reinstatement of traffic flow on respective carriageways and remainder of construction activities concluded.
- During the respective stages, it can be expected that the generic traffic accommodation scenario, as discussed in Section 5.1.1 will also apply, except where determined otherwise in the construction method statements.

- Traffic will be encouraged to remain on the N3 mainline during the construction period, except in case of an emergency or other exceptional circumstance, where all the N3 lanes will be closed off (e.g. truck accident, blasting, etc)
- Initial analysis of travel times on alternatives route suggest that travel times will be better on the N3, even with speed reductions, as compared to alternative routes. Proactive travel time information on both the mainline and alternative routes will be provided at key locations to allow road users to make informed decisions.
- In such cases, where the N3 is completely closed, light vehicles will be directed to the alternative routes. However, trucks will be stagged along the N3 or at truck stagging sites that will be identified along the corridor. This is due to other sections of the alternative routes not being suited for heavy vehicles, due to steep grades, sharp horizontal curves and close proximity to residential areas and activity nodes.

4.3.1 Package C: Paradise Valley to Mariannhill Toll Plaza

This package comprises of upgrades on the N3 Section 1 between Paradise Valley (km 17.5) and Mariannhill Toll Plaza (km 26.02). The upgrades include additional lanes, which will result in up to six mainline traffic lanes per direction, including auxiliary lanes. The project will also include upgrade of the following interchanges:

- Farningham Interchange (M7)
- Richmond Road Interchange (M1)
- Minor amendments to Mahogany Ridge Interchange

As the design for the package is not yet complete, the draft traffic accommodation strategy is presented below and may still be subject to change as the design is finalised and construction methodologies are confirmed at construction stage:

- Interchange ramps will be constructed in half widths to minimise traffic disruptions during the construction stage.
- Instead of contra-flow setup, both carriageways will be upgraded in different stages, yet simultaneously on both sides of the road.
- During Stage 1, will comprise of median widening to provide an additional lane and inner shoulder.
- Stage 2 will comprise of widening the outer edges to the existing carriageway to provide auxiliary lane and strengthening the existing outer pavement.
- Stage 3 will comprise of constructing median barrier and drains.

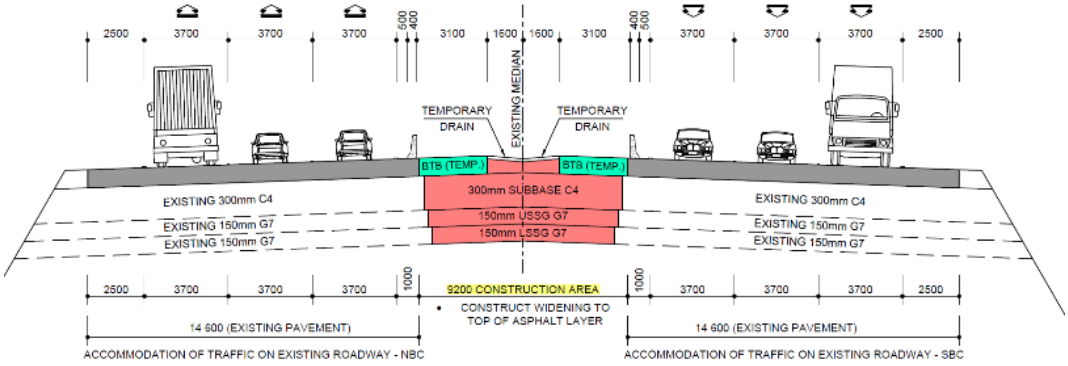


Figure 4-1: Stage 1 construction concept

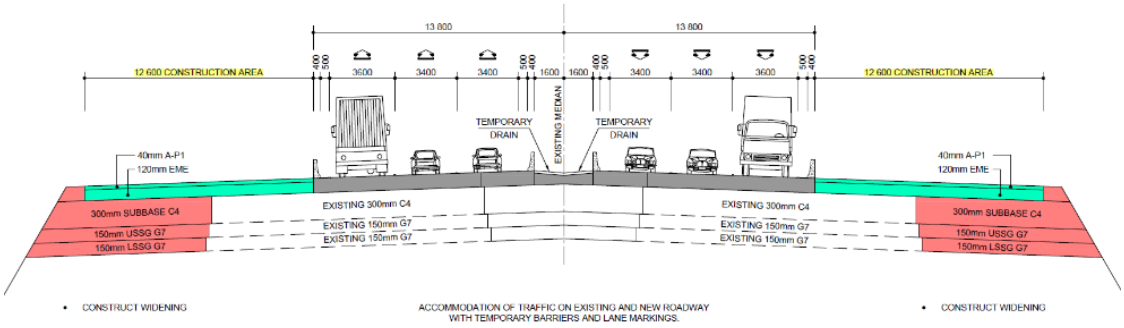


Figure 4-2: Stage 2 construction concept

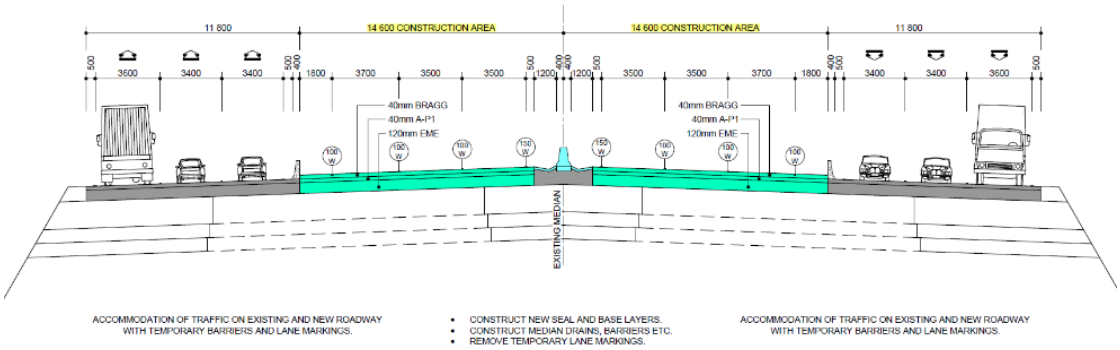


Figure 4-3: Stage 3 construction concept

4.3.2 Package D: Mariannhill Toll Plaza to Key Ridge

This package will involve an upgrade of the N3 between Mariannhill Toll Plaza (Section 1, km 26.0) to Key Ridge Interchange (Section 2, km 2.8). This will result in the N3, being upgraded from three lanes per direction to 5 lanes per direction. The Assagay (M13) interchange will also be upgraded, as part of this package.

There are also upgrades planned for the Mariannhill Toll Plaza, which is being done under a separate project. The Mariannhill Toll Plaza upgrade project is currently at conceptual design stage.

It is currently proposed that the upgrades be carried out in half-widths instead of contraflow arrangements. With this option, traffic will be accommodated on one half of each carriageway, which the other half is being constructed. The anticipated construction stages are discussed below.

- Phase 1: Shifting three lanes of traffic to the outside of each carriageway while the widening is constructed on the inside of the carriageway.
- Phase 2: Shifting three lanes of traffic to the inside of the carriageway while widening continues on the outside of the carriageway.
- Phase 3: Reducing traffic to two lanes against the median while upgrading the middle lane.
- Phase 4: Shifting traffic to the three newly constructed outer lanes while completing the two inner lanes.
- Phase 5: Works complete. Open all lanes to traffic.

The M13, is the only major east-west alternative to this N3 upgrade package, with opportunities available at the Assagay and Ntshongweni interchanges from road users to switch from the N3 to the M13. However, with the Assagay Interchange upgrade, the M13 is also directly impacted by the N3 construction activities. It has been noted from interactions with the KZNDoT, that the M13 may not have any significant spare capacity to accommodate diverted traffic during construction.

The R103 (Old Main Road), can offer some alternative from around Camperdown area and joining the M13 at Hilcrest. However, this route is not suited for heavy vehicles due to steep gradients and sharp curves. The route also passes through residential areas, with a speed limit of mostly 60 km/h. Except in case of an emergency, this route should not be recommended as an alternative. Heavy vehicles should not be diverted to this route, even during emergency N3 closures due to potential safety risks, as flagged above.

4.3.3 Package F1: Hammarsdale to BP Oasis and Package F2: Bp Oasis to Cato Ridge

Package F involve upgrading the N3 Section 2 between Hammarsdale Interchange (km 8.1) and Cato Ridge Interchange (km 19.4). As part of the upgrade, the N3 will be upgraded from existing three lanes per direction to four lanes per direction. Climbing / auxiliary lanes will also be provided where required.

This package was further split into two sub-packages at the BP Oasis services station, as described below:

- Project F1: Hammarsdale Interchange (km 8.7) to km 15.2
- Project F2: km 15.2 to Cato Ridge Interchange (km 20.2).

The proposed traffic accommodation strategy is summarised below for project F1 (Hammarsdale to BP Oasis).

The contraflow strategy is proposed for project F1, where work will proceed on one carriageway, with both northbound and southbound traffic being accommodated in one carriageway. Upon completion of one carriageway, traffic sill now shift to the completed carriageway. The project is further sub-divided into three uniform sections for construction phasing purposes as shown in Figure 17.

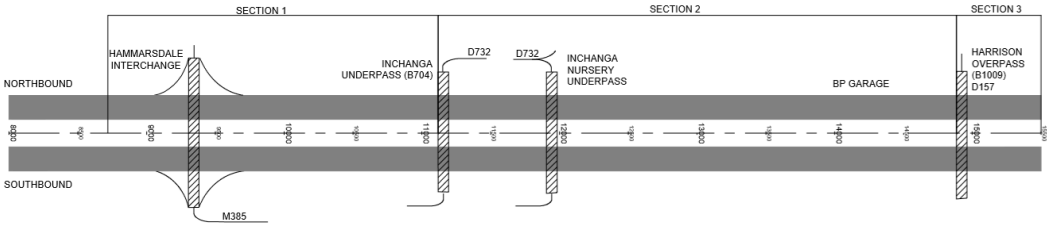


Figure 4-4: Package F1 construction phasing plan (sections)

Table 4-1: Project F1 construction phases

Section	Phase 1	Phase 2	Phase 3
Section 1 (SV 8 700 to SV 11 140)	Construction of median wall and barrier and temporary outside widening to southbound carriageway	Construction of northbound carriageway	Construction of southbound carriageway
Section 2 (SV 11 140 to SV 14 800)	Permanent and temporary outside widening of southbound carriageway	Rehabilitation and widening of northbound carriageway	Rehabilitation of southbound carriageway
Section 3 (SV 14 800 to SV 15 200)	Permanent and temporary outside widening of southbound carriageway	Rehabilitation and widening of northbound carriageway	Rehabilitation of southbound carriageway

The traffic accommodation strategy is summarised in Table 9.

Table 4-2: Project F1 - Traffic accommodation strategy

Construction Phase	Location / Chainage	Traffic Accommodation Strategy	Length (km)
Phase 1	SV 8 700 to SV 11 140	Existing configuration with reduced lane widths on the North- and Southbound carriageways.	2.44
	SV 11 140 to SV 15 200	Existing configuration with reduced lane widths on the southbound carriageway only	4.36
Phase 2	SV 8 700 to SV 15 200	Contra flow on SBC	6.80
Phase 3	SV 8 700 to SV 15 200	Contra flow on NBC	6.80

Changeover lanes (ramps) will be required at start and end of construction work zones, as well as the Hammarsdale Interchange, to facilitate contraflow transitions.

Traffic accommodation proposals for Project F2 were not yet finalised, at the time of preparing this report. It is assumed that they will follow either the contraflow or half widths construction strategies.

Possible alternative routes to the N3 section, within this package include the R103 and Main Road 385 (Thousand Hills Road). Some sections of these alternative roads will also function as haul roads for construction materials. Proposed improvements on the alternative roads include:

- Repair of distressed areas of the pavements, by means of asphalt patching and construction a 50mm asphalt overlay.
- Minor improvements such as grass cutting, guardrail replacement, road marking and signage, traffic signal settings, etc.

4.3.4 Package G: Key Ridge to Hammarsdale

This package comprises of upgrading the N3 Section 2, between Key Ridge Interchange (km 2.8) and Hammarsdale Interchange (Km 9.2). This upgrade will result in five lanes per direction. The upgrade will also include a 1.7km realignment of the N3 to improve road safety.

Historically, this section of the N3 has been one of the top three capacity constraints on the Durban - Free State - Gauteng Corridor, with the other two being Pietermaritzburg's Town Hill and Van Reenen's pass.

Three construction phases are envisaged as summarised below:

- Phase 1: Widening of the existing northbound carriageway to accommodate five lanes of traffic.
- Phase 2: Construction of the new five lane southbound carriageway.
- Phase 3: Construction of the new five lane northbound carriageway.

Envisaged construction sequencing and traffic accommodation strategy is summarised below:

- Phase 1: northbound widening
  - Construct all widening and cross-over sections along the existing northbound carriageway to provide adequate space for accommodation of six traffic lanes between Key Ridge (km2+800) and the Sterkspruit Bridge (km6+800) and five traffic lanes between the Sterkspruit Bridge (km6+800) and Hammersdale Interchange (km8+800).
    - Six lanes are provided along the steep grade section.
    - The mandatory truck stop will remain operational during Phase 2 construction.
    - The lane, shoulder and barrier widths are indicated in the figure below
  - Construct temporary widening along the existing Sterkspruit Bridge to accommodate traffic.
    - Only shoulder closures will be needed for these widenings
  - Construct required cut and fill for north- and southbound viaduct.
- Phase 2: northbound carriageway construction
  - Divert all traffic to existing northbound lane.
  - Demolish existing southbound carriageway pavement and road prism to use as fill and pavement layers on the new southbound carriageway.
  - Complete 5-lane southbound carriageway and southbound viaducts.
- Phase 3: Northbound carriageway construction
  - Construct median crossings at the start and end of the construction zone at appropriate positions.
  - Transfer all traffic to new southbound 5-lane carriageway

- Minimum of five lanes, 2-way traffic separated by moveable median barriers.
- Minimum lane widths to be maintained as shown in the figure below.

- Demolish existing northbound carriageway through the Sterkspruit section to use as fill and pavement layers on the proposed northbound carriageway.
- Construct and complete 5-lane northbound carriageway and northbound viaduct
- Transfer northbound traffic onto newly constructed 5-lane northbound carriageway
- Remove median barriers on southbound carriageway and allow southbound traffic to use full width of 5-lane southbound carriageway.

4.3.5 Package H: Cato Ridge to Dardanelles (Umlaas Rd)

Work Package H upgrades will be along N3, Section 2 and extends from Cato Ridge (km19.4) to Dardanelles (km26.6). The proposed upgrades includes the Cato Ridgeand the Camperdown interchanges. Part of the R103 will also be realigned to provide a balanced road network, to improve safety through the Camperdown town centre and to provide a viable alternative to the N3 between Umlaas and Cato Ridge interchanges.

Construction has commenced in this section, with initial works comprising of temporary barrier placements, asphalt overlay on select sections and improvements on some provincial roads. Activities that require lane closures are largely carried out in the evenings, where traffic volumes are relatively lower.

The upgrades will result in doubling of mainline capacity on the N3, from current two lanes per direction to four lanes per direction.

The contraflow traffic accommodation strategy is proposed, for the mainline, because it will ensure construction continuity per carriageway as opposed to half width whereby longitudinal construction joints would be required. It is proposed that the speed limit be reduced to 80 km/h, through the construction zones, for the duration of the construction period. A temporary median barrier, with containment level H2, is proposed to separate opposing traffic streams. A minimum of 2 lanes is proposed throughout the construction period.

Mainline construction phasing is summarised below:

- Phase 1: Median widening to final width to existing levels
- Phase 2: Outer edge widening to final width to existing levels (incl. embankments)
- Phase 3: SBC construction to design levels
- Phase 4: NBC construction to design levels.

Construction of the Camperdown interchange will also be carried out in phases to minimise traffic interruptions.

Only minor improvements are planned for the Cato Ridge interchange and minimal interruptions are therefore expected at this interchange.

The only viable alternative to the N3, through the project site, is the R103. Minor improvements such as asphalt overlay, grass-cutting, guardrail replacement and new road markings / signs could be carried out where required. In addition, a section of the R103, which currently passes through the Camperdown town centre, will be realigned to the southern side of the N3, between Km 22.3 and Camperdown Interchange. This realignment of the R103 will improve traffic safety through the Camperdown town centre. The R103 realignment will form part of the Camperdown Interchange upgrades.

Initial construction activities on this package have commenced.

4.3.6 Package I: Dardanelles (Umlass Rd) to Lynnfield Park

This package involve upgrade of the N3 section between Dardenelles (also known as Umlaas Road Interchange, km 26.6) and Lynnfield Park Interchange (km 30.6). The freeway upgrade proposal includes:

- The addition of at least two lanes in each direction throughout the length of the section. Construction will be done in the existing median, which will be entirely paved and include the provision of a median barrier.
- The construction of one or, in some places, two auxiliary lanes at on- and offramps, which will be constructed on the outer edges of the existing carriageways.
- Improvements at existing interchanges to increase traffic capacity to and from the main carriageways.

The package also includes upgrades of sections of provincial road network, i.e. R56 (P338), R103 and R603.

Construction has commenced in this section, with initial works comprising of temporary barrier placements, asphalt overlay on select sections and improvements on some provincial roads. Activities that require lane closures are largely carried out in the evenings, where traffic volumes are relatively lower.

Mainline construction will be carried out in the following stages:

- Stage 1: Widening the edges of the southbound carriageway to accommodate traffic during further stages of the construction period.
- Stage 2: Moving traffic to the temporary deviation of the southbound carriageway.
- Stage 3: Moving all traffic to the southbound carriageway (contraflow), allowing for works on the northbound carriageway.
- Stage 4: Shifting traffic to the northbound carriageway, to allow for full upgrades on the southbound carriageway.
- Stage 5 and 6: Road marking on the northbound carriageway to be done in two stages (half-widths).

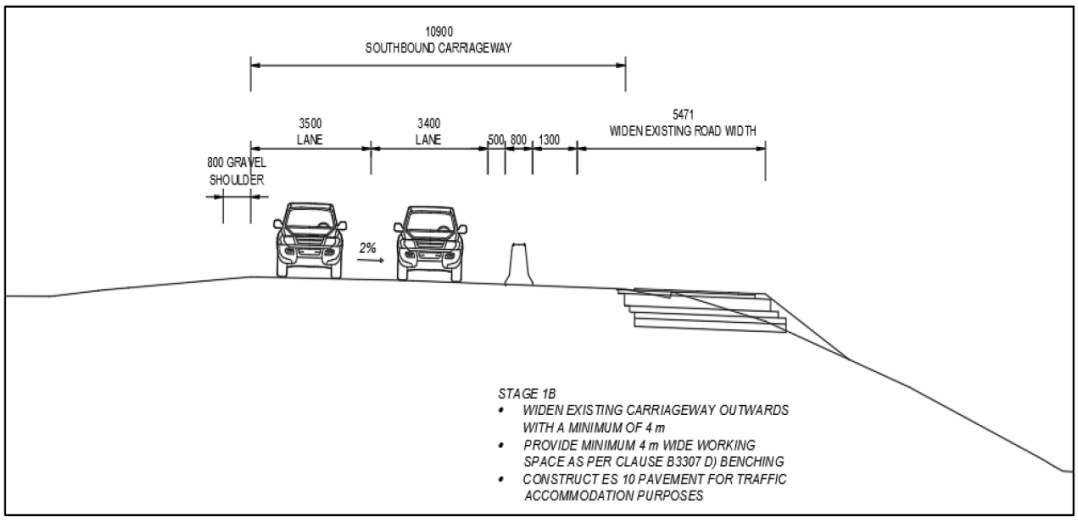


Figure 4-5: Package I - Staged 1 traffic accommodation strategy

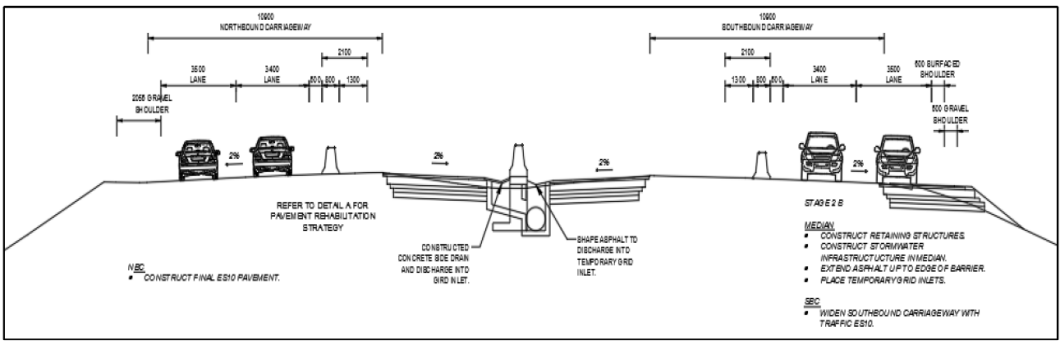


Figure 4-6: Package I - Stage 2 traffic accommodation strategy

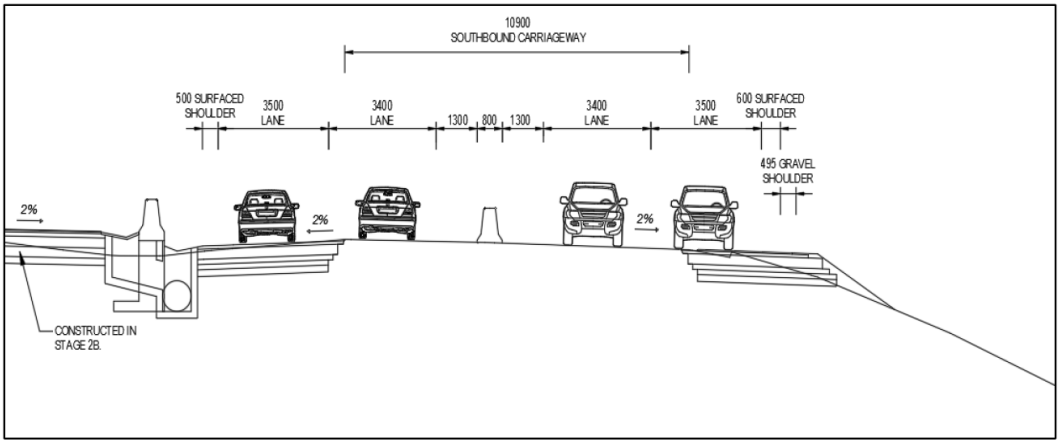


Figure 4-7: Package I - Stage 3 traffic accommodation strategy (contraflow on southbound carriageway)

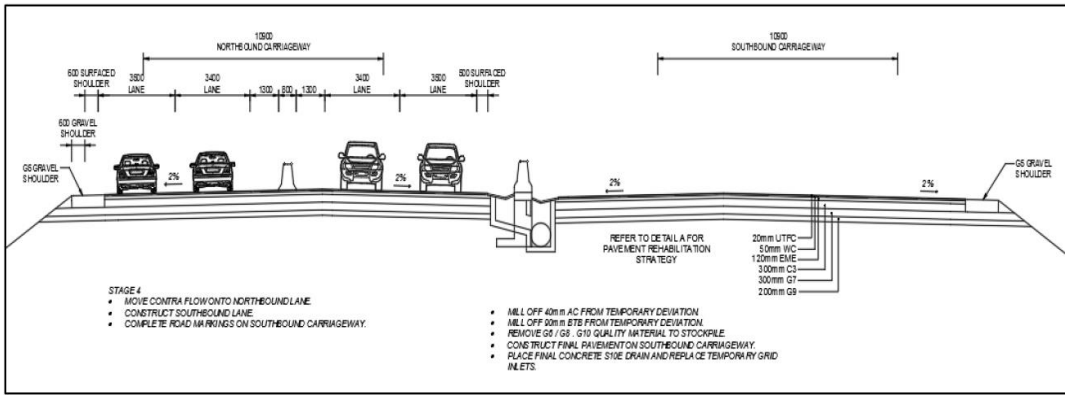


Figure 4-8: Package I – Stage 4 traffic accommodation strategy (contraflow on northbound carriageway)

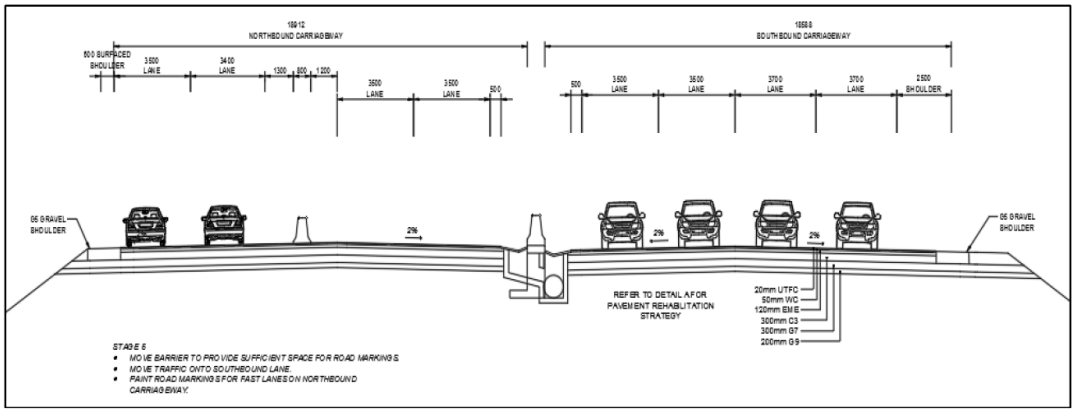


Figure 4-9: Package I - Stage 5 traffic accommodation strategy (road markings)

Alternative route to the mainline construction work zones will be the R103 and R603. Due to the upgrade of the Umlaas interchange, both these provincial routes will also be directly impacted by Package I upgrades.

Upgrades are planned on the R56 (P338), R103 and R603 in the immediate vicinity of Umlaas Interchange. Minor improvements may be carried out on other sections of the R102, as part of other N3 project packages.

Stop / Go operations are unavoidable on some alternative roads, during initial repairs / improvements. These operations will be constantly monitored to maintain safety of road users and the construction team.

4.3.7 Package J: Lynnfield Park to Ashburton (in construction)

This package will include an upgrade of the N3 between Lynnffield Park Interchange (Section 2, km 30.3) and Ashburton Interchange (Section 3, km 0.8). The upgrade will result in four northbound and five southbound lanes respectively. The Lynnfield Park Interchange upgrade is also included in this package.

It is envisaged that two northbound and three southbound lanes will be available along the N3 throughout the construction period. Lanes will be reduced, and the speed limit will also be reduced to 80 kph within the N3 construction zones.

The following construction phases are proposed for the mainline works:

- Phase 1a:
  - Maintain traffic flow on respective carriageways and position southbound concrete barriers.

- Construct slow lane widening for temporary deviations and temporary drains and guardrails.
- Construct earthworks for permanent works and temporary layerworks.

- Phase 1b:
  - Accommodation of traffic on widened southbound carriageway.
  - Construct Southbound fast median.
  - Apply road markings for temporary contraflow northbound lanes.
  - Construct southbound fast median widening.
  - Construct earthworks for permanent works and temporary layerworks.
- Phase 2:
  - Accommodating traffic on the southbound carriageway via contraflow, while constructing the Northbound carriageway and constructing portion of the Lynnfield bridge.
  - Construct Northbound carriageway.
  - Demolish portion of Lynnfield and Umpushini Spruit Bridge.
  - Construct permanent drainage, barriers and guardrails.
  - Apply road markings for final Northbound fast and middle lanes.
  - Apply road markings for temporary lanes.
- Phase 3:
  - Accommodating traffic on the Northbound carriageway via contraflow, while constructing the Southbound carriageway and constructing portion of the Lynnfield bridge.
  - Construct Southbound carriageway.
  - Construct permanent drainage and guardrails.
  - Apply road markings for final Southbound fast and middle lanes.
- Phase 4:
  - Southbound Carriageway opened to traffic.
  - Final surfacing (BRAGG) and road markings constructed under traffic.

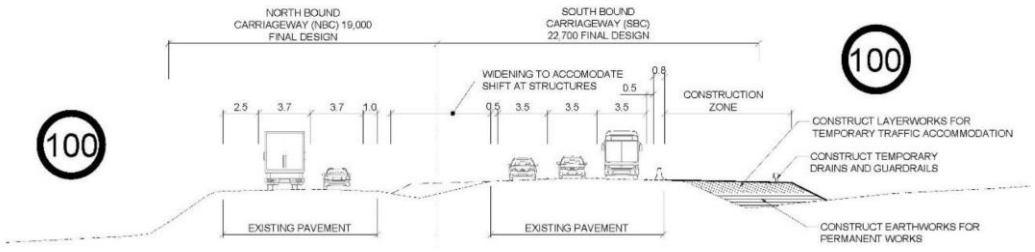


Figure 4-10: Package J – Phase 1A traffic accommodation strategy

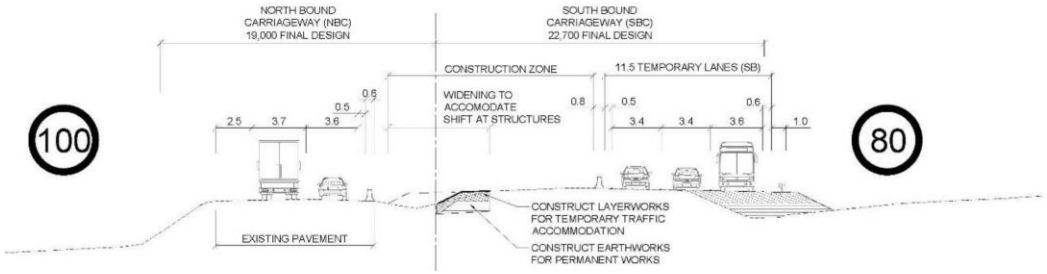


Figure 4-11: Package J - Phase 1B traffic accommodation strategy

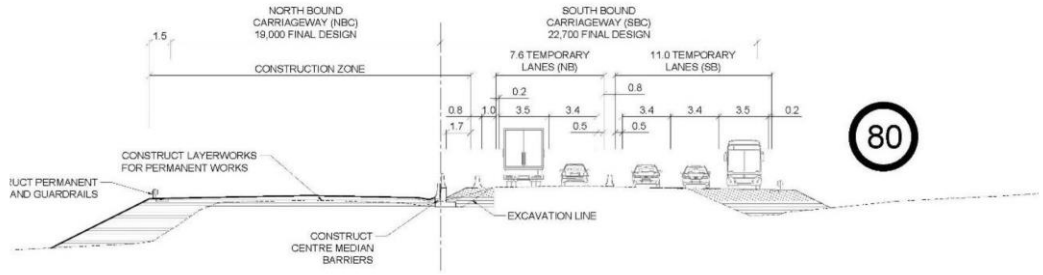


Figure 4-12: Package J - Phase 2 traffic accommodation strategy

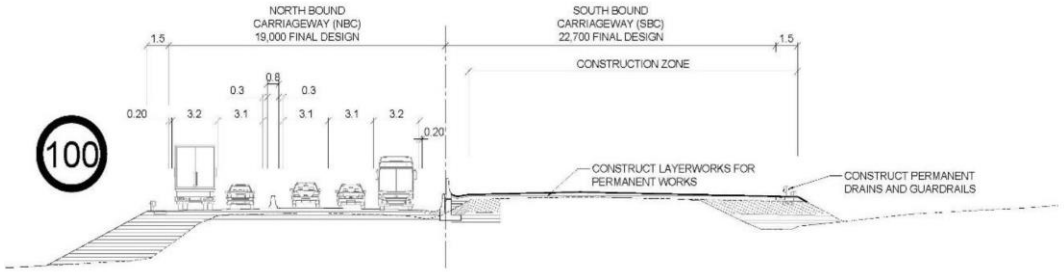


Figure 4-13: Package J - Phase 3 traffic accommodation strategy

The R103 will be constructed in half widths under Stop / Go conditions. Traffic will be accommodated on the completed portion on the completed base, while the other portion is constructed. Once completed surfacing and road markings will be done.

Ramps will also be constructed in half-widths. Traffic will be accommodated on the existing interchange, while a portion of the new interchange is being constructed.

The R103 is the only alternative route to the N3, within the extents of this project package. Minor repair work will be carried out on the R103. Portions of the R103 within the Lynnfield Park interchange will also be upgraded as part of this works package.

4.3.8 **Package K: Ashburton to Murray Road**

This package will involve upgrade of the N3 Section 3 between Ashburton (km0.8) and Murray Road (km 6.0). The N3 mainline will be upgraded from two lanes per direction to four lanes per direction. Climbing lanes will also be provided in some sections, where required.

The Ashburton Interchange will also be upgraded as part of the upgrade, to improve the geometric efficiency of the ramp loops. The Ashburton Bridge will also be replaced.

The traffic accommodation strategy will involve contra-flow operations, where traffic is accommodated on one carriageway, with two-lanes per direction provided, while the other carriageway is being constructed. The arrangements will be swapped for construction of the other carriageway. Ashburton Bridge will be constructed in half widths. Refer to further descriptions and images below:

- Stage 1:
  - Relocate Umgeni pipeline
  - Construct north half of Ashburton Bridge
  - Construct fills on southbound carriageways and median crossovers
  - Place barriers for contraflow
- Stage 2:
  - Move traffic into contraflow configuration on southbound carriageway.
  - Due to the narrow width under the Ashburton Bridge, traffic will remain on the two carriageways
- Stage 3:
  - Complete northbound carriageway and median wall north of Ashburton Bridge
- Stage 4:
  - Complete northbound carriageway on completion of Ashburton Bridge
- Stage 5:
  - Move all traffic onto northbound carriageway and construct southbound carriageway
- Stage 6:
  - Open both carriageways to traffic
- Stage 7:
  - Complete minor layerworks on the southbound carriageway under traffic.

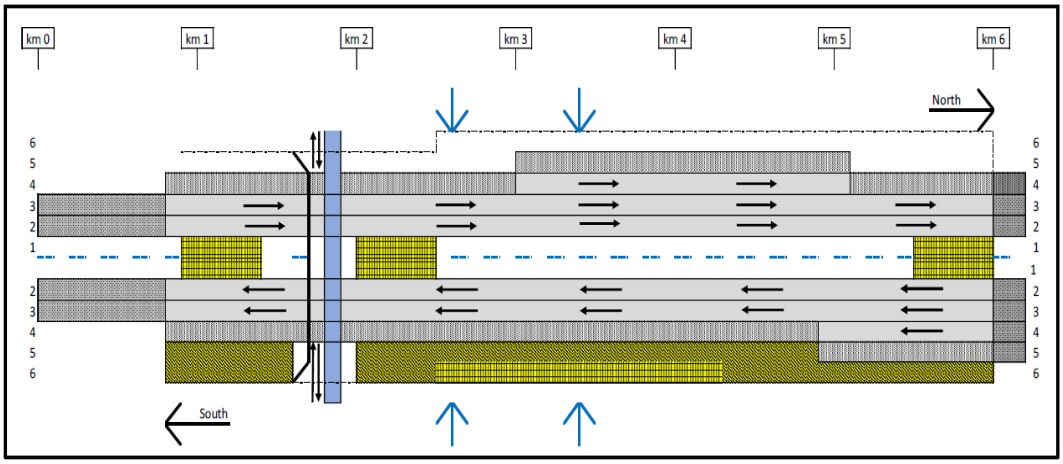


Figure 4-14: Package K traffic accommodation strategy - Stage 1

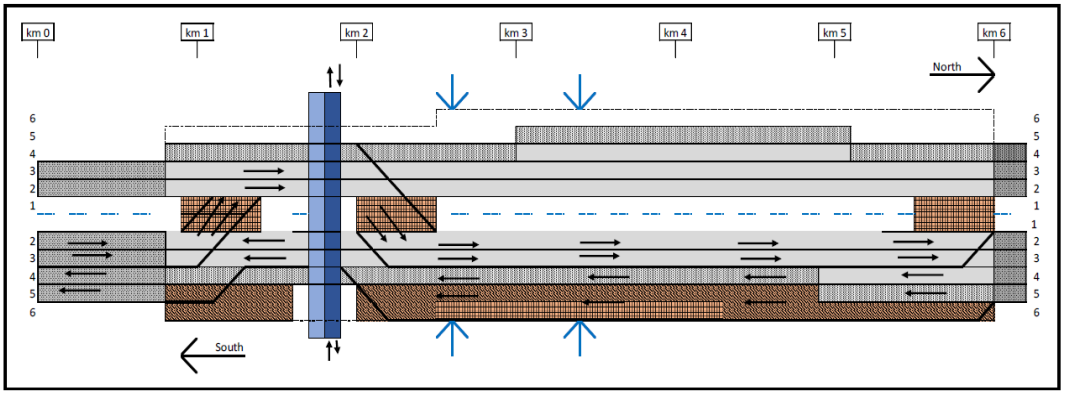


Figure 4-15: Package K traffic accommodation strategy - Stage 2

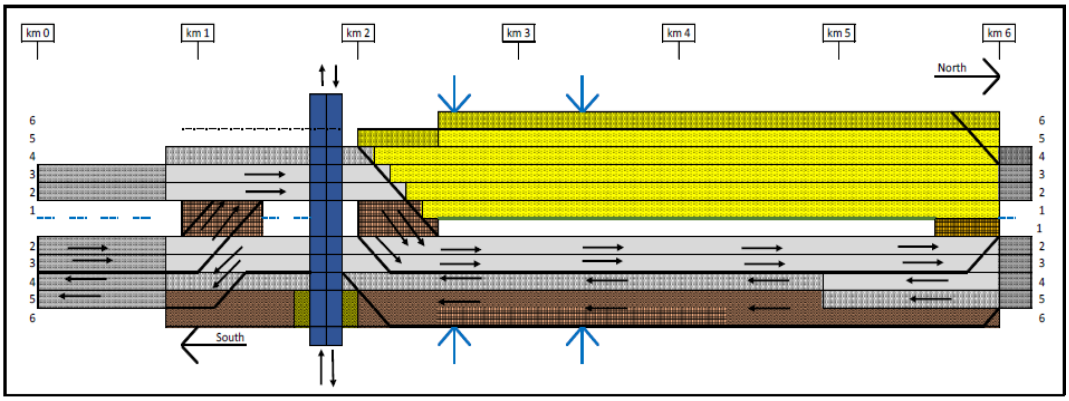


Figure 4-16: Package K traffic accommodation strategy - Stage 3

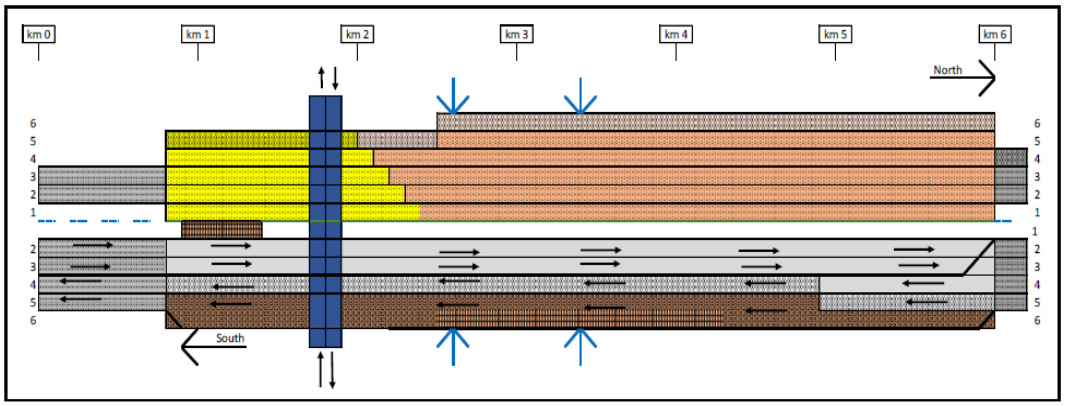


Figure 4-17: Package K traffic accommodation strategy - Stage 4

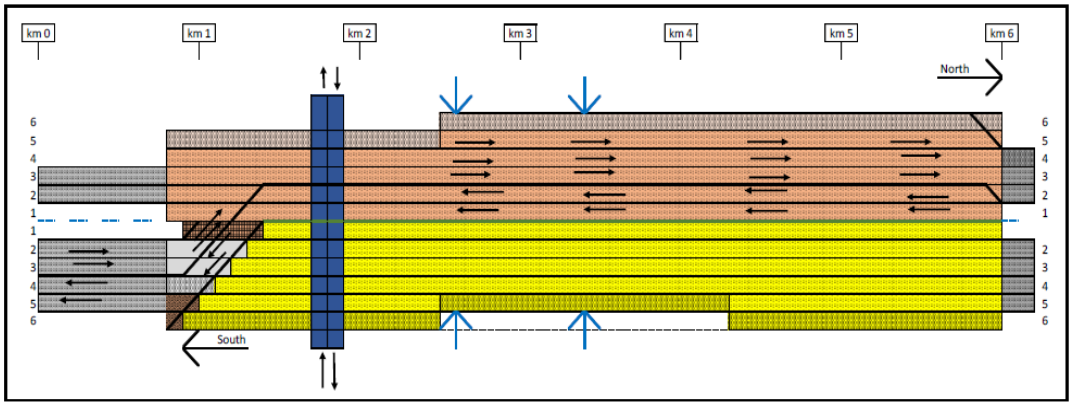


Figure 4-18: Package K traffic accommodation strategy - Stage 5

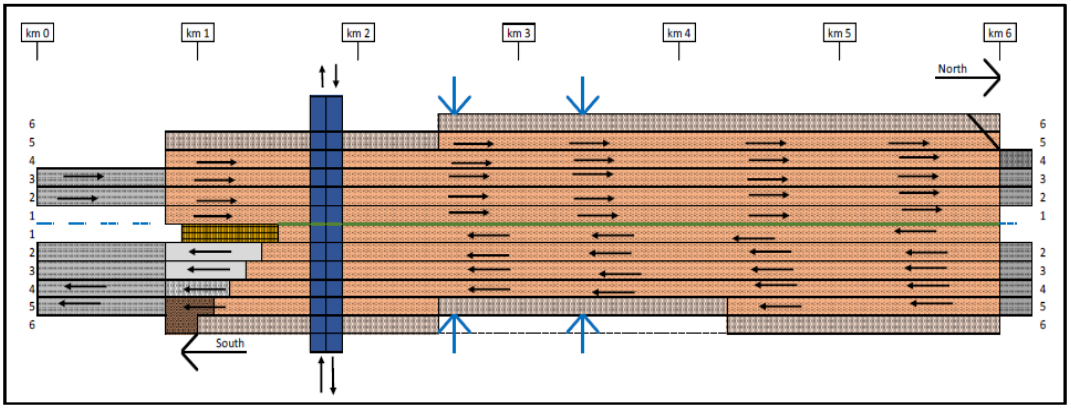


Figure 4-19: Package K traffic accommodation strategy - Stage 6

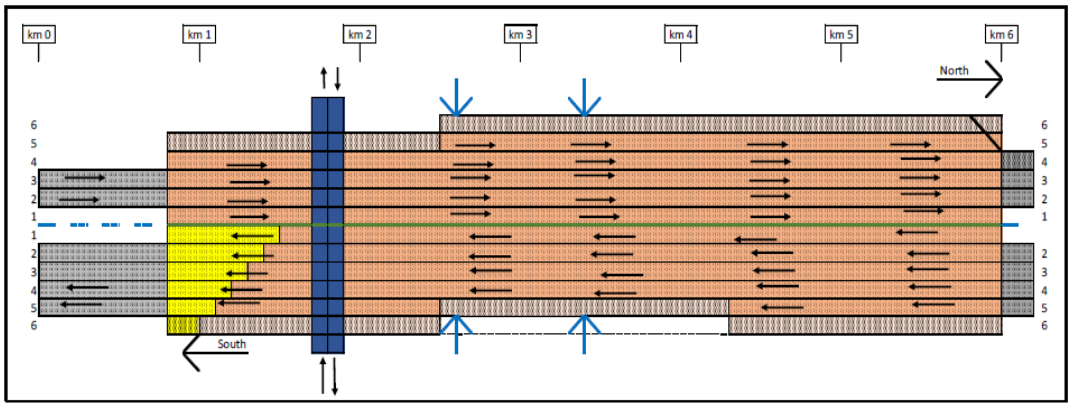


Figure 4-20: Package K traffic accommodation strategy - Stage 7

The R103 is the only alternative route to the N3 mainline in this area. Light rehabilitation works will be carried out on the R103 during initial phase of the project to improve safety on the road.

4.3.9 Package L: Murray Road to New England Road

The upgrades in this package will involve upgrade of the N3 Section 3 between Gladys Manzi (Murray) Road (km 5.9) and New England Interchange (km 9.0). The N3 mainline currently has three lanes in the southbound direction and two lanes in the northbound direction. Two additional lanes per direction will be provided as part of the upgrade.

The current right hand side onramp from Allan Paton Road will also be replaced with a safer underpass that will join the N3 mainline and the upgraded Market Road interchange.

The Market Road interchange will be upgraded to a diverging diamond interchange (DDI) and will include a link to Cleland Road. This upgrade is expected to improve access to the N3 from the Cleland, Hayfields, Lincoln Meade area and reduce local traffic on the N3 mainline. These improvements are therefore expected to improve road safety in the area, while improving mobility for the Gauteng - Free State - Durban Corridor traffic.

Improvements will also be made to some sections of Gladys Manzi (Murray) Road, Blackburrow Road, Market Road, R103 (CB Downes Road) and Cleland Road (between the Market Road and Gladys Manzi Road), as part of this package.

The upgrades will be carried out in several stages. Mainline upgrade sequencing is summarised below:

- Stage 1: Chainage 7-300 to 8-900
  - Stage A - Temporary widening on the N3 southbound
  - Stage B- Both northbound and southbound traffic will be accommodated on the widened southbound carriageway, while upgrades are being carried out on the northbound carriageway.
  - Stage C – Shift traffic over to the newly constructed northbound carriageway, while the southbound carriageway is constructed.
- Phase 2: Chainage 5-900 to 7-300
  - Stage D – Temporary widening on the southbound carriageway to proceed after completion of the Market Road bridge.
  - Stage E – Both northbound and southbound traffic to be accommodated on the widened southbound carriageway.
  - Stage F – Traffic to shift to the newly constructed northbound carriageway, while the other carriageway is being constructed.

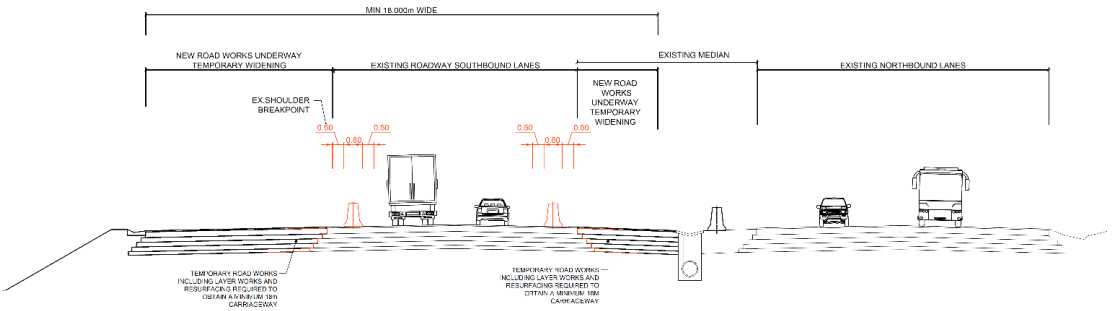


Figure 4-21: Package L Traffic Accommodation - Phase 1, Stage A

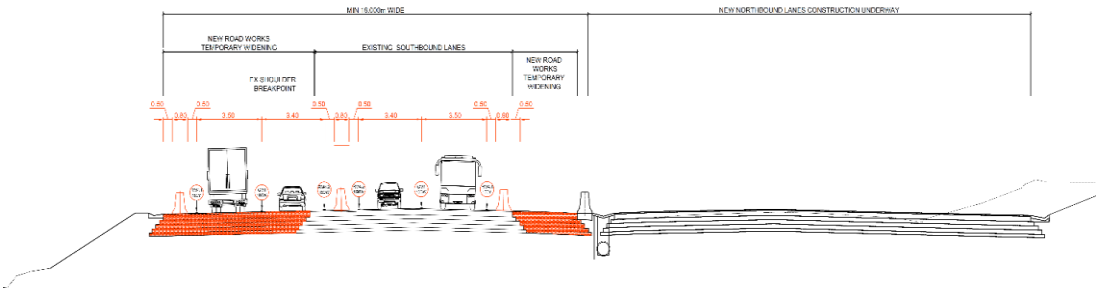


Figure 4-22: Package L Traffic Accommodation - Phase 1, Stage B

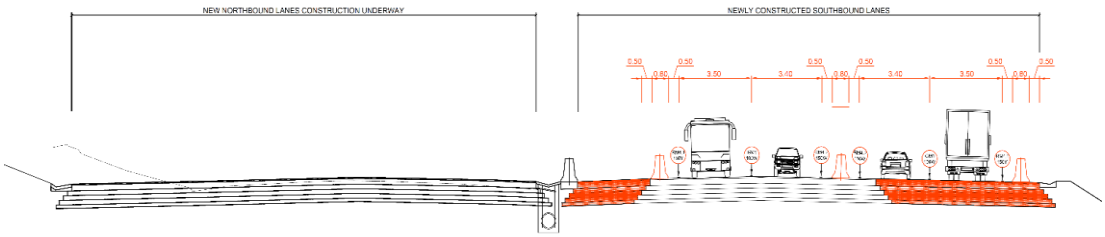


Figure 4-23: Package L Traffic Accommodation - Phase 1, Stage C

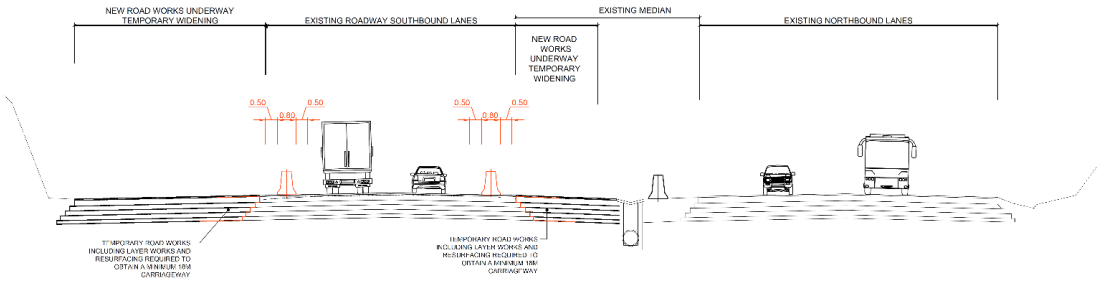


Figure 4-24: Package L Traffic Accommodation - Phase 2, Stage D

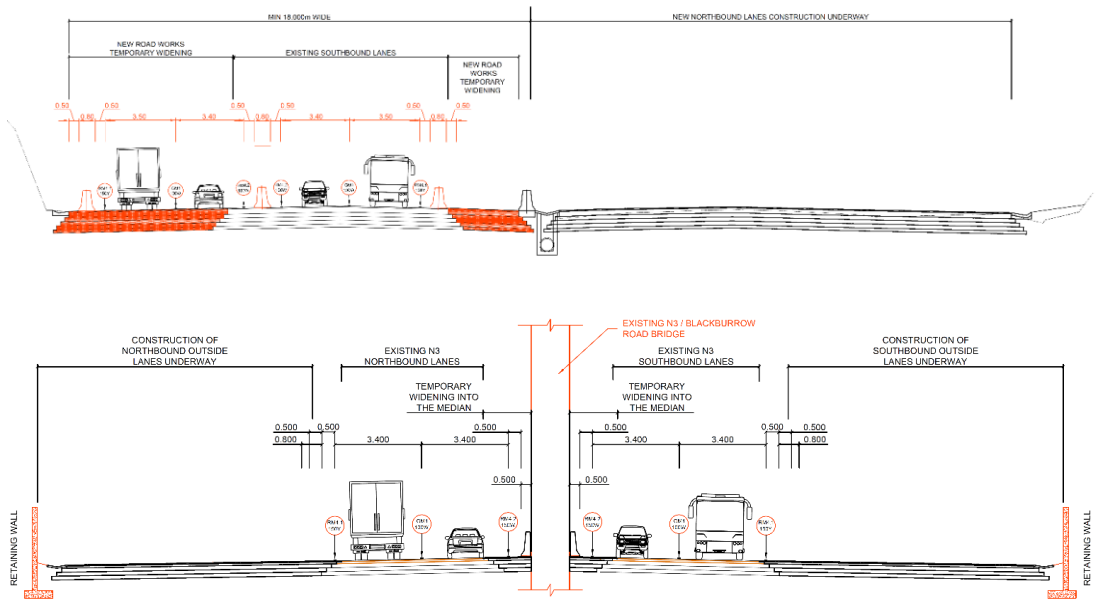


Figure 4-25: Package L Traffic Accommodation - Phase 2, Stage E

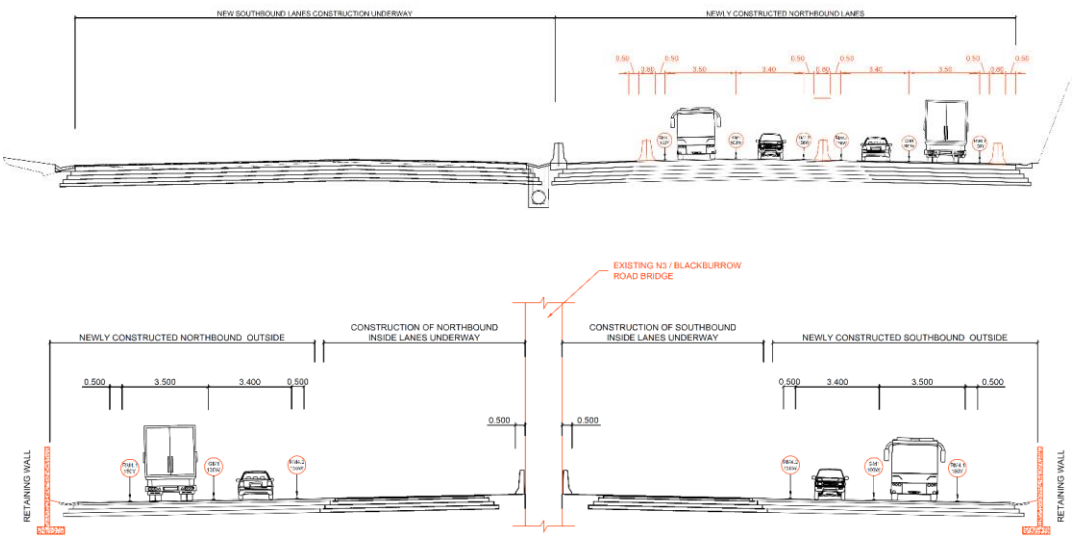


Figure 4-26: Package L Traffic Accommodation - Phase 2, Stage F

Work will be carried out on the municipal and provincial roads mentioned above, during the initial phases of the construction programme, so that the routes can be available for use as alternative routes if so required.

The R103 is the only major alternative route for the N3. Minor pavement rehabilitation will be carried out on some sections of the R103 during initial stages of the construction programme. Minor intersection improvements, within the existing roadway may be considered, depending on the outcome of more detailed analysis to be carried out in the Pietermaritzburg CBD.

4.3.10 Package M: New England Road to Twickenham

Package M will involve upgrade on the N3 section 3 between New England Interchange (km 9.0) and Twickenham Road (km16.5). A two lane per direction collector-distributor road will be added to the network parallel to the existing N3 between Blackburrow overpass and Sanctuary Road Interchange.

This separation of the local traffic (with high access requirements) from long-distance traffic (which high mobility requirements) aims to improve traffic flow, overall capacity and improving road safety. The package includes upgrades to the following interchanges:

- New England Interchange (to be upgraded to a diverging Diamond Interchange)

- Ohrtmann Interchange (upgraded to a single-point diamond interchange, including new north-facing ramps)
- Dr Chota Motala Interchange
- Armitage Road
- Sanctuary Road (replace mainline connection with Collector-Distributer (CD)-Road linkages)
- Twickenham Road (New interchange).

The N3 mainline lanes will be rehabilitated and will remain three lanes per direction. Capacity improvements will result from the addition of the CD road, which provides an additional two lanes per direction but also improves the overall networks efficiency through separation of local traffic from high-mobility national traffic.

Due to the possible impact of the Pietermaritzburg Ring Road project, the designs for this package are not finalised and may still be subject to change.

Current assumptions, regarding construction sequencing and temporary traffic accommodation, are provided below:

- Initial construction activities will involve improvements on the local road network.
- Connector-distributer (CD) roads will be constructed during initial stages as well, while traffic is using the existing mainlines, possible with half-width construction of the ramps.
- When the CD roads are complete, mainline traffic will be shifted to the CD roads, while the mainline is being rehabilitated / upgraded.

Alternative routes to the N3 includes the R103, R56 and Boschoff Street. These roads pass through the Pietermaritzburg CBD. More detailed analysis of the CBD environment is still to be carried out. The results and recommendations from this detailed analysis will be appended to this report. It is currently assumed that improvements will include intersection repainting, widening within the existing road reserves, and traffic signal settings optimisation.

It is expected that some sections of the alternative road network may not be suitable for heavy vehicles. In case of unavoidable closure of the N3, due to emergencies, blasting activities, etc, it will be necessary to stage trucks and divert light vehicles to the alternative road network. Truck stagging sites are being identified and will be appended to this report as and when agreements are

concluded between SANRAL and property owners, and necessary approvals are obtained, to use such sites as temporary truck staging areas.

4.3.11 Package N: PMB Ring Road

This package is currently in advanced route determination stage and is expected to begin EIA, public participation, and preliminary design stage in 2022. Details on possible construction phasing and traffic accommodation strategies will be determined at that stage of the project.

4.4 Package 6: Edwin Swales to south of EB Cloete

4.4.1 Works on / outside the shoulders for the widenings

During this stage of construction, no slow lane may be closed for the purpose of providing working space and the contractor shall always provide the existing number of through lanes. The following conditions must be adhered to:

- Temporary barriers are to be used on the widening of the project roads (N2 and M7) between the existing road and new construction and reflectors shall be fixed to the sides to increase visibility during night time.
- The number of entrances that may be provided into any continuous working space shall be restricted to a maximum of two.
- Construction vehicles will only be allowed to exit the construction area at the end of the section under construction.
- Flashing lights shall be erected at the start for the closure for the entire construction period of each section, and shall also be operational during night time.
- The speed restriction must be reduced to 80 km/h in the vicinity of the closure.

4.4.2 Long-term works in median

The work shall be programmed that roadworks in the median and the outside shoulders does not take place simultaneously, if applicable. The following conditions must be adhered to:

- Traffic shall be moved to the outside by changing of the lane marking to maintain the existing number of through lanes.

- The fast lane can be closed temporarily and the start shall be indicated with a flashing illuminated arrow board, also during day time.
- A temporary barrier shall be placed between the construction area and traffic, inside the fast lane and next to the middle lane.
- The speed shall be restricted to 80 km/h.
- Only one entrance to the construction area shall be provided.
- Construction vehicles will only be allowed to exit the construction area at the end of the closure in order to allow for acceleration in the fast lane.
- Should construction in the median during night hours be required, the contractor shall make use of alternative lighting and flashing illuminated arrow boards.

4.4.3 Short-term diversions of carriageway

This will typically be required during the placing of precast bridge beams and the erection of gantry structures. This will entail a slow lane drop in the one carriageway to be closed and a fast lane drop on the opposite carriageway. The following conditions must be adhered to:

- A minimum of two lanes with 3.3 m lane widths must be provided in both directions. This will require that certain widenings must be completed to provide a wide enough road surface.
- The speed shall be restricted to 80 km/h in both directions.
- Temporary barriers shall be used to separate the traffic.
- Double flashing illuminated arrow boards shall be placed as the lane drops.
- This type of closure or diversion must be approved by the Engineer and may occur during Saturdays from 14:00 to sunset and Sundays from 08:00 to 15:00, or any other time approved by the Engineer.
- The travelling public shall be informed by the information signs.
- The public shall also be informed through the media of the planned closure 7 days before in advance of the closure or diversion.

4.4.4 Long-term shoulder closures at bridges

The following conditions shall be adhered to:

- Temporary barriers must be in place on the shoulder 1 m away from the slow lane.
- A flashing illuminated arrow board must be placed at the start of the closure.

- The speed must be reduced to 80 km/h.
- Construction vehicles will only be allowed to exit the construction area at the end of the closure in order to allow for acceleration on the shoulder.
- Entrance to the construction area shall only be provided at the start of the closure.

4.4.5 Short-term lane closure

Short term lane closures shall typically be required during the surfacing overlay of the existing road(s), application of lane markings and roads studs, parking of concrete truck during the pour of the road concrete pavement, etc. The following conditions must be adhered to:

- The approximate time periods for short term lane closures and construction of the works shall be as follows:
  - Day Shifts: 09:00 – 15:00
  - Night Shifts: 20:00 – 05:00
- The day prior to a long weekend the full road width shall be re-opened not later than 14:00.
- For night shifts, the maximum reflection shall be used on road signs and LED lights shall be used with reflective lighting.
- A minimum of 2 lanes within the interchange and 3 lanes outside the interchange widths shall be provided at all times. The lane widths shall be 3.3 m wide. During nigh time the number may be reduced to 2 outside of the interchange.
- Flashing illuminated arrow boards must be placed at the start of the closure.
- Delineators shall be used to demarcate the construction area.
- The maximum length of lane closure is 2.0 km.
- The maximum number of closures is one per direction of traffic flow.
- Information signs as detailed with variable dates and time of a lane closure shall be erected at positions as directed by the engineer. The travelling public shall be informed of the lane closure at least 7 days in advance by displaying the information on the sign.

4.4.6 Very short-term full closure of a carriageway

Full closure of a carriageway will typically be required for the time of blasting, for heavy rigs to cross over the median and back, etc. The following conditions must be adhered to:

- The public must be informed over commercial / identified radio station(s) the day preceding and the day of the closure.
- Information of the closure must be displayed on the Variable Message Signs 7 days in advance.
- Full closure will only be permitted during day time between peak hours.
- Closure must not occur on a Friday or the day preceding a long weekend.
- The assistance of the traffic authorities shall be acquired.
- The time of closure must be limited not to exceed 15 minutes.
- The carriageway shall be opened only after declared safe by the contractor.

4.4.7 Works on crossroads and ramps

Whilst construction work on ramps and crossroads is conducted the following conditions shall be adhered to:

- All road signs used shall be high visibility rectangular signs.
- Excavations shall be demarcated with temporary steel and/or concrete barriers at areas causing a safety hazard, else delineators can be used.
- At least half of the road or ramp shall be open to accommodate traffic.

4.5 Other N2 Packages

The impact of the traffic accommodation strategies for the remainder of the N2 packages is only assessed at very high level. This report will be updated in future drafts to take account of all packages. The sections below provide high-level details as contained in the design reports.

Where no detailed traffic accommodation plans are provided, the generic approach, as discussed in Section 5.1.1, is assumed.

4.5.1 Package 1 (Lovu River to Moss Kolnick), 2 (Moss Kolnick to Isipingo/Umlaas Canal), 3 (Adams Road Interchange), 4 (Isipingo Interchange)

Packages 1 is 7,7km long, Package 2 is 7,3 km long, Package 3 is for the future planning and Package 4 is included in Package 2. These packages will involve widening of the N2 between Lovu River Section 24 (km 12.0) and Umlaas Canal Section 25 (km 2,7). In general, the upgrade will result in 3 lanes per direction being constructed, with auxiliary and climbing lanes provided where needed. Several bridges will be widened, and the following interchanges will be upgraded:

- Kingsburgh
- Seadoone Road
- Moss Kolnick Drive
- Dickens Road
- Joyner Road
- Isipingo
- Adams Road (minor amendments).

The packages are currently at preliminary and detail design stages, with construction expected commence in November 2023 for the main sections. No estimated contraction start date has been determined yet for the Adams Road Interchange.

The R102 is expected to be the only viable alternative route to the construction work zone. However, it should be noted that the R102 has limited capacity. With its beachside scenery, the R102 is expected to have higher level of pedestrian and driveway access activities. The R102 is therefore not expected to be a suitable alternative for heavy vehicles or through traffic. It may be expected that some temporary traffic calming measures may be required to discourage through traffic from diverting to the R102. There will also be a need to restrict heavy vehicles on the R102.

Depending on the assessed pavement condition along the R102, it may be necessary to resurface some sections of the road, clear the verges, improve signage and road markings, upgrade guardrails, improve pedestrian facilities and other minor improvements (within the existing road reserve), during the initial phase of the construction period. A memorandum of understanding will be required (or need to be amended) to enable SANRAL contractor to carry out these potential preliminary works on provincial roads.

Traffic accommodation plans, for this package, are not yet finalised. The generic methodology, as descried above, is currently assumed. The report will be updated when more detailed construction traffic accommodation plans are available.

Due to the R102 being within the Adam's Road interchange area, this upgrade is expected to have a major impact on the R102 as well. Construction sequencing will be planned to minimise potential impact on both the N2 and the R102, when

Adam's Road interchange is being upgraded. Detailed traffic management plans for the package will address the project impact and possible mitigation measures.

4.5.2 Package 5: (Isipingo - Higginson) & 7 (Higginson - Edwin Swales)

This package comprises of upgrading of the N2 Section 25, between Isipingo Interchange (km 0.75) and Edwin Swales Interchange (km12.8). The package excluded the N2 / Higginson Highway interchange, which is discussed further in the next sub-section. Isipingo and Edwin Swales interchanges are also excluded as they form part of other packages.

The upgrade will result in between 5 lanes of traffic per direction, with auxiliary lanes provided where required.

At least one lane of traffic may be lost during the bulk of the construction period. Alternative routes to the project section include the R102 and M4. However, these roads are expected to be congested during peak hours and may not have sufficient spare capacity to accommodate traffic diverted from the N2. Demand reduction measures should be emphasised for this section.

The package is also adjacent to other key sections and interchanges, which will also be going through upgrades, when this package is being rolled out. There needs to be increased level of coordination between the packages and uniform approach to the traffic accommodation, when all the adjacent packages are being rolled out simultaneously.

4.5.3 Package 6: Higginson Interchange

The detail design of the Higginson Interchange is being reviewed, to value-engineer the proposed solution. The review has effectively moved the project back to conceptual design and is therefore expected to follow after the Isipingo-Higginson and Higginson to Edwin Swales packages.

There are no immediate viable north-south alternatives to the Higginson Highway interchange. The M7 and M30 / R102 can offer some east-west alternative. However very limited spare capacity is expected on these routes, and the M7 may be under construction at the same time that this package is also being

implemented. Demand-side mitigation will therefore need to be a key element of the traffic management plans for this package.

4.5.4 Package 9: uMhgeni Interchange to KwaMashu Interchange

This package comprises of upgrades on the N2 between uMhmgeni Interchange (Section 25, km20.9) and Mt Edgecombe (Section 26, km 2.2). The upgrades include additional lanes, which will result in up 5 of traffic in some sections and auxiliary lanes between closely spaced interchanges, where required. The following interchanges are also going to be upgraded:

- Inanda Interchange
- Queen Nandi Drive Interchange
- KwaMashu Interchange.

A number of bridges and culverts will also be upgraded.

Construction along this package extents will be carried out in five stages. Initial work on the interchanges will occur during Stage 1. Further interchange upgrades will be carried out in subsequent stages. N2 mainline will commence during Stage 2, starting with shoulder widening and followed by median widening. Further works at KwaMashu interchange will be carried out during Stage 3 to 5. It is envisaged that at least three mainline traffic lanes will be available throughout the construction period. Further details will be updated when the detail design is finalised or at construction stage. Refer to Figures 12 and 13 for graphical representation of the current traffic accommodation proposals.

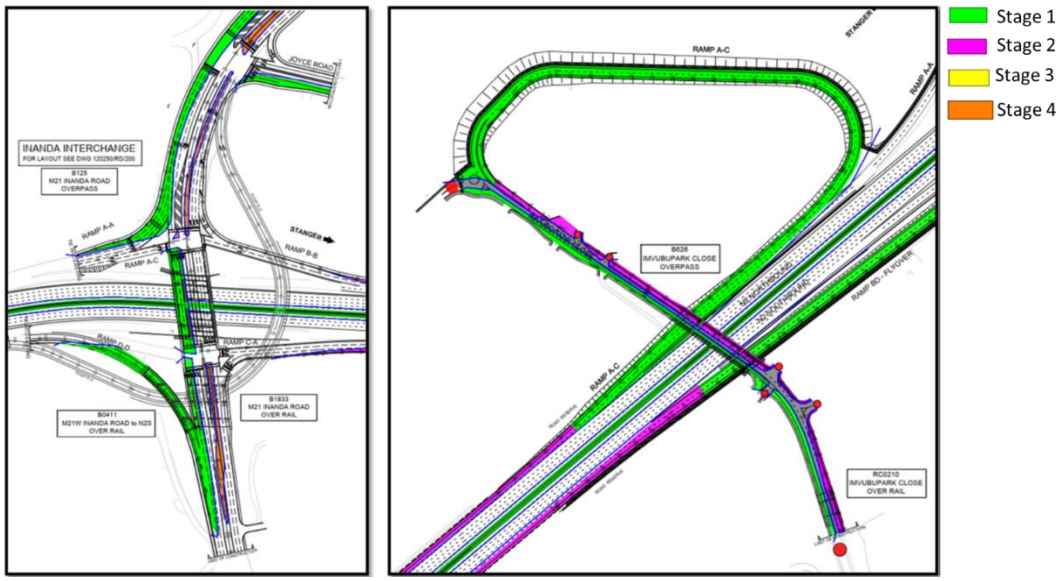


Figure 4-27: N2 Package 9 traffic accommodation proposals - Inanda & Imvupark

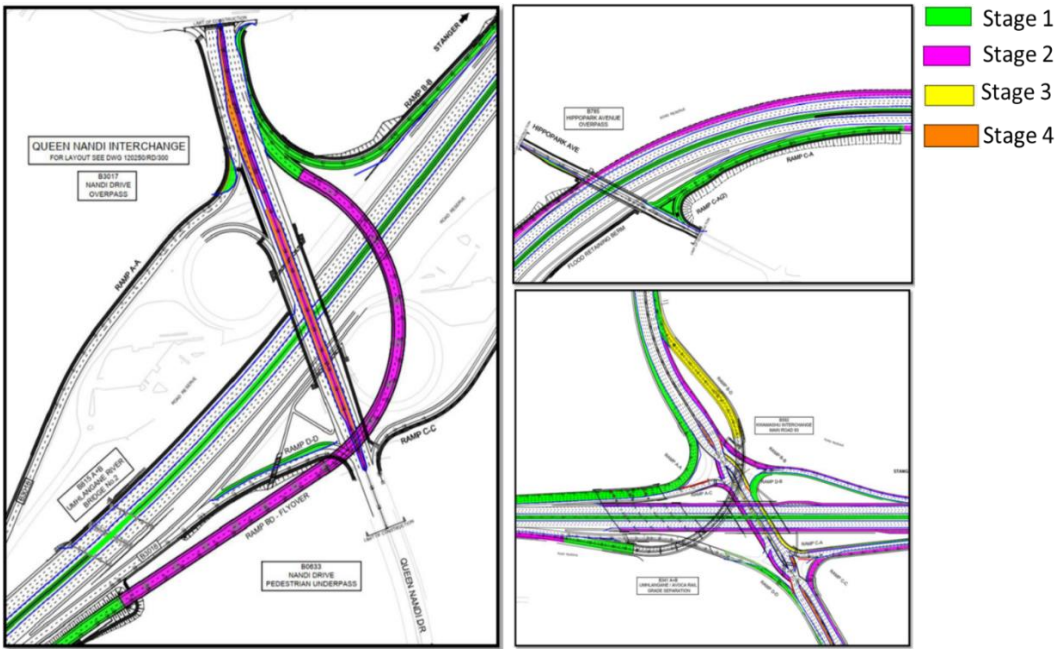


Figure 4-28: N2 Package 9 traffic accommodation proposals - Queen Nandi, Hippopark & KwaMashu interchanges

Alternative north-south routes to this construction package includes the following:

- Mr577 (Dumisani Makhaye Dr / R102)
- M4 (Ruth First Highway).

Minor improvements will be made to the alternative routes are proposed, such as:

- Minor intersection improvements incl. signal timing
- Grass cutting and vegetation clearing
- Road signs:

- Replacement
- Additional road signs where required

- Renew road markings and studs
- Guardrails

4.5.5 Package 11: KwaMashu Interchange to Umdloti Interchange

This package comprises of an upgrade of the N2 between KwaMashu Interchange (Section 25, km 28.6) and Mdloti Interchange (Section 26, km 14). This will be a follow up to the recent upgrading of the N2 between Mdloti and Tongaat Plaza and the Mt Edgecombe Interchange. Two mainline traffic lanes will be added, in each direction, as part of the upgrade. Auxiliary lanes will also be added where needed.

In the immediate vicinity, the N2 has three lanes per direction between KwaMashu and Mt Edegcombe Interchange, drops to two lanes per direction between Mt Edgecombe and Mdloti, then increases to four-lanes per direction beyond Mdloti.

Two lanes, with minimum width of 3.5m will be retained during the construction period. The speed limit will be reduced to 80km/h.

Alternative routes available in the area include the M4 and the R102. The M4 is not expected to have significant spare capacity south of Umhlanga area, as existing demand is relatively high. The R102 could be an alternative for the airport traffic. It is expected that minor pavement improvements, verge clearing, minor intersection upgrades and guardrail improvements can be carried out on the R102 during initial phases of the project.

Only minor improvements (such as verge clearing, etc) are envisaged on the M4. There are committed upgrade plans for sections of the M4, near the M27, as part of the Sibaya Development. the roll out of such upgrades will need to be coordinated to limit impact on the N2 construction works.

5. IMPACT ON MAINLINE N2 AND N3

The road network in the immediate vicinity of the EB Cloete Interchange is the most complex, carries high volumes of traffic and there are a number of provincial and metropolitan roads that are likely to be impacted by the proposed upgrades and associated construction works. N3 Packages A and B and N2 Package 8 are directly impacting on the EB Cloete and the immediate road network. For this reason, relatively more detailed analysis is carried out in the area. This analysis is at a mesoscopic level of analysis, with analysis carried out using sketch planning techniques and spreadsheets.

SANRAL also intends to carry out mesoscopic level analysis within the Pietermaritzburg CBD area. However, engagements with Msunduzi Local Municipality, regarding the traffic management plan, only just commenced in August 2021. Further engagement sessions with Msunduzi Municipality are planned, which will follow initial data gathering and high-level analysis.

This document will be updated as the analysis is finalised and to reflect feedback from the municipalities and KZNDoT, following further engagement sessions.

5.1 Traffic management scenarios

5.1.1 Traffic accommodation scenario

The capacity impact of the traffic accommodation is summarised below, from a capacity analyses point of view:

- One lane of traffic will be closed per direction on the mainline (N2 and N3), where there are currently three lanes of traffic or more.
- The sections with two lanes per direction will remain two lanes per direction.
- At least two lanes of traffic will be retained on the mainline for the duration of construction period.
- Speed limit of 80 kilometres per an hour (km/h) is proposed along both the N2 and N3 sections throughout the construction period.
- Only one entry and exit point will be provided for each work zone.
- All ramps remain open during construction.
- Minimum lane widths of 3.4 m on N2 and N3 (absolute minimum width of 3.3 for some packages).

- Where the shoulder lane is unavailable, emergency response vehicles will be allowed access into the construction zone to attend to incidences, in accordance with relevant road incident management system (RIMS) protocols.
- Each package will have 24-hour emergency recovery vehicles for quicker response to vehicle breakdowns.
- Emergency entrance and exit points will be provided on some packages to allow for quicker access by emergency response vehicles (e.g. ambulances, recovery vehicles, fire engines, etc)
- It is expected that initially there may be significant diversions to alternative routes, as drivers re-evaluate their generalised cost of travel on alternatives (e.g. travel times, vehicle-operating costs, delays, etc).
- After the initial re-evaluation period, it is expected that diversions will be minimal as there may not be travel time and cost savings on the alternative, as compared to remaining on the N2 and N3. As an example, refer to Figure 1 and 2, which show typical travel times on the mainline to be about two times faster as compared to the alternative routes for the Pietermaritzburg to Durban AM peak trip (2019 baseline).
- In case of an emergency, where all the highway lanes are closed, diversions will be necessary.
- Depending on quality of the alternative roads, horizontal curvature, steep slopes and other aspects of the local environments, majority sections of alternative roads network may be unsuitable for heavy vehicle use (e.g. R103 between Cato Ridge and Hillcrest, refer to Figure 3). In such circumstances, heavy vehicles will need to be stacked along the N3 or re-directed to staging areas, where such are identified and available.
- Some packages may also include temporary ramps for emergency evacuations or recovery vehicle access, in case of an emergency.
- Planned short-term road closures or additional lane reductions, where unavoidable, will likely occur at night or weekends, where traffic volumes are expected to be lower, and interruption can be kept to a minimum. Long weekends will be avoided for such planned short-term closures.
- These planned short-term / further lane reductions could be for activities such as maintenance of existing pavement structures, setting up temporary barriers, bridge demolitions, etc.
- Such short-term closures / further lane reductions will be communicated in advance. There will be prior discussion with affected road authorities , Road Incident Management System (RIMS) and Freeway Management Systems

(FMS) teams prior to implementation of these planned short-term closures or additional lane reductions.

5.1.2 Traffic demand reduction scenarios

The following traffic demand reduction scenarios were included in the analysis and will be very dependent on the effectiveness of communication campaigns. The communication campaigns will need to be aimed at influencing driver choices and behaviour prior to and during the construction programme:

- Scenario 1 - 10% reduction in light vehicles;
- Scenario 2 - 20% reduction in light vehicles; and
- Scenario 3 - 30% reduction in light vehicles.

This reduction in traffic demand is expected to result from:

- People making the decision not to travel;
- People working from home;
- People switching to virtual meetings and conferences
- People travelling to different (preferably nearby) destinations;
- People travelling outside the peak hours; or
- People switching to alternative modes such as public transport, walking and cycling where opportunities exist.

These demand reduction measures typically form part of Travel Demand Management (TDM) strategies, which have long been advocated by transport and urban planners, but was experienced first time, at a mass scale in South Africa, during the Covid-19 lockdown period. Generic TDM measures, and those possibly applicable for the N2 / N3 upgrade programme, are discussed further in Section 6.

5.1.3 Peak hour scenarios

The analyses included the following peak hour scenarios:

- AM Peak hour; and
- PM Peak hour.

5.1.4 Mainline traffic capacity and demand assumptions

The mainline traffic capacity was compared to the 2019 baseline traffic demand. Year 2019 was selected as the analysis baseline due to the impact of Covid-19

and associated lockdowns through years 2020 and 2021. The baseline traffic demand, along the N2 and N3, was derived from analysis of continuous traffic observation (CTO) sites, which are typically used for the SANRAL freeway management system (FMS).

The traffic volumes were converted to passenger car units (pcu) by applying a 2.5 factor to the heavy vehicles. This assumes that, on average, a single truck is equivalent to two and half passenger cars, which account for impact on available road capacity in response to heavy vehicle lengths, acceleration / deceleration rates, and topography.

For purposes of this analyses, the capacity of 2,200 vehicles per an hour (vph) per lane was assumed for the N2 and N3 mainlines under normal operational conditions. During construction, there will be lane and speed reductions. Mainline lanes will be a minimum 3.3 m wide and speed limits will be 80km/h. For these reasons, it is anticipated that capacity will reduce by about 15% during construction, resulting in lane capacity reducing to 1,870 vph.

5.2 Mainline demand / capacity analyses

The demand on the mainline (N2/N3) was compared to the vehicle demand per road section. As an example, the 2019 Eastbound traffic demand for the N3 section between M13 Interchange and Harry Gwala Road Interchange is shown in Figure 5-1. The scenarios of demand reduction as discussed in Section 5.1.2 was also applied and the different demand scenarios are shown in Figure 5-2.

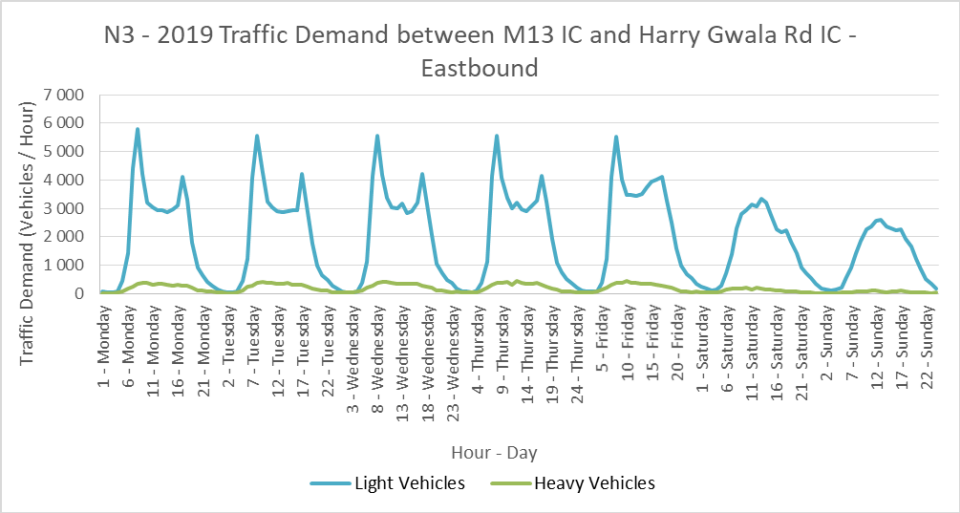


Figure 5-1: N3 – 2019 Traffic Demand between M13 IC and Harry Gwala Road IC - Eastbound

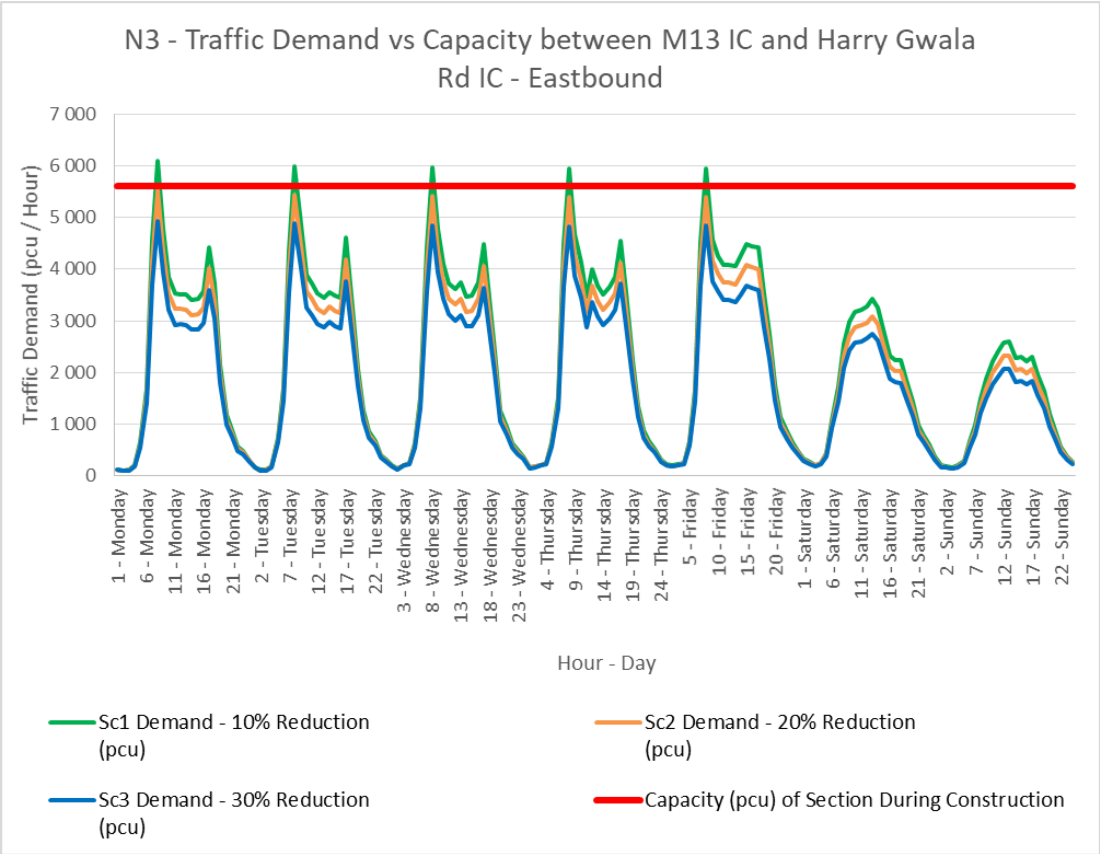


Figure 5-2: N3 – Traffic Demand vs Capacity between M13 and Harry Gwala Road - Eastbound

There will be 3 out of the 4 traffic lanes remaining on this section during construction. Total capacity is therefore estimated 5,610 pcu per hour. This capacity will be exceeded during the AM peak hour for the 10% reduced demand scenario, with the section expected to have adequate capacity if further reductions can be realised.

5.3 Estimated queue lengths

Packages with road sections were identified where it is expected that the mainline traffic demand would exceed the capacity under the traffic accommodation scenario. The packages that where identified are the following:

- Package A: EB Cloete Interchange including, N2 North & N3 West;
- Package B: N3 - Westville Viaduct to Paradise Valley;
- Package C: N3 - Paradise Valley to Mariannhill Toll Plaza;
- Package 2: N2 - Moss Kolnick to Isipingo;
- Package 7: N2 - Higginson Interchange to Edwin Swales Interchange;
- Package 8: N2 - Edwin Swales to south of EB Cloete;
- Package 9: N2 - Mgeni to KwaMashu Interchange; and
- Package 11: N2 - KwaMashu Interchange to Umdloti Interchange.

It is expected that queues would originate from two capacity elements, these elements are:

- At the point where a lane is closed on the mainline; and
- At major merge points.

These elements will be discussed in more detail below.

5.4 Expected queues due to lane closed on mainline

The expected queues were calculated for each of the packages listed above. The details of the expected queues for Package A and B is discussed below to illustrate the process that was followed.

The onsets of work zones are shown in Table 5-1. The expected queue length on the N2 in the Northbound direction is show in Figure 5-3. The expected queue length in kilometres (y - axes) is shown as well as the duration of the queue (x – axes time) for a typical week.

Table 5-1: Assumed Start of Traffic Accommodation per Approach for Queue Estimation (EB Cloete Interchange)

No	Approach	Direction of Travel	Road	Start of Traffic Accommodation	Assumed Traffic Accommodation Measure at this Point
1	Western	Eastbound	N3	M13 interchange – Paradise Valley – 150 m Before Bridge over N3 Eastbound Direction	One lane closed and Speed Limit 80 km/h.
2	Eastern	Westbound	N3	Jan Smuts Highway Interchange – After On-Ramp joined N3 Westbound Direction.	One lane closed and Speed Limit 80 km/h.
3	Northern	Southbound	N2	Umgeni Road Interchange – After On Ramp joined N2 Southbound Direction.	One lane closed and Speed Limit 80 km/h.

No	Approach	Direction of Travel	Road	Start of Traffic Accommodation	Assumed Traffic Accommodation Measure at this Point
4	Southern	Northbound	N2	Edwin Swales Interchange – 150 m Before Off-Ramp on N2 Northbound Direction.	One lane closed and Speed Limit 80 km/h.

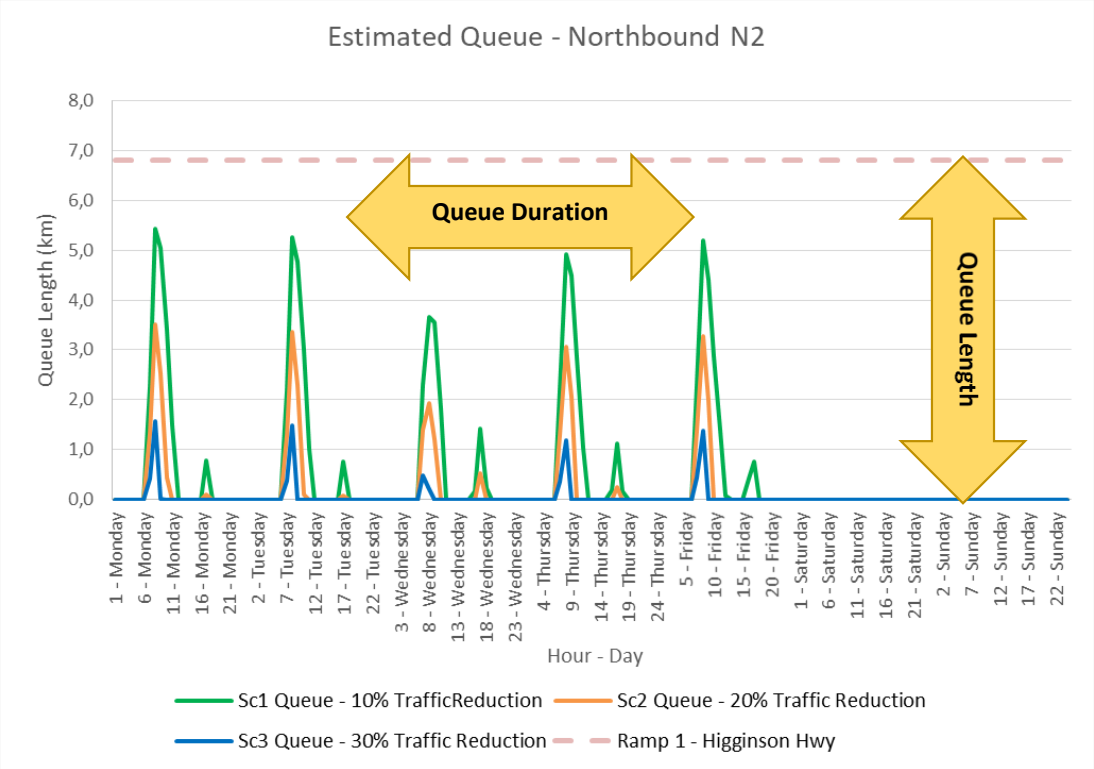


Figure 5-3: Expected Queue Length for a Typical Week (N2 Northbound mainline traffic, approaching EB Cloete Interchange)

It is expected that a queue will emanate at the start of the work zone, 150 m before the off-ramp on N2 Northbound Direction at Edwin Swales Interchange. The queue would back up toward Amanzimtoti. The expected queue lengths and durations for all the approaches are shown in Annexure C and summarised in Table 5-2 to Table 5-4.

Table 5-2: Expected Queue Lengths – Scenario 1 – 10% Reduction in Traffic Demand (EB Cloete Interchange)

No	Approach	Direction of Travel	Road	Expected Queue Length (km)	Expected Queue Duration (hours)
1	Western	Eastbound	N3	Weekdays Mornings – 0.6 to 0.85 km from M13 ramp merge. Weekends – no queue	Weekdays - 1 hour Weekends – none
2	Eastern	Westbound	N3	Weekdays Afternoons – 1.1 to 0.5 km from Jan Smuts Ave ramp merge. Weekends – no queue	Weekdays – 2 to 3 hours Weekends – none
3	Northern	Southbound	N2	Weekdays Afternoons – 4.1 to 2.1 km from Umgeni Road ramp merge. Weekends – no queue	Weekdays – 4 to 5 hours Weekends – none
4	Southern	Northbound	N2	Weekdays Afternoons – 5.4 to 3.6 km from Edwin Swales off ramp. Weekends – no queue	Weekdays – 4 to 5 hours Weekends – none

Table 5-3: Expected Queue Lengths – Scenario 2 – 20% Reduction in Traffic Demand

No	Approach	Direction of Travel	Road	Expected Queue Length	Expected Queue Duration
1	Western	Eastbound	N3	Weekdays – no queue Weekends – no queue	Weekdays – none Weekends – none
2	Eastern	Westbound	N3	Weekdays Afternoons – 0.4 to 0.2 km from Jan Smuts Ave ramp merge. Weekends – no queue	Weekdays – 2 to 3 hours Weekends – none
3	Northern	Southbound	N2	Weekdays Afternoons – 1.6 to 0.9 km from Umgeni Road ramp merge. Weekends – no queue	Weekdays – 2 to 3 hours Weekends – none
4	Southern	Northbound	N2	Weekdays Afternoons – 3.5 to 1.9 km from Edwin Swales off ramp. Weekends – no queue	Weekdays – 3 to 4 hours Weekends – none

Table 5-4: Expected Queue Lengths – Scenario 3 – 30% Reduction in Traffic Demand

No	Approach	Direction of Travel	Road	Expected Queue Length	Expected Queue Duration
1	Western	Eastbound	N3	Weekdays – no queue Weekends – no queue	Weekdays – none Weekends – none
2	Eastern	Westbound	N3	Weekdays – no queue Weekends – no queue	Weekdays – none Weekends – none
3	Northern	Southbound	N2	Weekdays Afternoons – 0.2 to 0.0 km from Umgeni Road ramp merge. Weekends – no queue	Weekdays – 1 hour Weekends – none
4	Southern	Northbound	N2	Weekdays Afternoons – 1.6 to 0.2 km from Edwin Swales off ramp. Weekends – no queue	Weekdays – 2 to 3 hours Weekends – none

The analyses illustrate that significant reduction in vehicle queues can be attained if the demand is significantly reduced (i.e. through work from home, virtual meetings and conferences, avoiding non-essential travel, shifting to public transport, changing to local destinations where some trips can shift to walking and cycling, and other travel demand measures).

Based on the above analysis results, it can be expected that queues that could form with a 10% demand reduction may range from 0.6 km to 5.4 km. 20% demand reduction may result in queues that range from 0 km to 3.5 km and for a 30% traffic reduction queues could range from 0 km to 1.6 km. This assumes no adverse impact from other key elements within EB Cloete Interchange and no queue spill-over from ramp traffic.

5.5 Expected Queue due to Merge Points within the EB Cloete Interchange

The existing merge points within the EB Cloete interchange cannot accommodate the current traffic demand, as a result there are existing queues that form regularly for at least 1 km on all approaches to the interchange during peak periods. During the proposed construction and upgrade of the EB Cloete Interchange traffic accommodation will be implemented within the interchange which will probably

reduce the capacity of merge points and cause the normal queues to increase in length. The EB Cloete Interchange merge points are shown in Figure 5-4.

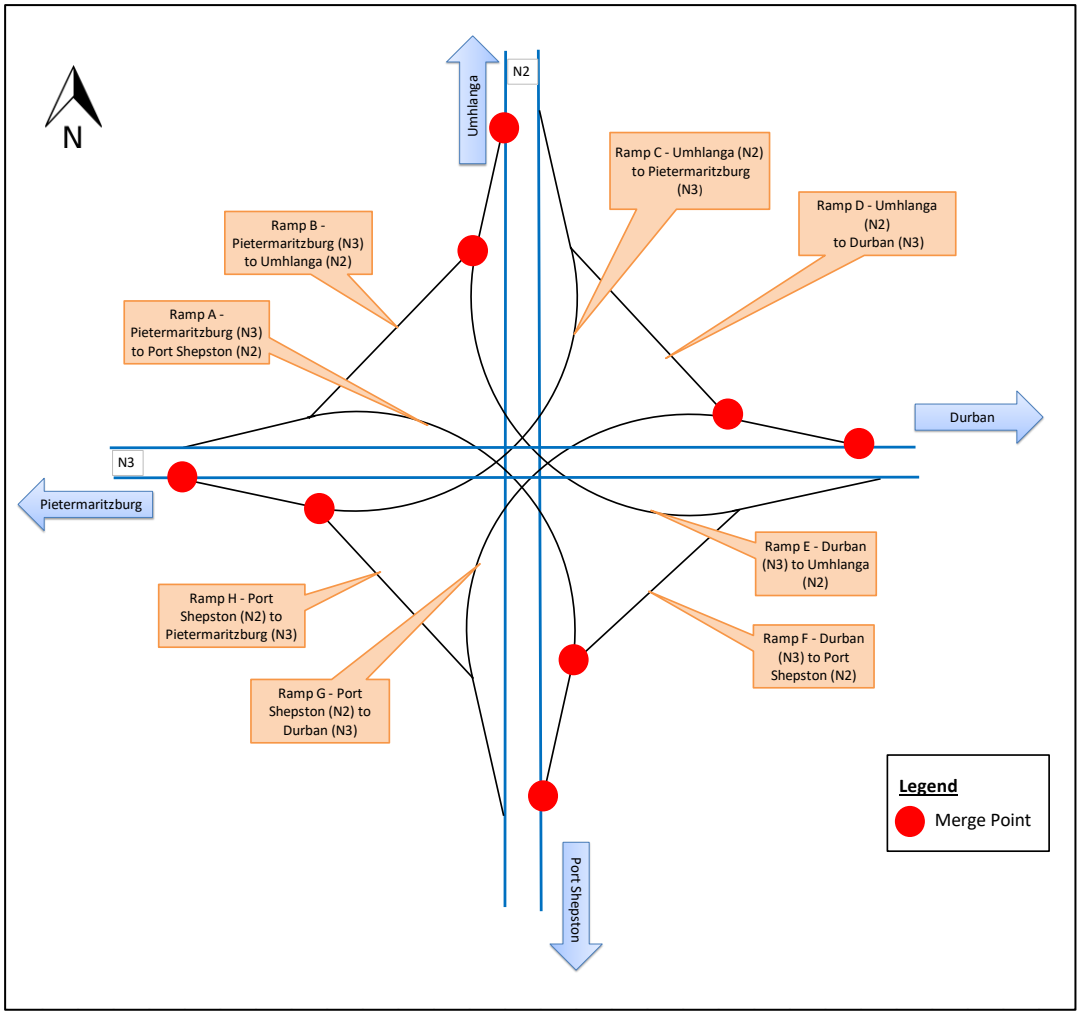


Figure 5-4: Merge Points in EB Cloete Interchange

The detailed traffic accommodation to be implemented within the EB Cloete Interchange is not available at this point in time and will be finalised with the construction team. It was assumed that the merge point capacities will be reduced by 30% during the construction period. The expected queue was calculated emanating upstream from the merge points. The expected queue length for Ramp B (West to North) is shown in Figure 5-5 and the expected queue lengths for the other ramps are shown in Annexure C. The results for all the ramps are summarised in Table 5-5.

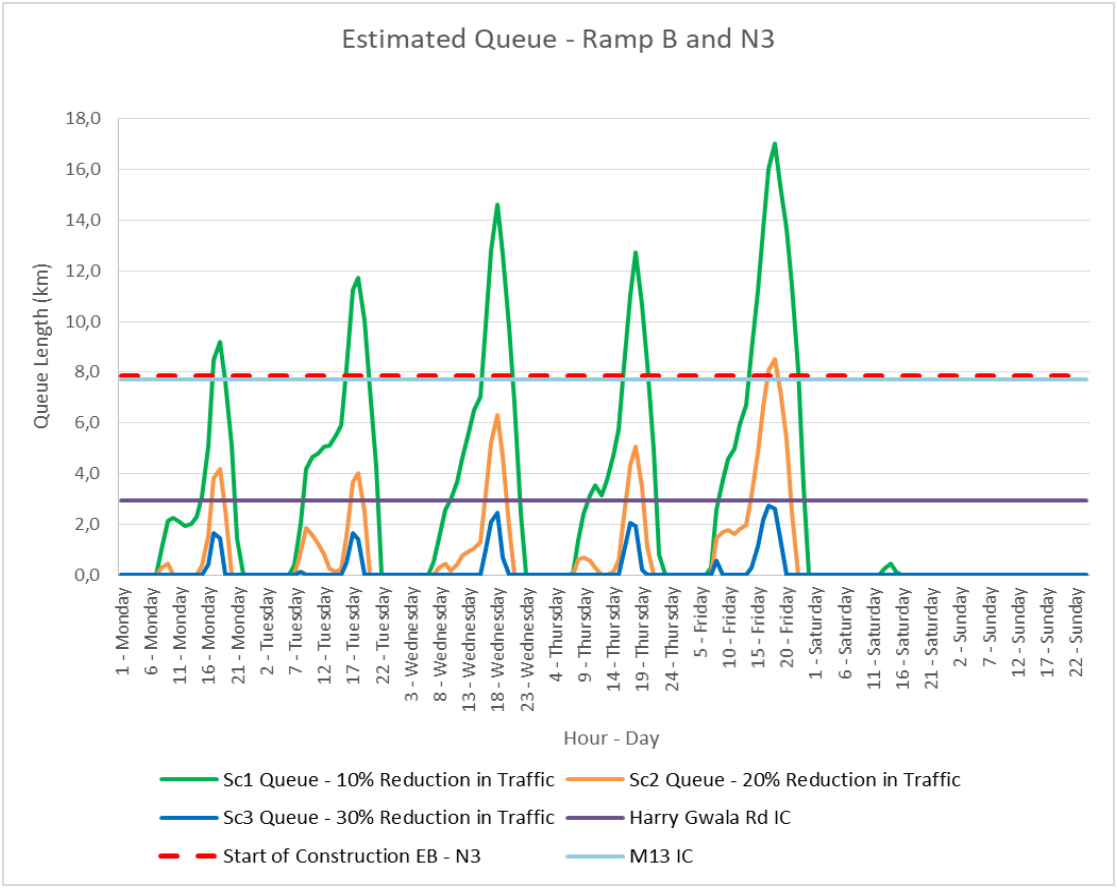


Figure 5-5: Expected Queue Length – Merge Points for EB Cloete Interchange Ramp B

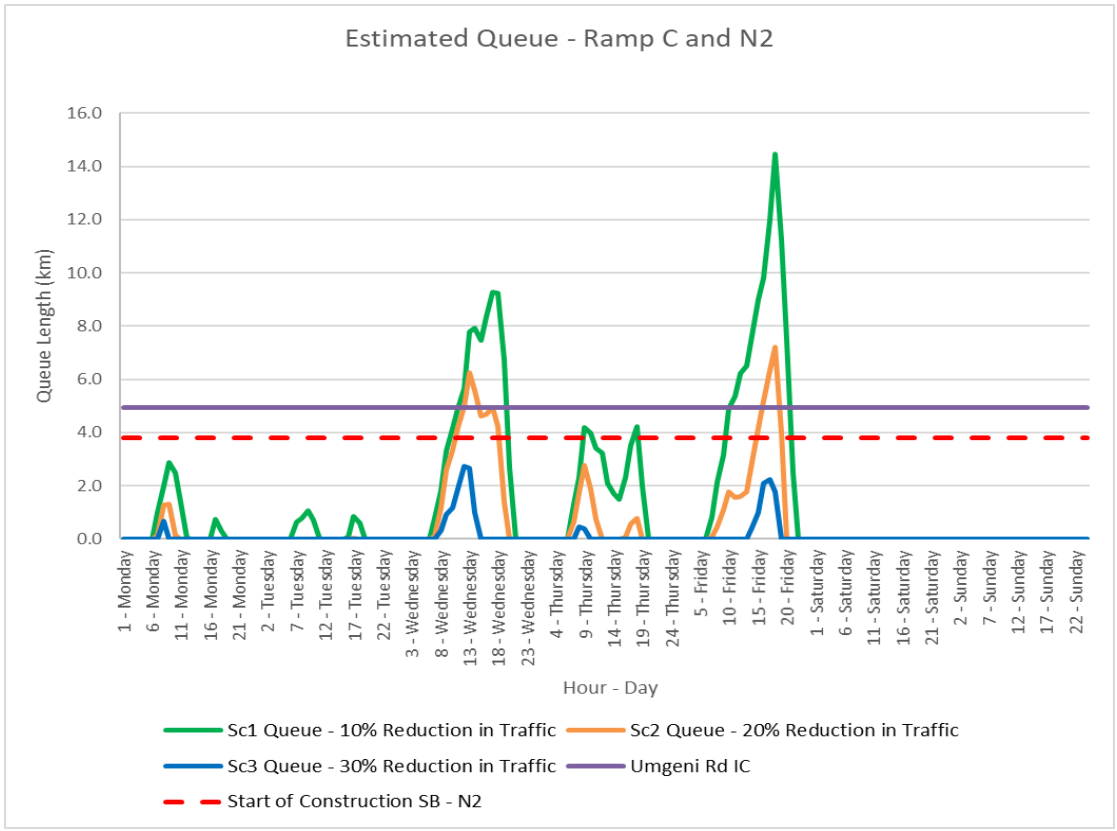


Figure 5-6: Expected Queue Length – Merge Points for EB Cloete Interchange Ramp C

Table 5-5: Expected Queue Lengths – EB Cloete Merge Points

No	Ramp	Traffic Scenario	Expected Maximum Queue Length	Expected Queue Duration
1	Ramp A	10% Reduction in Traffic	Weekdays Afternoon – 2.4 to 2.8 Weekends – no queue	Weekdays – 4 to 5 hours (varying queue length) Weekends – none
		20% Reduction in Traffic	Weekdays Afternoon – 1.3 to 2.0 Weekends – no queue	Weekdays – 3 to 4 hours (varying queue length) Weekends – none
		30% Reduction in Traffic	Weekdays Afternoon – 0.7 to 1.0 Weekends – no queue	Weekdays – 2 to 3 hours(varying queue length) Weekends – none
2	Ramp B	10% Reduction in Traffic	Weekdays – 10.0 to 17.0 Weekends – no queue	Weekdays – 10 to 12 hours(varying queue length) Weekends – none
		20% Reduction in Traffic	Weekdays – 4.0 to 8.5 Weekends – no queue	Weekdays – 10 to 12 hours(varying queue length) Weekends – none
		30% Reduction in Traffic	Weekdays Afternoon – 1.4 to 2.9 Weekends – no queue	Weekdays – 3 to 4 hours(varying queue length) Weekends – none
3	Ramp C	10% Reduction in Traffic	Weekdays – 9.2 to 14.5 Weekends – no queue	Weekdays – 10 to 12 hours(varying queue length) Weekends – none
		20% Reduction in Traffic	Weekdays Morning – 6.2 to 7.2 Weekends – no queue	Weekdays – 8 to 10 hours(varying queue length) Weekends – none
		30% Reduction in Traffic	Weekdays Morning – 1.8 to 2.6 Weekends – no queue	Weekdays – 3 to 4 hours(varying queue length) Weekends – none

No	Ramp	Traffic Scenario	Expected Maximum Queue Length	Expected Queue Duration
4	Ramp D	10% Reduction in Traffic	Weekdays – 2.9 to 8.0 Weekends – no queue	Weekdays – 10 to 12 hours(varying queue length) Weekends – none
		20% Reduction in Traffic	Weekdays Morning – 0.8 to 4.0 Weekends – no queue	Weekdays – 4 to 6 hours(varying queue length) Weekends – none
		30% Reduction in Traffic	Weekdays Morning – 0.2 to 2.1 Weekends – no queue	Weekdays – 3 to 4 hours(varying queue length) Weekends – none
5	Ramp E	10% Reduction in Traffic	Weekdays – 11.4 to 22.0 Weekends – no queue	Weekdays – 10 to 12 hours(varying queue length) Weekends – none
		20% Reduction in Traffic	Weekdays – 5.0 to 10.5 Weekends – no queue	Weekdays – 10 to 12 hours(varying queue length) Weekends – none
		30% Reduction in Traffic	Weekdays Afternoon – 1.4 to 3.0 Weekends – no queue	Weekdays – 3 to 4 hours(varying queue length) Weekends – none
6	Ramp F	10% Reduction in Traffic	Weekdays Afternoon – 2.3 to 3.5 Weekends – no queue	Weekdays – 4 to 5 hours(varying queue length) Weekends – none
		20% Reduction in Traffic	Weekdays Afternoon – 1.2 to 2.6 Weekends – no queue	Weekdays – 3 to 4 hours(varying queue length) Weekends – none
		30% Reduction in Traffic	Weekdays Afternoon – 0.8 to 1.3 Weekends – no queue	Weekdays – 2 to 3 hours(varying queue length) Weekends – none

No	Ramp	Traffic Scenario	Expected Maximum Queue Length	Expected Queue Duration
7	Ramp G	10% Reduction in Traffic	Weekdays Afternoon – 2.2 to 4.4 Weekends – no queue	Weekdays – 10 to 12 hours(varying queue length) Weekends – none
		20% Reduction in Traffic	Weekdays Afternoon – 2.3 to 3.4 Weekends – no queue	Weekdays – 3 to 4 hours(varying queue length) Weekends – none
		30% Reduction in Traffic	Weekdays Afternoon – 0.7 to 1.7 Weekends – no queue	Weekdays – 2 to 3 hours(varying queue length) Weekends – none
8	Ramp H	10% Reduction in Traffic	Weekdays – 6.0 to 7.1 Weekends – no queue	Weekdays – 10 to 12 hours(varying queue length) Weekends – none
		20% Reduction in Traffic	Weekdays – 3.8 to 5.2 Weekends – no queue	Weekdays – 8 to 10 hours(varying queue length) Weekends – none
		30% Reduction in Traffic	Weekdays – 1.3 to 2.9 Weekends – no queue	Weekdays – 3 to 4 hours(varying queue length) Weekends – none

The expected queue forming on Ramp B and extending onto the N3 is predicted to be between 9 km (Mondays) and 16 km (Fridays) (for the 10% reduction demand scenario). This queue extends past the point where the assumed lane closure (start of construction) would occur. Similarly, queue forming from Ramp C is predicted to be between 2 km on Mondays and 14 km on Fridays for the 10% demand reduction scenario. In other words north-west traffic queues can extend beyond Kwa-Mashu Highway Interchange on Friday afternoons.

These queues, resulting from the merge points, were assumed to occupy the left lane only on the N3 and N2, as these are the lanes drivers would be expected to use to access the ramp (i.e. no queue spill-over to the mainline traffic lanes).However, for the 30% reduced demand scenario, the predicted queues would be between 1.6 km (Mondays) and 2.6 km (Fridays) for both Ramp B and C.

It therefore becomes clear that the most effective mitigation measure for construction impacts will be demand reduction. As discussed earlier, demand reduction will rely on travel behaviour change. Covid-19 lockdowns have demonstrated that such travel behaviour change is possible, but the change rely on a good communication strategy, public buy-in on the reasons to alter behaviour and an understanding of the required trade-offs between short-term pain and long-term gains.

It is therefore critical that the right messages, for the right audience, be communicated at right moments and platform. It is also important that user feedback is worked into the plans to adapt the plans to reflect to realities of the time. This approach has worked in South Africa during the 2010 FIFA Worldcup where operational plans were altered overnight after the first event day, in London during the 2012 Olympics where residents changed travel times to work to make way for the tourist, and recently during COVID-19 Lockdown where people adapted new ways of working. Lessons were also learnt from the Gauteng Freeway Improvement Schemes (GFIP) on impacts and behaviour change during long-term construction works.

The analyses also show that the EB Cloete interchange, under certain circumstances, could cause major queues on both N2 and N3. It is recommended that the proposed detailed traffic accommodation within the EB Cloete be reviewed by a Traffic Engineer before implementation to ensure maximum capacity is provided at the merge points while still ensuring optimum traffic safety. The exact lane configuration within these merge areas will be critical to ensure the optimisation of available roadway capacity.

5.6 Queuing analysis of incidents

Many types of incidents can occur on the road network, the most frequent incidents that occur are:

- Vehicle break downs; and
- Crashes.

Both of these incidents could result in additional lane closures especially within a work zone. Typically in a work zone environment it is difficult to move a vehicle out of the roadway due to the limited space availability. In this situation typically an additional lane is then closed as a result of the incident. For this analysis a road section was chosen and an incident scenario. It should be noted that many different scenarios can be analysed for each road section. The purpose of this section is to illustrate the analysis process and to discuss the results the analysis can provide.

The incident scenario that was used for this analysis was the following:

- Wednesday at 08:00 am a truck breaks down on the N3 between Harry Gwala Road interchange and the EB Cloete interchange on the Eastbound Carriageway; and
- This break down results in an additional lane closure for 12 hours (08:00 to 20:00).

The impact this has on the mainline capacity is shown in Figure 5-7. During the additional lane closure the capacity drops from 5 610 pcu per hour to 3 740 pcu per hour. The demand exceeds the available capacity significantly during this period and a queue is formed. The expected queue for this incident scenario is shown in Figure 5-8.

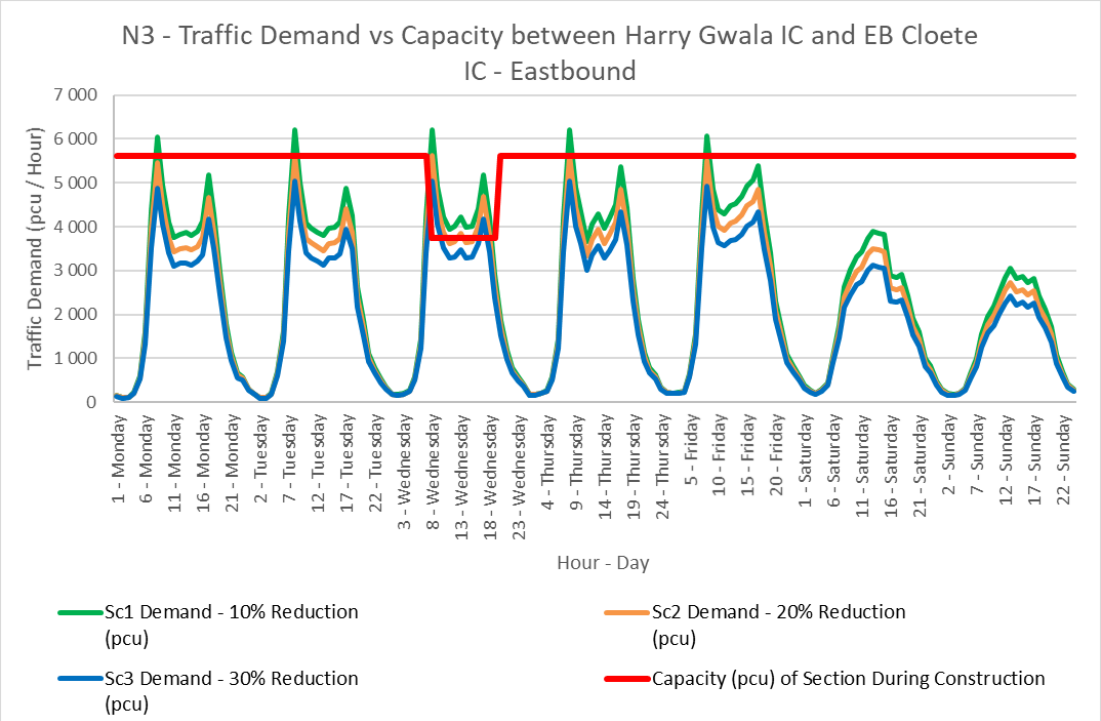


Figure 5-7: Capacity compared to vehicle demand during the incident scenario

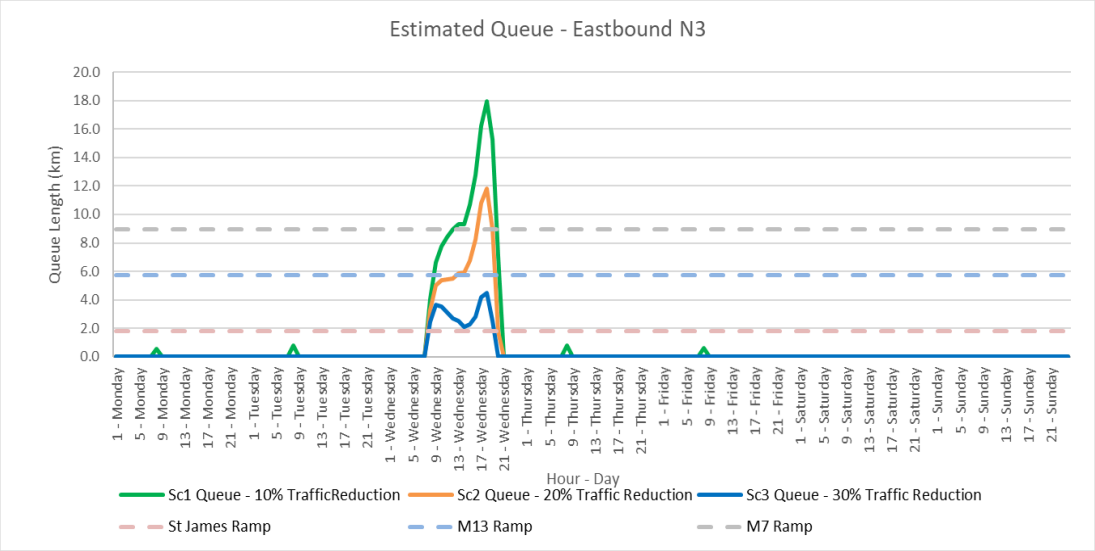


Figure 5-8: The expected queue for the incident scenario

For this incident scenario the expected maximum queue length and the duration of the queue is the following:

- 10% Traffic Reduction – Maximum queue length 18 km and the duration 13 hour;
- 20% Traffic Reduction – Maximum queue length 12 km and the duration 12 hour; and
- 30% Traffic Reduction – Maximum queue length 4.5 km and the duration 11 hour.

The maximum queue length compared to the duration of the incident (duration to clear) is shown in Figure 5-9. For this incident scenario the expected queue could be limited to under 8 km if the incident could be cleared within 3 hours for the 10% reduction in traffic demand. This illustrate the importance of clearing incidents as quick as possible.

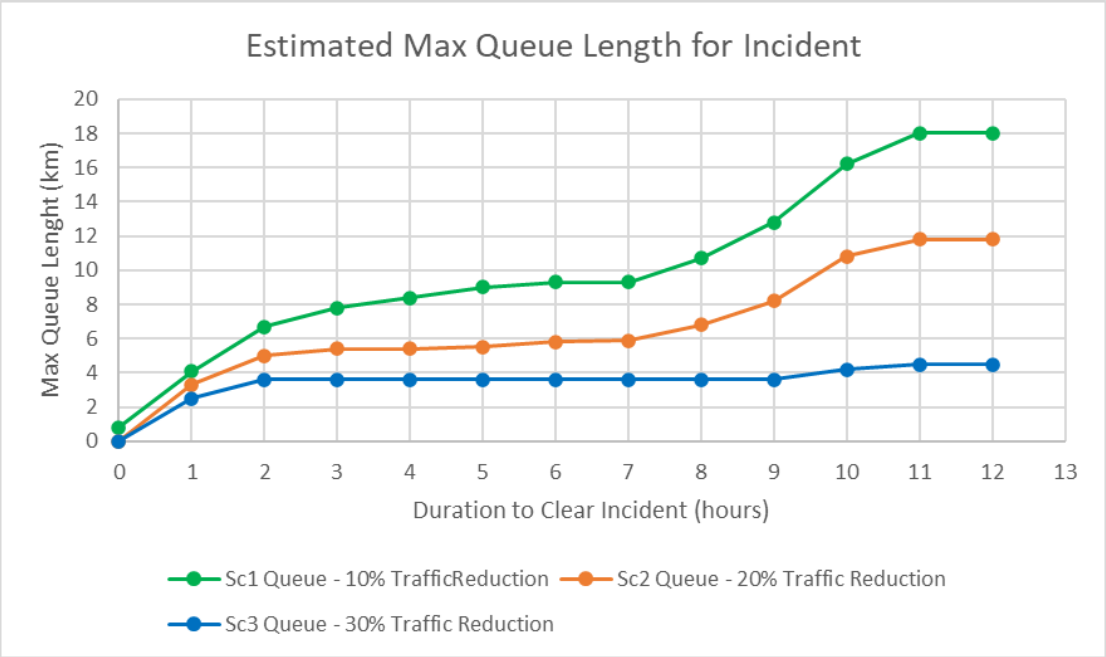


Figure 5-9: Expected queue lengths for different incident clearance times

The time required to clear the expected queue after the incident has been cleared is shown in Figure 5-10 for different incident durations. For this incident scenario, if the incident is cleared within 3 hours the queue would clear in 2 hours after the incident has been cleared for the 10% reduction in traffic demand.

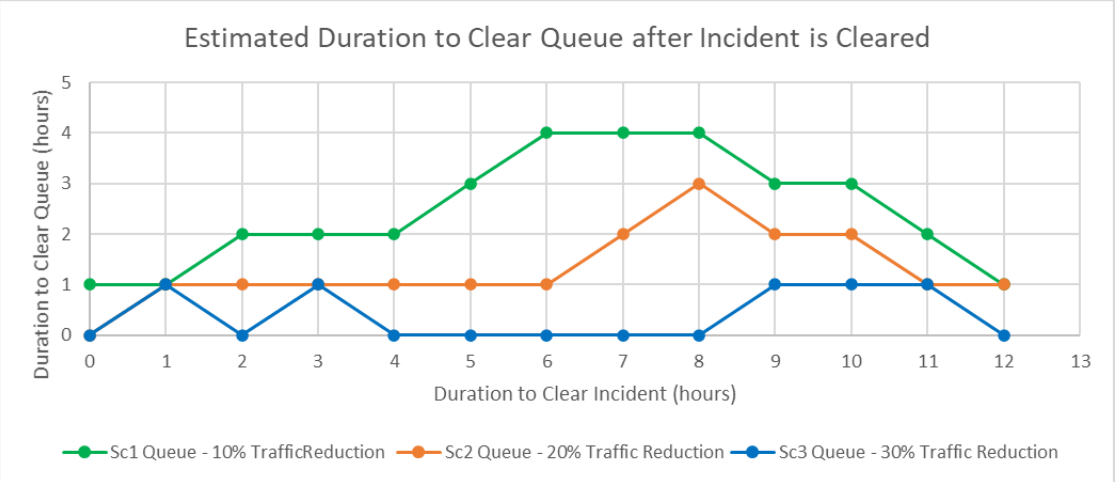


Figure 5-10: Estimated duration to clear queue after the incident is cleared

5.7 Queuing analysis of upfront maintenance and temporary concrete barrier installation

During the upfront maintenance and temporary barrier installation the traffic accommodation typically would reduce the number of open lanes for traffic to 1 lane per direction. This has a significant effect on the capacity of the mainline and could

cause lengthy queues. For this reason these activities are typically conducted during the off peak periods from 09:00 to 15:00.

The analysis was conducted and to illustrate the process and results the road section between Richmond Road (M1) interchange and the M7 interchange will be discussed below. The capacity compared to the vehicle demand is shown in Figure 5-11. It should be noted that the demand exceeds the capacity from 06:00 to 18:00 on weekdays.

The expected queues as a result of these additional lane closures are shown in Figure 5-12. For this road section the expected maximum queue length and the duration of the queue is the following:

- 10% Traffic Reduction – Maximum queue length 13.7 km and the duration 14 hour;
- 20% Traffic Reduction – Maximum queue length 11.0 km and the duration 12 hour; and
- 30% Traffic Reduction – Maximum queue length 8.8 km and the duration 11 hour.

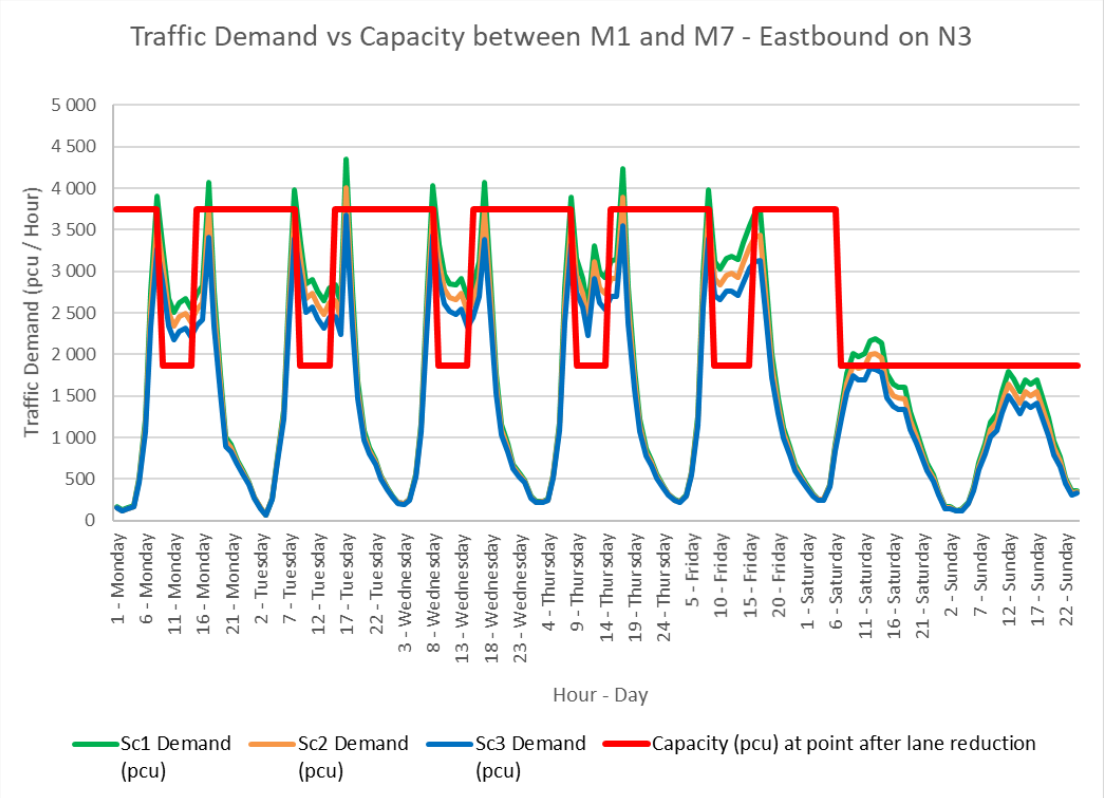


Figure 5-11: Capacity compared to vehicle demand (M1 interchange to M7 interchange)

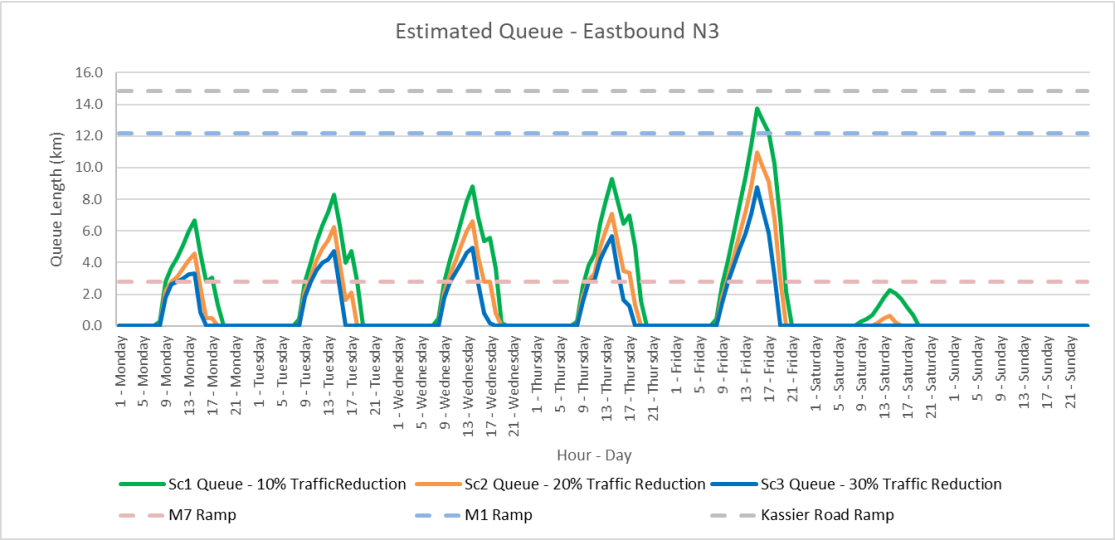


Figure 5-12: Expected queue lengths as result of additional lane closure between M1 and M7

6. TRAVEL DEMAND MANAGEMENT (TDM)

The three pillars of improving mobility are shown in Figure 6-1, TDM is one of the three pillars. During the construction of the different packages, capacity will be reduced on the mainline with the implementation of the required traffic accommodation. TDM could be used to reduce the demand and limit the amount of congestion during the construction period.

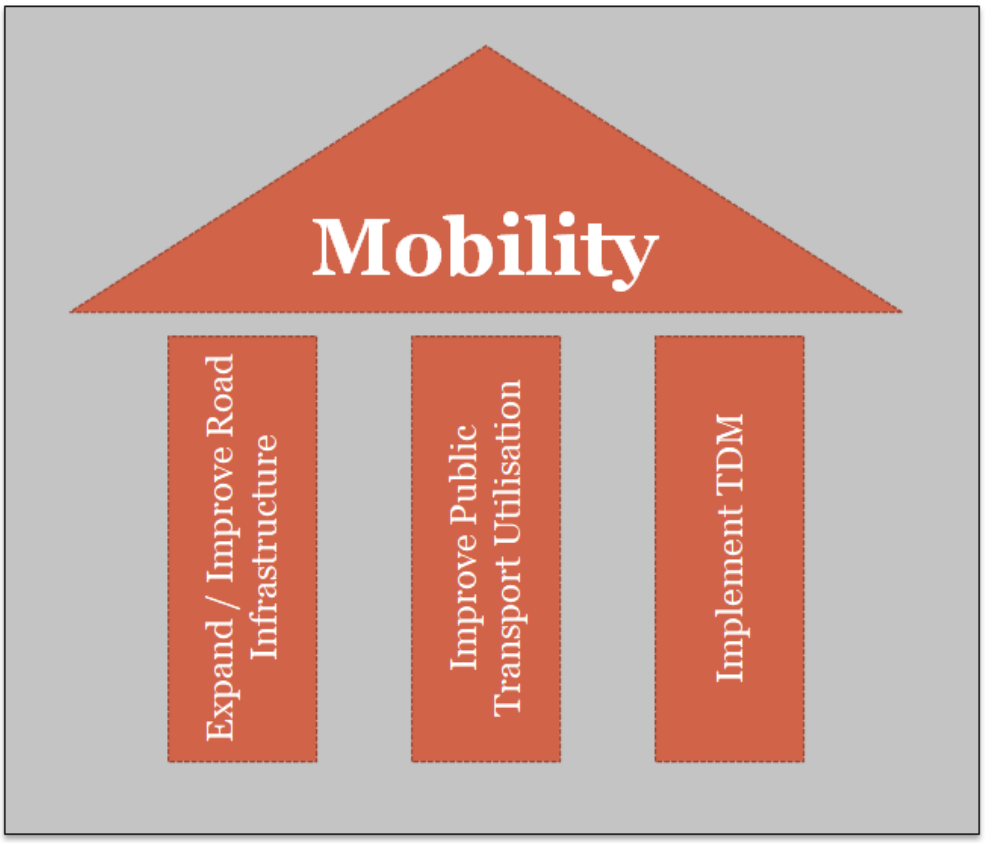


Figure 6-1: Three Pillars of Improving Mobility

Travel Demand Measures that could be considered are shown in Table 6-1. Further work would need to be done to determine the measures that should be implemented and how to practically implement.

Table 6-1: TDM that could be Considered

Measure	Field / Area
Mobility Measures	NMT
	Public Transport
	Rideshare
	Telecommute
	Guarantee Ride Home
	Flexible Working Hours
	HOV
	Traveller Information System
	Large Employer Trip Reduction Program
Economic Measure	Congestion Pricing
	Commuter Financial Incentives
	Taxes (Carbon, Second Car, Fuel)
	Parking Management

7. ALTERNATIVE ROUTES / DIVERSION ROUTES

This section describes alternative routes for the N2 and N3 Packages and the assessment conducted on the alternative routes.

7.1 Traffic diversion

The reduced capacity on the N2 and N3 freeways will encourage traffic to divert to the alternative routes to reach the desired destination. The route choice will be influenced by the following factors:

- Cost;
- Travel Time;
- Safety;
- Signage; and
- Knowledge of the alternative route options.

The above factors can be further simplified in to generalised cost, based on willingness to pay attributes of simplified population bands (sometimes often referred as Value of Time (VOT)).

In an ideal world, road users will keep changing routes until there are no generalised cost savings that can be realised by changing route of travel. This is generally described as Wardrop's Equilibrium in the traffic modelling circles.

However, in real life people are not always equally aware of cost of travel or all the options available. They will most often settle on their preferred route based on a combination of trial and error and information from traffic reports, Google, Waze, i-traffic and other Map re-routing recommendations. Mobile phone or web alerts, VMS information and other media also provide key data sources, especially as part of pre-journey route planning.

To achieve desired rerouting scenarios, focus will need to be on the marketing, communication and digital strategies and campaigns, together with closer working relationship between the construction teams and RIMS / FMS teams.

7.2 Identification of alternative routes

The road network was studied, and the following alternative routes have been identified that motorists would likely choose as alternatives to the N2 and N3 within Ethekwini:

- M1: Richmond Road / MR85 / Higginson Highway;
- M4;
- MR577: Otto Volek Road / Dinkelman Road / Dumisani Makhaye Drive;
- M7: Solomon Mahlangu Drive;
- M12: Kenneth Kaunda Road / Umhlanga Rocks Drive
- M13: King Cetshwayo Highway
- M19: St Johns Avenue / Umgeni Road
- HG: St James Avenue / Harry Gwala Road / Rick Turner Road
- R102; and
- R103.

Alternative routes were also identified through Pietermaritzburg. These routes could be used by motorists as alternative routes for a short section of the N3 through Pietermaritzburg. The routes that were identified are:

- Alexandra Road;
- Armitage Road;
- Boshoff Street;
- Church Street M70;
- Howick Road;
- King Edward Avenue;
- New England Road; and
- Ohrtmann Road.

The alternative routes are shown in Figure 7-1.

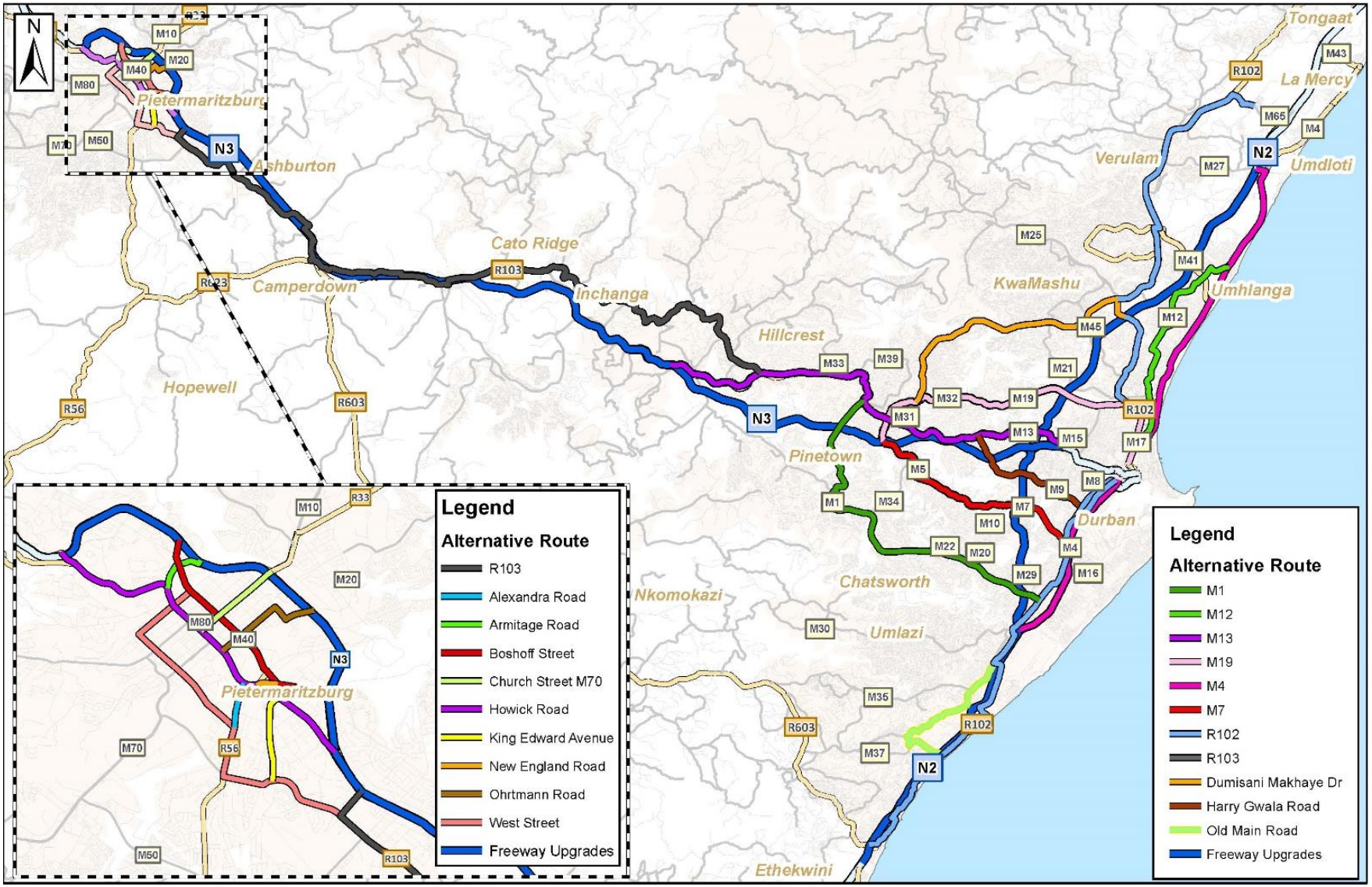


Figure 7-1: Alternative Routes

7.3 Freight routing

The N2 and N3 are used to transport freight within South Africa. The N3 has the highest volumes of truck traffic in South Africa. The TMP must consider heavy vehicle traffic to ensure that the freight can be transported during the construction period. An analysis was done to identify steep gradients along the mainline (N2 and N3) and the identified alternative routes. Refer to Figure 7-2 for an example of the analysis.

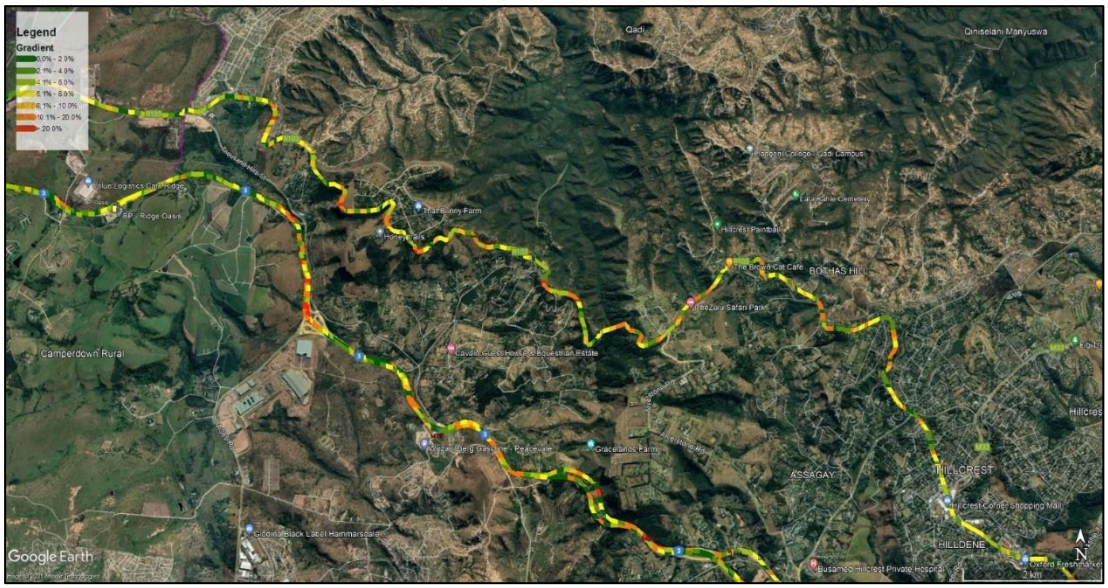


Figure 7-2: Example of alternative routes that may be unsuitable for heavy vehicles (R103, between Cato Ridge and Hillcrest)

The analysis concluded that heavy vehicle should remain on their original route as far as possible. Several of the alternative routes have sections which are not suited for heavy vehicle traffic.

7.4 Spare capacity on alternative routes

The capacity constraints on the alternative routes are typically the signalised intersections. The volume / capacity ratios for the through movements on the alternative routes were calculated for all the signalised intersections along the alternative routes as shown in Annexure D.

Assuming a maximum volume capacity ratio of 0.95 and taking into account the number of through lanes, green over cycle length ratio for the through movements and a saturation flow rate of 2,200 pcu per hour (pcu/hr) per lane the spare capacity was calculated. The results are shown graphically in Figure 7-3 for the Solomon

Mahlangu Drive M7 Eastbound alternative. It is clear from Figure 7-3 that the Bellair Road intersection will be the capacity constraint on this alternative route for this peak hour and travel direction. Bellair Road has a through movement spare capacity of 10 pcu/h in the AM peak hour in the Eastbound direction. The second most constrained intersection is the South Coast Road with a spare capacity of 490pcu/h in the Eastbound direction. The third limiting intersection is N2 Eastern Terminal with 1,200 pcu/h in the Eastbound direction.

The graphical representation of the spare capacity for the other alternative routes are shown in Annexure D. The spare capacity per alternative route is summarised in Table 7-1. The spare capacity for the route is based on the lowest spare capacity of all the intersections along the route. The critical intersections are also listed in Table 7-1.

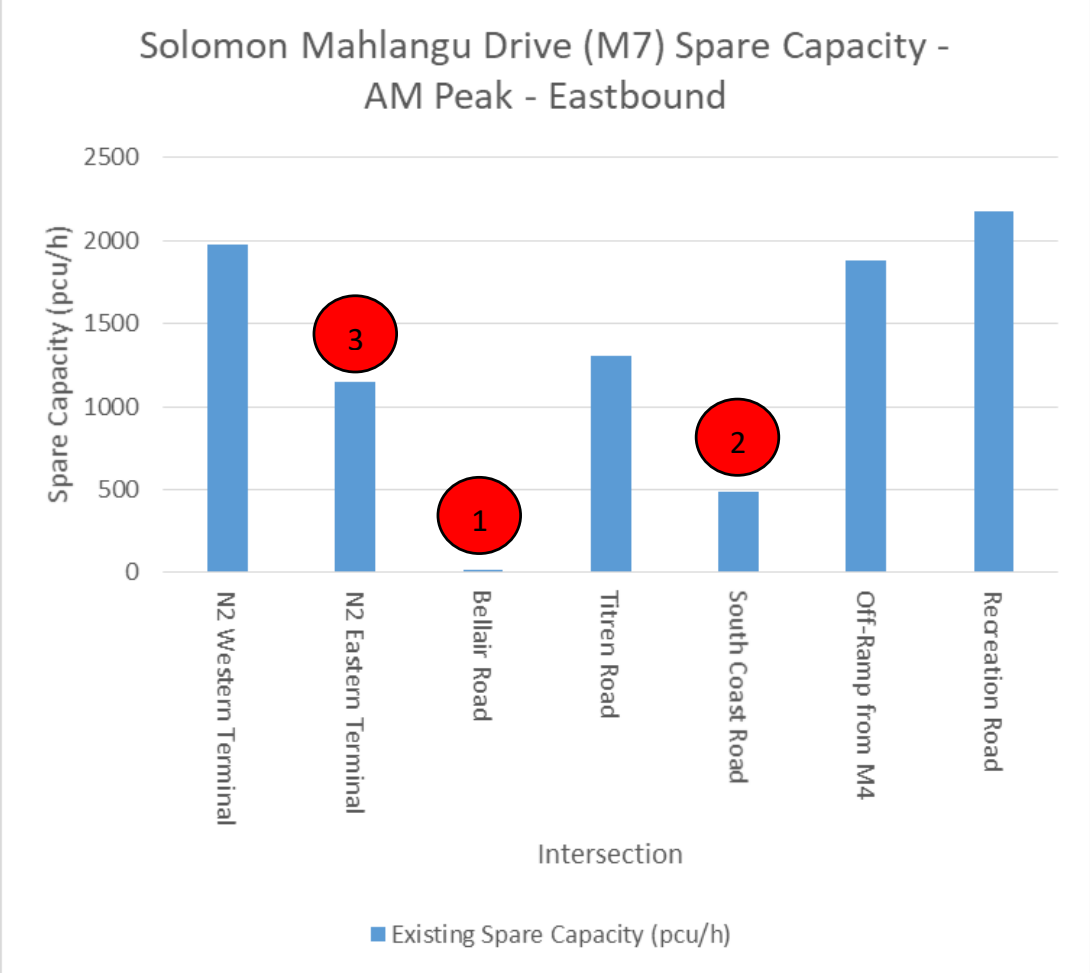


Figure 7-3: Existing spare capacity - Solomon Mahlangu Drive - M7

Table 7-1: Low existing spare capacity at signalised intersection for the through movement on alternative routes within Ethekwini

No	Alternative Route	Intersections with Low Spare Capacity on Route
M1	Richmond Road / MR85 / Higginson Highway	• Marianhill Road • Hans Dettmann Highway • Old Richmond Road • Wiltshire Road • Abbot Francis Road • Mobeni Heights Drive
MR577	Otto Volek Road / Dinkelman Road / Dumisani Makhaye Drive	• Posselt Road • N2 Western Terminal • N2 Eastern Terminal
M7	Solomon Mahlangu Drive - M7	• Bellair Road • South Coast Road
M12	Kenneth Kaunda Road / Umhlanga Rocks Drive	• Isaiah Ntshangase Road • Smiso Nkwanyana Road • Athlone Drive • Umhlanga Rocks Drive / Kenneth Kaunda Road • Ashley Avenue • Westridge Road
M13	King Cetshwayo Highway	• Locksley Drive • Cullingworth Road
M19	St Johns Avenue / Umgeni Road	• Shepstone Road • Alpine Road • Bamboo • M13 Southern Terminal • M13 Northern Terminal
HG	St James Avenue / Harry Gwala Road / Rick Turner Road	• Link Road • ZK Mathews Road • Buckingham Terrace • N3 Northern Terminal • N3 Southern Terminal • The Pavilion Entrance • The Boulevard

No	Alternative Route	Intersections with Low Spare Capacity on Route
R102	R102	• N2 Prospecton Western Terminal • Wilcox Road • Kenyon Howden Road • Solomon Mahlangu Drive • Sarnia Road • Sandile Thusi Road • Smiso Nkanyana Road • Sea Cow Lake Road • Effingham Road • Rinaldo Road • N2/Churnick Ndlovu Hwy Eastern Terminal • N2/Churnick Ndlovu Hwy Western Terminal • Mount Edgecombe Dr /Stonebridge Dr • Hillhead Dr/ Phoenix Hwy • Phoenix Hwy
R103	R103	• Greenway Close • Bamboo Close

7.5 Typical mitigation measures

Typical mitigation measure were considered. Mitigation measures that could be implemented in a relatively short period of time and at a low cost were:

- Traffic Signal Timing Plans;
- Repainting of Intersections;
- Intersection Control Type; and
- Restriction of Movements.

Based on feedback from the TMP liaison meetings with ETA, KZNDoT and other partners, options were also reviewed where geometric upgrades could be considered, within the available road reserves.

7.5.1 Traffic signal timing plans

The following mitigation measures can be considered at signalised intersections:

- The traffic signal timing plans can be refined to improve capacity; or

- The green time on opposing movements can be reduced to increase the green time on the phases for the alternative route.

7.5.2 Repainting of intersections

Intersections could be evaluated to determine if repainting the intersection would be an option to increase the capacity. The following repainting options should be considered:

- Use shoulders / parking to increase number of lanes; and /or
- Repaint entire intersection to increase number of lanes.

7.5.3 Intersection control type

The intersection control could also be evaluated as follows:

- Priority control for side road should be left as is; and
- At intersections with all way stop control it could be considered to implement a traffic signal or points men (subjects to SARTSM and road authorities' requirements).

7.5.4 Restriction of movements

At intersections it could be considered to restrict certain movement to increase the alternative route capacity through an intersection. Typically, this would be restricting the right turn movement at the intersection for certain approaches.

The above measures are possible means to mitigate. However, these will be investigated in further detail with due consideration to the local context and subject to approval by affected road authorities.

7.6 Proposed mitigation measures

7.6.1 Traffic signal timing plans

The traffic signals in eThekwini Municipality generally operate with fixed timing plans in the peak periods and vehicle actuated plans in the off peak periods. It is recommended that the traffic signal timing plans for the signals on the identified alternative routes should be reviewed and optimised where practical.

It could also be considered to reduce the green time on the other movements to increase the green time for the through movement to increase capacity. The possible capacity improvement on the through movement that could be obtained by reallocating 10% of the cycle time to the through movement is shown in Table 7-2. This is a generic example, with the purpose to illustrate the concept of potential capacity gains on the alternative routes.

Table 7-2: Reallocating 10% of the cycle time to the green time of the through movement

No. of Through Lanes	Existing Green / Cycle Split of Through Movement (%)	Proposed Green / Cycle Split of Through Movement (%)	Existing Capacity for Through Movement at Signal (pcu/h)	New Capacity for Through Movement at Signal (pcu/h)	Increase in Capacity Through Movement at Signal (pcu/h)	% Increase in Signal Through Movement Capacity
1	40%	50%	880	1 100	220	25%
1	50%	60%	1 100	1 320	220	20%
1	60%	70%	1 320	1 540	220	17%
2	40%	50%	1 760	2 200	440	25%
2	50%	60%	2 200	2 640	440	20%
2	60%	70%	2 640	3 080	440	17%
3	40%	50%	2 640	3 300	660	25%
3	50%	60%	3 300	3 960	660	20%
3	60%	70%	3 960	4 620	660	17%

The capacity of the through movement can be increase by between 220 and 660 by reallocating 10% of the cycle time to green time of the through movement. The list of intersections that are proposed to be reviewed are shown in Table 7-3.

It should be noted that in most situations the traffic signal settings would have been optimised and coordinated with other traffic streams, especially in CBD environments. The potential gains with traffic signals may be limited. But these still need to be reviewed in more details to identify where such traffic signal improvements can be expected to have the maximum benefits.

Table 7-3: List of intersections – traffic signal timings to be reviewed

No	Alternative Route	Intersection
1	Solomon Mahlangu Drive - M7	N2 Western Terminal
2	Solomon Mahlangu Drive - M7	Bellair Road
3	Solomon Mahlangu Drive - M7	Titren Road
4	Solomon Mahlangu Drive - M7	South Coast Road
5	Solomon Mahlangu Drive - M7	Recreation Road
6	King Cetshwayo Highway - M13	Locksley Drive
7	King Cetshwayo Highway - M13	Cullingworth Road
8	King Cetshwayo Highway - M13	N3 Northern Terminal
9	St Johns Avenue / Umgeni Road - M19	M13 Southern Terminal
10	St Johns Avenue / Umgeni Road - M19	M13 Northern Terminal
11	St Johns Avenue / Umgeni Road - M19	Bamboo Lane
12	St Johns Avenue / Umgeni Road - M19	Shepstone Road
13	St Johns Avenue / Umgeni Road - M19	Supply Road
14	St Johns Avenue / Umgeni Road - M19	Electron Road
15	St Johns Avenue / Umgeni Road - M19	Alpine Road
16	St Johns Avenue / Umgeni Road - M19	Smiso Nkwanyana Road
17	St Johns Avenue / Umgeni Road - M19	Sandile Thusi Road
18	Richmond Road / MR85 / Higginson Highway - M1	Surprise Road
19	Richmond Road / MR85 / Higginson Highway - M1	Marianhill Road
20	Richmond Road / MR85 / Higginson Highway - M1	Abbot Francis Road
21	Richmond Road / MR85 / Higginson Highway - M1	Wiltshire Road
22	Richmond Road / MR85 / Higginson Highway - M1	Old Richmond Road
23	Richmond Road / MR85 / Higginson Highway - M1	Hans Dettmann Highway
24	Richmond Road / MR85 / Higginson Highway - M1	Havenside Drive
25	Richmond Road / MR85 / Higginson Highway - M1	Mobeni Heights Drive
26	St James Avenue / Harry Gwala Road / Rick Turner Road	Buckingham Terrace
27	St James Avenue / Harry Gwala Road / Rick Turner Road	Link Road
28	St James Avenue / Harry Gwala Road / Rick Turner Road	N3 Northern Terminal
29	St James Avenue / Harry Gwala Road / Rick Turner Road	N3 Southern Terminal
30	St James Avenue / Harry Gwala Road / Rick Turner Road	The Pavillion Entrance
31	St James Avenue / Harry Gwala Road / Rick Turner Road	The Boulevard
32	St James Avenue / Harry Gwala Road / Rick Turner Road	Dennis Shepstone Road
33	St James Avenue / Harry Gwala Road / Rick Turner Road	ZK Mathews Road
34	St James Avenue / Harry Gwala Road / Rick Turner Road	Umbilo Road
35	Otto Volek Road / Dinkelman Road / Dumisani	M19 Northern Terminal
36	Otto Volek Road / Dinkelman Road / Dumisani	Falcon Road
37	Otto Volek Road / Dinkelman Road / Dumisani	Posselt Road
38	Otto Volek Road / Dinkelman Road / Dumisani	N2 Western Terminal
39	Otto Volek Road / Dinkelman Road / Dumisani	N2 Eastern Terminal
40	R103	Stonewall Road
41	R103	Greenway Close
42	R103	Bamboo Close
43	R102	Somerset Pl/Leslie Rd
44	R102	Umdoni Rd
45	R102	Ocean View Rd
46	R102	Joyner Rd
47	R102	The Avenue/ Baltex Ave
48	R102	N2 Prospecton Eastern Terminal
49	R102	N2 Prospecton Western Terminal
50	R102	Wilcox Rd
51	R102	Grimsby Rd
52	R102	Kenyon Howden Rd
53	R102	Blamey Rd
54	R102	Trent Rd

No	Alternative Route	Intersection
55	R102	Sarnia Rd
56	R102	Adrian Rd/Arbuckle Rd
57	R102	Sea Cow Lake Rd
58	R102	Acutt Ave/Briar Ave
59	R102	Orange Grove
60	R102	Effingham Rd
61	R102	Blackburn Rd
62	R102	Malacca Rd
63	R102	Moreland Dr
64	R102	Rinaldo Rd
65	R102	Mount Edgecombe Dr /Stonebridge Dr
66	R102	Hillhead Dr/ Markhouse Pl
67	R102	Hillhead Dr/ Phoenix Hwy
68	R102	Phoenix Hwy
69	M12	Isaiah Ntshangase Rd
70	M12	Smiso Nkwanyana Rd
71	M12	Athlone Dr
72	M12	Tyne Pl/Humber Cres
73	M12	Lonsdale Dr/Old Mill Way
74	M12	Umhlanga Rocks Dr/ Kenneth Kaunda Rd
75	M12	Longwoods Dr
76	M12	Sagewood Way
77	M12	Village Way/Falbaire Ave
78	M12	Somerset Dr/Ilala Dr
79	M12	Westridge Rd
80	Moss Kolnick Dr/Wanda Cele Rd/Mfundi Mngadi	Arbour Rd
81	Moss Kolnick Dr/Wanda Cele Rd/Mfundi Mngadi	Citrus Dr
82	Moss Kolnick Dr/Wanda Cele Rd/Mfundi Mngadi	Phila Ndwandwe Rd/ Aster Pl
83	Moss Kolnick Dr/Wanda Cele Rd/Mfundi Mngadi	Jeffels Rd
84	Moss Kolnick Dr/Wanda Cele Rd/Mfundi Mngadi	Stroude Pl
85	St James Avenue / Harry Gwala Road / Rick Turner Road	Bartle Road
86	St James Avenue / Harry Gwala Road / Rick Turner Road	Dennis Shepstone Road
87	St Johns Avenue / Umgeni Road - M19	Isaiah Ntshangase Road
88	R102	Kissoon Road
89	R102 South Coast Road	Jacobs Road
90	R102 Umbilo Road	Hannah Road
91	R102 Umbilo Road	Franks Avenue
92	R102 Magwasa Maphalala Road	Eaton Road
93	R102 Magwasa Maphalala Road	Alan Paton Road
94	R102 Magwasa Maphalala Road	Canbera Road
95	R102 Magwasa Maphalala Road	Canada Road
96	R102 Sydney Road	Canada Road
97	R102 Sydney Road	Spradbrow Road
98	R102 Sydney Road	Franks Avenue
99	R102 Sydney Road	Pioneer Road
100	R102	Sbu Mkhize Rd (Main Rd)
101	R102	Khoto Mkhunya Rd
102	R103	Van Eck Place
103	R103	Washington Road
104	R103	Gladys Manzi Road
105	R103	Portland Road
106	R103	Claveshay Road
107	R103	Poinsettia Road

7.6.2 Repainting of intersections

The existing geometry of the signalised intersections along the alternative routes were reviewed to identify intersections where it could be possible to implement repainting of the intersection to create additional lanes that would increase the capacity of the intersection. The intersections that have been identified as intersections that could be repainted are shown in Table 7-4 below.

Table 7-4: List of intersections – repainted

No	Alternative Route	Intersection
1	St James Avenue / Harry Gwala Road / Rick Turner Road	Link Road
2	St James Avenue / Harry Gwala Road / Rick Turner Road	Bartle Road
3	St Johns Avenue / Umgeni Road - M19	Beviss Road / Shepstone Road
4	St Johns Avenue / Umgeni Road - M19	Isaiah Ntshangase Road
5	St Johns Avenue / Umgeni Road - M19	Sandile Thusi Road
6	R102	Kissoon Road
7	R102 South Coast Road	Jacobs Road
8	R102 Umbilo Road	Hannah Road
9	R102 Umbilo Road	Franks Avenue
10	R102 Magwasa Maphalala Road	Eaton Road
11	R102 Magwasa Maphalala Road	Alan Paton Road
12	R102 Magwasa Maphalala Road	Canbera Road
13	R102 Magwasa Maphalala Road	Canada Road
14	R102 Sydney Road	Canada Road
15	R102 Sydney Road	Spradbrow Road
16	R102 Sydney Road	Franks Avenue
17	R102 Sydney Road	Pioneer Road

It should be noted that repainting can result in sub-standard lane widths. Where road authorities grant temporary deviations from minimum lane widths, the intersection layouts will need to be restored to the existing configurations upon completion of N2 / N3 construction works, or as agreed in the memorandum of understanding guiding work on alternative road network.

The proposed intersections layout changes are shown in Annexure F. It should be noted that these layouts are conceptual in nature and should be reviewed further in a more detailed design exercise in terms of services, practicality and safety aspects.

7.6.3 Intersection control type

Almost none of the intersections on the alternative routes are stop controlled. The majority of the intersections are signalised. Thus the control type is already optimised.

7.6.4 Restriction of movements

The restriction of certain movements at intersection were considered but it was concluded that this measure would improve one intersection and create issues and other intersections in the vicinity. The decision was made not to implement this measure.

7.6.5 Geometric upgrades of intersections

Intersections that could be upgraded within the available road reserve that could increase the through traffic capacity was identified. The intersections are listed in Table 7-5 and the conceptual layouts are shown in Annexure E.

Table 7-5: List of intersections – geometric upgrades

No	Alternative Route	Intersection
1	St James Avenue / Harry Gwala Road / Rick Turner Road	Mahlathi Road
2	St James Avenue / Harry Gwala Road / Rick Turner Road	Dennis Shepstone Road
3	Higginson Highway (M1)	Abbot Francis Road
4	Higginson Highway (M1)	Wiltshire Road
5	Higginson Highway (M1)	Old Richmond Road
6	Higginson Highway (M1)	Hans Dettmann Highway
7	St Johns Avenue (M19)	M13 Northern Terminal
8	St Johns Avenue (M19)	M13 Southern Terminal
9	St Johns Avenue (M19)	Bamboo Lane
10	R103	Van Eck Place
11	R103	Washington Road
12	R103	Gladys Manzi Road
13	R103	Portland Road
14	R103	Claveshay Road
15	R103	Poinsettia Road
16	R102	Sbu Mkhize Rd (Main Rd)
17	R102	Somerset Pl/Leslie Rd
18	R102	Khoto Mkhunya Rd
19	R102	Phoenix Hwy

7.6.6 Fast track projects in progress

If the eThekwini Municipality or KwaZulu-Natal Department of Transport have any capacity upgrade projects in process these projects should be implemented and completed as soon as possible to create additional capacity in the supporting road network. This is being discussed in ongoing liaison meetings jointly with the municipality and KZNDoT.

7.6.7 Congestion monitoring

Traffic congestion during the construction period should be monitored on the N2, N3 and on the supporting road network. This should be done to identify prominent bottlenecks in the system. These bottlenecks can then be investigated to determine further mitigation measures. A tool was developed to monitor travel times with vehicle tracking data as shown in Figure 7-4 and Figure 7-5.

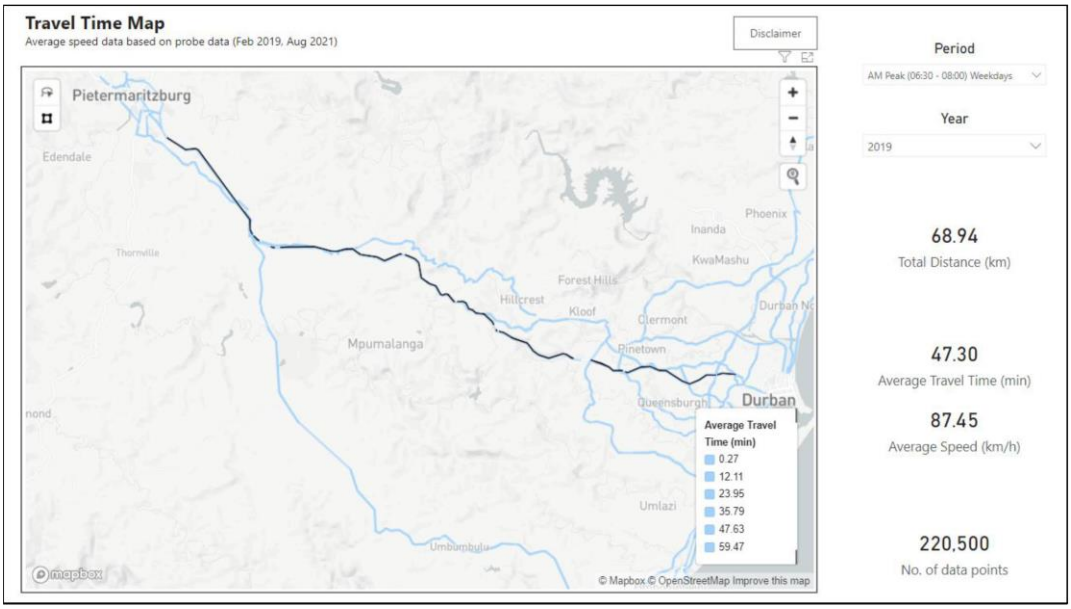


Figure 7-4: Travel times – Pietermaritzburg to Durban – 2019 AM baseline (mainline)

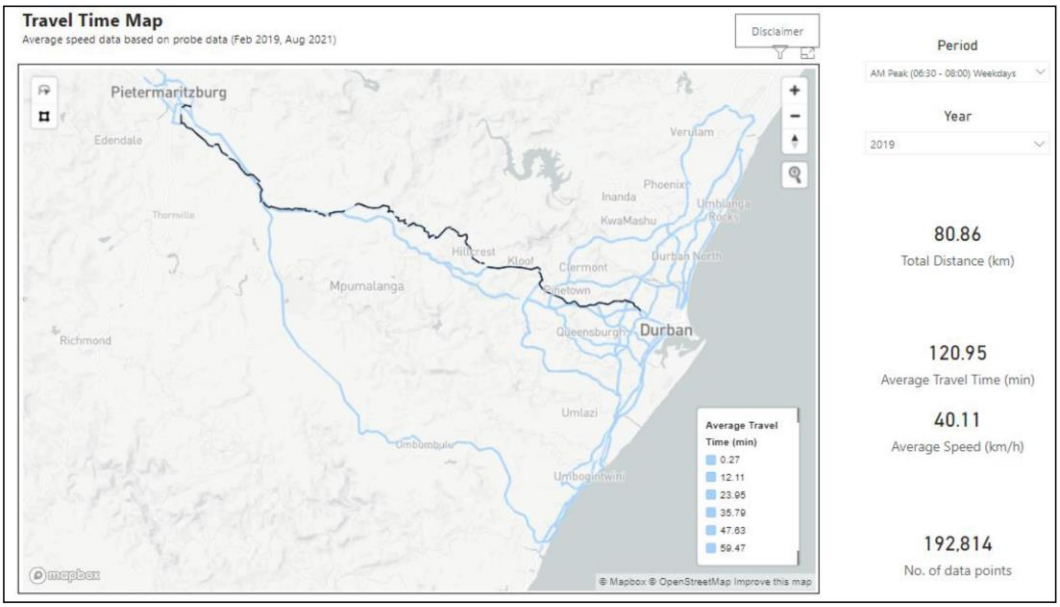


Figure 7-5: Travel times – Pietermaritzburg to Durban – 2019 AM baseline (alternative routes)

7.7 Spare Capacity on alternative routes after mitigation measures

The expected spare capacity on the alternative routes are shown in Table 7-6. The spare capacity ranges from 70 to 900 pcu/h. The figure in brackets indicate the percentage of the freeway lane capacity to be closed that could be accommodated on the alternative route. This has been categorised in terms of:

- 0 % to 10% red;
- 11% to 19% orange; and
- 20 % and more green.

Table 7-6: Spare Capacity for the Through Movement on the Alternative Routes after Mitigation Measures

No	Alternative Route	Eastbound		Westbound	
		AM Peak pcu/h	PM Peak pcu/h	AM Peak pcu/h	PM Peak pcu/h
M1	Richmond Road / MR85 / Higginson Highway	175 (8%)	75 (3%)	125 (6%)	350 (16%)
M5	Otto Volek Road / Dinkelman Road / Dumisani Makhaye Drive	400 (18%)	450 (20%)	450 (20%)	200 (9%)
M7	Solomon Mahlangu Drive	600 (27%)	700 (32%)	900 (41%)	500 (23%)

No	Alternative Route	Eastbound		Westbound	
		AM Peak pcu/h	PM Peak pcu/h	AM Peak pcu/h	PM Peak pcu/h
M13	King Cetshwayo Highway	175 (8%)	300 (14%)	400 (18%)	800 (36%)
M19	St Johns Avenue / Umgeni Road	100 (5%)	300 (14%)	400 (18%)	400 (18%)
HG	St James Avenue / Harry Gwala Road / Rick Turner Road	450 (20%)	500 (23%)	85 (4%)	70 (3%)

Note: the values in brackets represents the percentage of the freeway lane to be closed that could be gained on the alternative route in terms of capacity.

7.8 Pinetown CBD Transport Study

The following alternative routes traverses the Pinetown CBD area:

- M7
- M13
- M19.

The spare capacity analyses identified intersections in the Pinetown CBD area that have limited spare capacity and reduces the amount of traffic that could use the alternative routes. These intersections are:

- Saint Johns (M7) / M13 Southern Terminal;
- Saint Johns Avenue (M7) / M13 Northern Terminal;
- Bamboo Lane and Saint Johns Avenue (M19); and
- Beviss Road and Saint Johns Avenue (M19).

A proposal was made to upgrade the Saint Johns (M7) / M13 interchange to a diverging diamond interchange to improve the capacity of the intersection. The proposed diverging diamond interchange is shown in Figure 7-6.

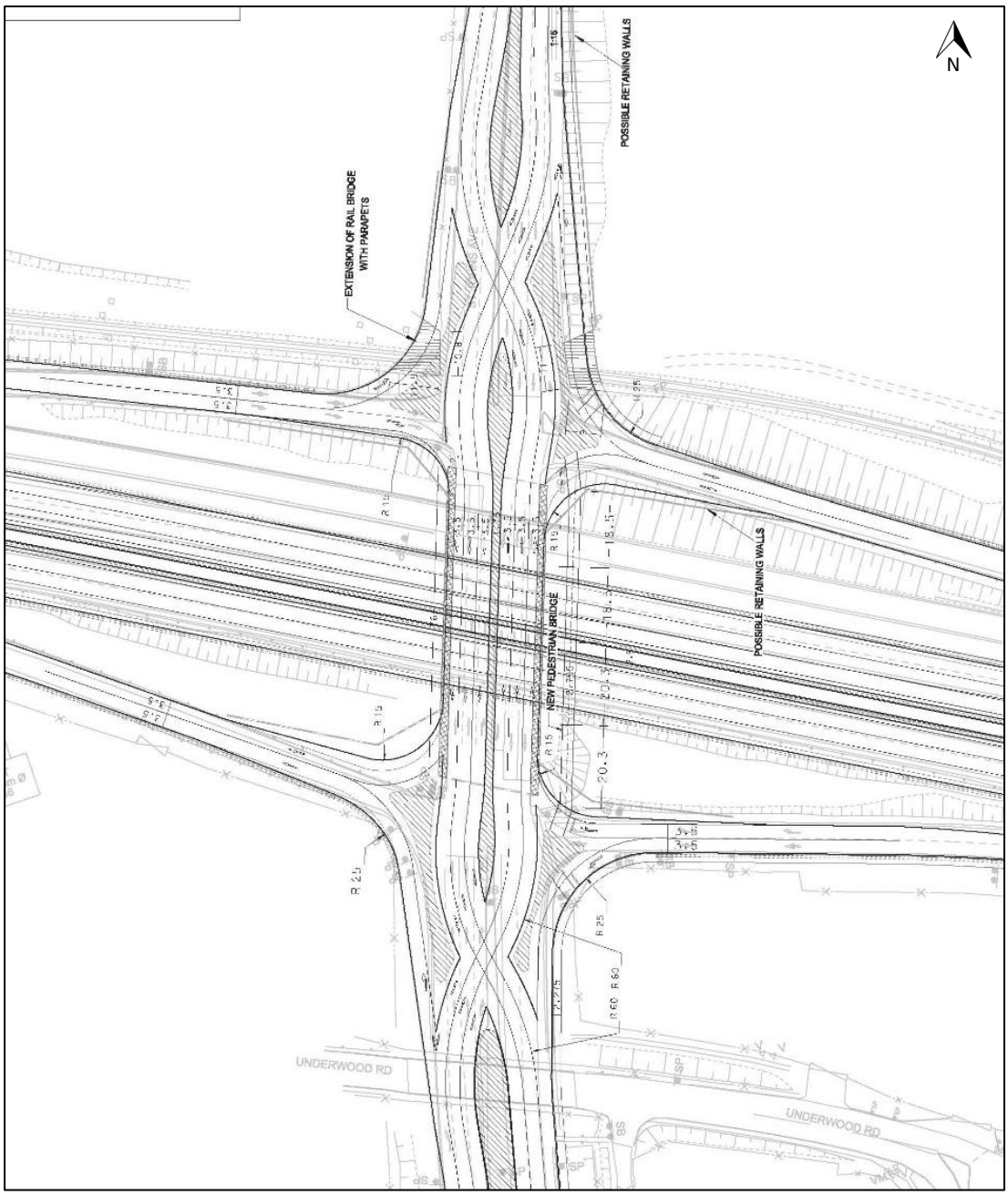


Figure 7-6: Proposed diverging diamond interchange at Saint Johns (M7) / M13 interchange

Short term upgrades are being considered to improve the traffic flow at the terminal intersections while the diverging diamond is being investigated further. Short term upgrades or repainting options are also being considered for the intersections if Bamboo Lane / Saint Johns Avenue (M19) and Beviss Road / Saint Johns Avenue (M19).

7.9 Pietermaritzburg CBD Transport Study

There are several routes through the Pietermaritzburg CBD area that the motorist could consider to avoid the work zones on the N3 adjacent to Pietermaritzburg. These routes are shown in Figure 7-7.

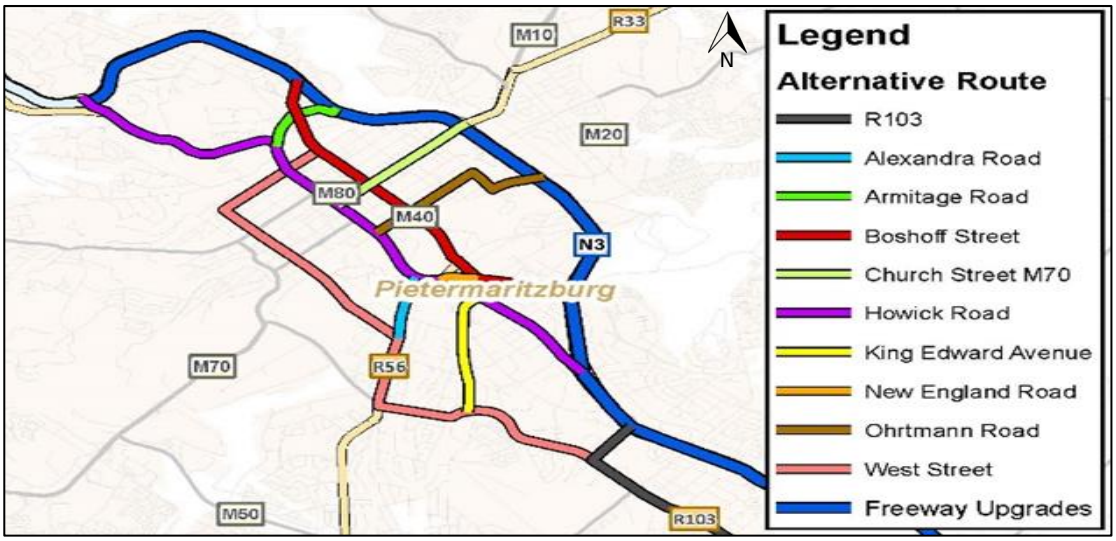


Figure 7-7: Alternative routes through Pietermaritzburg CBD area

It should be noted that all the alternative routes are traversing the CBD area of Pietermaritzburg, these roads are low speed roads and are relatively congested. It is expected that limited amount of traffic would attempt these alternative routes through the CBD as the travel time would probably be longer than the travel time in the N3. In addition, there are concerns on the continuous operation of the traffic signals through the CBD.

8. ACCESSIBILITY ASSESSMENTS

8.1 Port of Durban Accessibility Assessment

Currently heavy vehicles are using the N3 and the M7 as their main routes to the Port of Durban. Traffic accommodation on the N3 will reduce the capacity on the N3 which will result in longer travel times. However, the N3 will remain open for most of the duration of the construction. There will only be a few rare occasions were the N3 would be closed for a short period as a result of the construction.

The planned traffic accommodation will reduce the capacity of the ramps that link the N3 with the M7. The ramps will remain open for the majority of the duration of the construction. There will only be a few rare occasions were the ramps would be closed for a short period as a result of the construction.

It is advised that heavy vehicle traffic remain on their current routes throughout the duration of the construction. Accessibility to the port is a priority and will be ensured as far as possible.

8.2 King Shaka International Airport Accessibility Assessment

Currently motorist traveling to King Shaka International airport can travel to the airport via the N3 and N2 freeways. During the construction period motorist could divert to the alternative routes to avoid some of the work zones on the N2 and N3. It is expected that if motorist diverts to the alternative routes the MR577 and/or M19 would be used.

Traffic accommodation on the N3 and/or N2 will reduce the capacity on the mainline which will result in longer travel times. However, the N3 and/or N2 will remain open for most of the duration of the construction. There will only be a few rare occasions were the N3 and/or N2 would be closed for a short period as a result of the construction.

The King Shaka International airport will remain accessible via the N3 and/or N2 and via the alternative routes MR577 and/or M19 for the duration of the construction period.

8.3 Pietermaritzburg Airport

Currently motorist traveling to Pietermaritzburg airport can travel to the airport from the N3 via the following interchanges in Pietermaritzburg:

- Marked Road Interchange;
- Alan Paton Avenue Interchange; and
- New England Road Interchange.

During the construction period these interchanges will remain operational. The capacity reduction on the N3 and the interchanges will result in a longer travel time. However, the airport will remain accessible to the public.

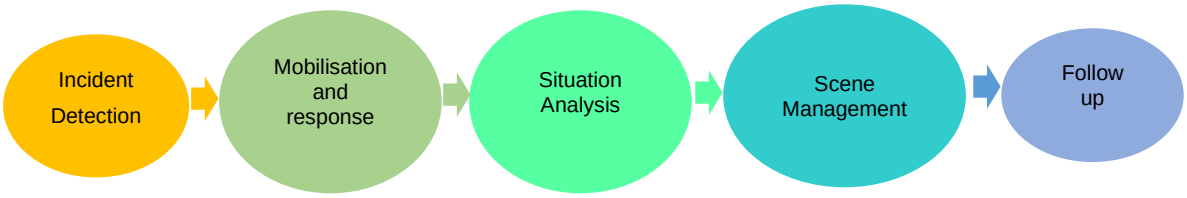
9. ROAD INCIDENT MANAGEMENT SYSTEM (RIMS)

The aim of a Road Incident Management System is to achieve an efficient use of resources, in a coordinated and pre-panned manner and to ensure proper management of scene, through an operations system that is acceptable to all parties involved.

Road incidents can be classified into the following categories:

- A major accident
- A minor accident
- A shoulder / lane blockage
- A construction zone
- A random event.

Incident management chain of events are summarised in graphics below



Road incident management system typically comprise of the following components:

- The Centralised Communication Centre (CCC)
- The Emergency Services (EMS)
- The Specialist Services (e.g emergency recovery vehicles)
- Non specialist but essential services
- The affected parties.

Success of RIMS depend on centralised communication, as represented below:

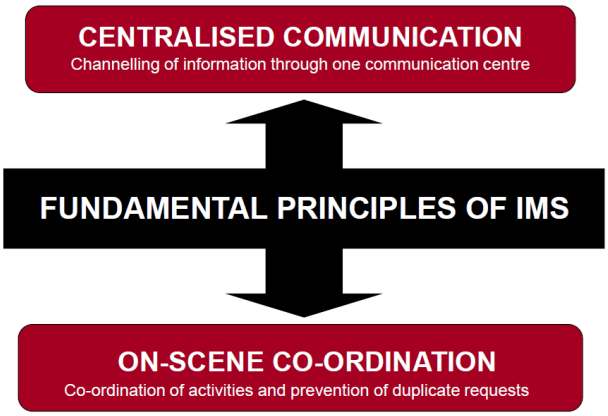


Figure 9-1: RIMS centralised communication approach

In case of the N2 / N3 project, communication will be centralised through the Traffic Monitoring Centre (TMC), which comprises of Freeway Management system (FMS), Road Traffic Inspectorate (RTI), South African Police Service (SAPS), Metro Police, and other teams, who can easily communicate with their members for quick response and recovery following incident detection. (similar to joint operational centre (JOC) for special events).

The construction team is to agree on lines of contact and engagement protocols at project inception and should maintain regular contact with the TMC and other parties to the RIMS.

There may also be a need to coordinate operational plans with other control centre (e.g. N3TC), in case of major incidents or events, which may need traffic to be managed over a long distance or major re-routing of traffic is required.

Scene management shall follow the standard operating procedures (SOPs), as will be communicated by the RIMS team at project inception, including regular updates as weaknesses are identified with existing protocols.

Construction teams and key personnel, such as Traffic Safety Officers (TSOs), should be properly inducted on the RIMS SOPs and protocols, which apply along the N2 and N3 corridors, within the project extents.

For RIMS to function optimally, the following pillars must function well.

- **PILLAR 1** – Structures, programme development and protocols implementation
- **PILLAR 2** – Resource allocation and management
- **PILLAR 3** - Improved communication and deployment of communication technology
- **PILLAR 4** – Training of services, capacity building and public outreach
- **PILLAR 5** – Monitoring, reporting and overall evaluation.

All Provincial RIMS Projects are on implementation phase and National and Regional information is collated at the National Technical Committee (NTC). Centralised data collation is being uploaded on ITIS on the on-going basis.

10. FREEWAY MANAGEMENT SYSTEM

Interactions with Freeway Management System (FMS) team will be guided by the Standard Operating Procedures (SOPs). An overview of the FMS and key aspects of the SOPs are detailed below and detailed SOPs are included in Annexure J.

10.1 FMS overview

The Freeway Management System (FMS) utilises intelligent transport technologies to monitor and optimise the N2 and N3 freeways in KZN. It provides an informative platform for the public which is effective in reducing delays and improving the safety of persons travelling on the freeways.

At present, with the road upgrades taking place on the N2/N3, the emphasis on travel delays and road safety is of greater concern, hence the FMS can aid in SANRAL's vision of safety as well reduce the traffic volumes by providing the traveller with live relevant information for alternate routes where necessary. The network surveillance on the N3 is covered from EB Cloete (Spaghetti) interchange to Cedara, whilst on the N2 coverage is from Lovu River (south coast) to Salt Rock (north coast).

The FMS utilizes a few sources of information to monitor the N2 and N3 incidents effectively. The various sources of information are received at the Traffic Management Centre (TMC) where it is processed by the Traffic Management Operators (TMO's) who monitor specific sections of the freeway and communicate to the public via the prescribed output channels. Figure 1 provides a high-level overview of the inflow, processing and outflow of information by the FMS

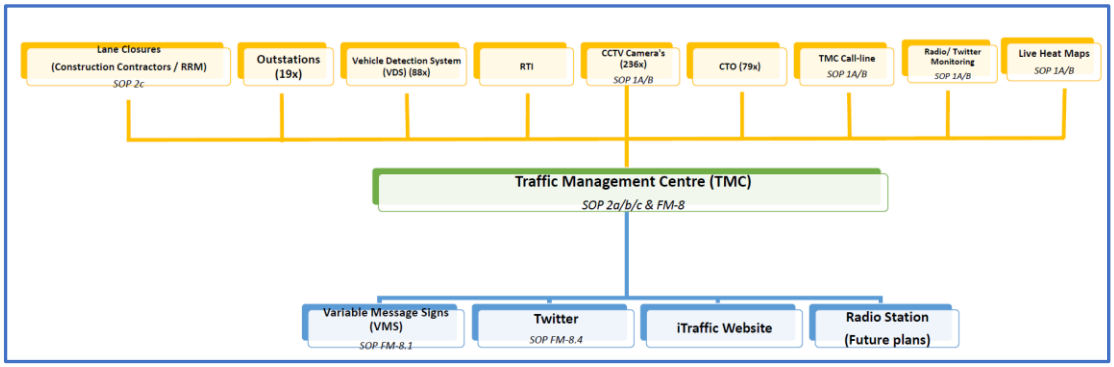


Figure 10: Overview of FMS inflow, processing and outflow of information

10.2 ITS sources of information

The main sources of information available to the TMO's that assist in providing the public with relative vital travel information and aid in alleviating traffic congestion in the construction zones are:

- CCTV cameras
- Vehicle Detection System (VDS)
- TMC call-line
- Live Heat Maps
- Road Traffic Inspectorate (RTI)
- Lane closures

10.2.1 CCTV cameras

The TMOs at the TMC are assigned specific sections of the network to be monitored on the CCTV cameras at the beginning of a shift. Incident detection is done by manual surveillance of the CCTV cameras. Constant monitoring by experienced TMO's is essential in detecting incidents within the construction zones and alerting the relevant authorities. Detection, verification and notification of incidents should take a TMO within 330 seconds to log (Refer to Annex A: SOP-4 Network Surveillance and Incident Detection).

10.2.2 Vehicle Detection System (VDS)

There are VDS sensors along the N2 and N3. The existing VDS's are used to determine classified traffic volumes and vehicle speeds along the road segments. The average speeds are used in the travel time algorithm to calculate the travel times for travellers. The data can be used to determine the hotspots of traffic congestion over time and possibly assist to divert traffic to alternate routes.

10.2.3 TMC call-line

It is possible for the TMC to receive external calls. The operator determines whether the caller is a trusted source or untrusted source and thereafter follow the prescribed procedure of logging a confirmed or unconfirmed event. (Refer to Annex A: SOP-4 Network Surveillance and Incident Detection). Notifications could come via other services located in the TMC. These services get informed either through their field staff or telephone calls from the public.

The number is however not generally published, as the TMC has limited call taking capacity.

10.2.4 Live Heat Maps

The TMO's are encouraged to use live heat maps in conjunction with camera surveillance to assist in incident detection. Live temperature maps are monitored on either the TMC ATMS, Google maps and Waze. Live heat maps can provide a quick indication of traffic congestion should it not be visible via the nearest camera. When the incident is confirmed the necessary action can be taken by the TMO to alert the public. (Refer to Annex A: SOP-4 Network Surveillance and Incident Detection).

10.2.5 Road Traffic Inspectorate (RTI)

RTI is situated within the KZN TMC and can, at times, assist the TMC in providing updates from an incident scene which can enable the TMO to provide the public with actions to take to avoid traffic congestions. RTI also assists the TMC in providing and confirming live incidents that may not be visible via other surveillance methods.

10.2.6 Comprehensive Traffic Observations (CTO)

Although not monitored extensively, the data can be used to compare against VDS data to verify vehicle types, speed and traffic volumes.

10.2.7 Monitoring of local radio/twitter

The radio and Twitter are used as a detection source. The radio in the TMC stays on all day and TMO's listen to traffic reports. Known incidents can be verified via these reports whilst new incidents, if heard on radio, must be verified and confirmed via other sources before logging.

All TMO's open Twitter and monitor the @i_trafficKZN account on their desktops. It was noted that in KZN, incidents are often detected via Twitter.

(Refer to Annex A: SOP-4 Network Surveillance and Incident Detection).

10.2.8 Lane closures

At the TMC, lane closures by the various contractors are classified as planned events. Authorization for lane closures must be obtained from SANRAL Project Managers and they will request contractors to submit notices for approved lane closures to TMC. All contract managers and specifically the road safety officers on contracts must be notified of the presence of the TMC and their responsibility to notify the TMC of any construction related activities which may impact traffic flows.

Contractors are to report any road works to the TMC at least 48 hours prior to the event. This allows the TMC to prepare travel times and alternate route posts via the output channels and gives the public adequate time to plan accordingly. Large events are encouraged to be reported at least 7 days in advance and approved by relevant local authority with an Event Plan.

10.3 Information processing software

The systems software includes the following packages among others:

- Advanced Transportation Management System (ATMS) software
- Advanced Traveller Information System (ATIS) software
- Computer Aided Dispatch (CAD) software.

10.3.1 Advanced Transportation Management System (ATMS) software

The ATMS provides real-time data to the traveller information system and serve as a common data repository for traffic data, incident data, reporting and other data for multiple applications. The ATMS is the primary application that will be used by TMC TMOs (Traffic Management Operators).

10.3.2 Advanced Traveller Information System (ATIS) software

This software is utilised to distribute traffic information from the ATMS, camera systems and external sources to the public using various means. A component of the National ATIS is a gateway server, which also handles the exchange of data to and from external systems.

10.3.3 Computer Aided Dispatch (CAD) software

CAD is used to enable the TMOs and/or dedicated dispatchers to manage incident response fleets to support incident management. The CAD system will integrate with the ATMS for the seamless exchange of “calls for service” from TMOs entering incident information, and the likewise update of incident information in the ATMS with response vehicle status.

10.4 Outflow of information (notification mediums to public)

To minimise delays to road users in the event of an incident, TMO’s will utilize the received information, process it and disseminate the information via the following channels:

- Variable Message Signs (VMS)
- Twitter
- iTraffic website (KZN)
- Radio stations.

10.4.1 Variable Message Signs (VMS)

In the event of an incident, the VMS selected for the event’s automatic response plan messaging will temporarily display the event message until the incident is closed and the event message is removed from the VMS message queue, upon which the travel time message will resume displaying on a VMS sign. (Refer to Annex B: SOP-6 Incident Notification).

10.4.2 Twitter

Twitter messages will be automatically generated by ATMS in response to the details entered when an incident occurs. The contents of the message should be checked by the Shift Supervisor, or in the absence of him/her, by a senior TMC Operator. (Refer to Annex B: SOP-6 Incident Notification)

10.4.3 iTraffic website (KZN)

This notification is to notify the public of events that will have a major impact on their trip. The website also provides a snapshot of the current road conditions.

10.4.4 Radio stations

It is envisaged that improved and active liaison with the commercial local radio stations is vital in reaching a larger audience for dissemination of information regarding incidents and delays especially during the construction period. Further discussions are required.

10.5 Procedure for managing construction related incidents

The procedure for managing construction related incidents on the freeway involve the following:

- Notification and scheduling
- Communication during incidents and events
- Information to the public
- Use of temporary VMS
- Monthly coordination meetings.

10.5.1 Notification and scheduling

The contractor's representative and the FMS reginal coordinator (RC) must coordinate all scheduled road works. All construction related information to the public, must be approved by the RC before posted from the TMC. Where applicable, the RC will obtain approval from SANRAL.

Crashes, stationary vehicles and other incidents must be reported directly to the TMC and the normal Incident SOP will be followed.

10.5.2 Communication during incidents and events

The Contractors must identify persons and contact numbers, of management personnel to which incidents can be escalated to in case the extent of severity of the incident warrants it. During any incident, communication lines must be open to ensure fast clearance of the incident.

10.5.3 Information to the public

The overall communications strategy and information related to real time traffic info must be coordinated by all parties, to ensure it complies with the necessary standards and policies, and to ensure the public gets the same message.

10.5.4 Use of temporary VMS

The Contractor's TSO must coordinate all messages with the RC before posting, to ensure there is no conflict in information to the public. The location and placement of the temporary VMSs must be coordinated and communicated to the RC.

10.5.5 Monthly coordination meetings

A monthly coordination meeting must be held to plan for the next month, to review information distributed, comments from the public and to review incidents and the management thereof.

10.6 Annexures

Detailed FMS protocols are contained in the following SOPs, as included in Appendix J:

- SOP-4 Network Surveillance and Incident Detection (Attached)
- SOP-6 Incident Notification (Attached)

11. COMMUNICATION AND MARKETING STRATEGY

The main aim of the communication and marketing strategy is to communicate project related information at the right time, platform and using the most suitable medium for the targeted audience.

Messages will be communicated via both traditional and emerging digital channels and will be aimed at achieving the following:

- Providing information on the upgrade projects, including:
  - Reasons for the project
  - Long term benefits
  - Short term sacrifices expected from the general public
- Travel advisory that will be aimed at encouraging behaviour change during the construction period, which can lead to reduced travel demand, e.g:
  - Working from home where possible
  - Switching to local or nearby destinations
  - Switching to public transport or car share
  - Switching to virtual meetings / conferences; etc
- Managing re-routing to alternative routes, through provision of timely travel time estimates through a number of channels e.g.
  - Variable Message Signs
  - Radio
  - Television (TV)
  - Print media
  - Social media
  - Mico-blog
  - Web alerts, etc.

Travel advisory will be colour coded and coordinated with Freeway Management Systems (FMS) heatmaps and incident alerts. Examples of travel advisories that can be used are provided in figures overleaf.

It should be noted that the aim of traffic advisories will be to inform and provide sufficient information to road users to make informed decision rather than being prescriptive.

Prescriptive messaging may be required during black alerts, where all the lanes are closed and it will be necessary to state which categories of traffic should re-route or diverted to stagging sites.

Based on lessons learnt from the Gauteng Improvement Project, it is expected that the Comms strategy will be a live document and will be updated from time to time to reflect project specific dynamics.

11.1 Summary of the communications and marketing plan

11.1.1 Key communication objectives

The main objective of the communication strategy is traffic management, where key stakeholders will be notified and engages, around upgrade activities that may affect traffic flow.

The desired result will be a reduction in baseline traffic flows by 25-30%, which could be achieved through the following:

- Deliver overarching and project specific Communications / Public Service Announcements (PSA's) / Traffic Announcements (TA's).
- Communicating planned road closures, lane closures, diversions, reduction of traffic lanes, etc
- Warn motorists of disruptions, congestion and delays
- Addressing long term, medium term and short-term inconveniences, including work on alternative roads
- Provide solutions to encourage change of travel behaviour/travel patterns
- Encourage use alternative routes, work from home and car-pooling

The communication strategy also aim for a more understanding and empathetic road uses, through messaging that:

- Encourage safe driving
- Encourage positive respectful behaviour
- Encourage positive participation (e.g. together we make a difference)
- Thank motorists for their patience and understanding.

There is a very large and diverse primary target audience – all who need notification, warning and other forms of engagements.

11.1.2 Key stakeholder groups

The key stakeholder groups include the following:

- Locals - The People of KwaZulu-Natal
- The Transport industry / Hauliers
- All other stakeholder groups.

#1: Locals - The People of KwaZulu-Natal

The greatest day to day impact will be on the people in the Durban – Pietermaritzburg Corridor, those living and commuting in the area (N3 / N2 Road users). But the ripple effect will be felt across the province and up into Gauteng, possibly affecting millions of people.

The demographics of the local population are described below

- 87% Black / 7% Indian / 4% White / 1% Coloured
- 78% IsiZulu / 13% English
- Over 5 million people living in the Dbn – Pmb Corridor
- 8.1 million travel by taxi
- 2.7 million travel by car
- 1.5 million licensed drivers
- Those who will be closest to the noise and dust pollution
- Those who may feel they are being personally compromised by the project.

As illustrated above, there is a very large and diverse primary target audience – who all need ‘notification/warning‘

#2: The Transport industry / Hauliers

The Durban-Free State-Gauteng corridor is the busiest road freight corridor in South Africa and forms the backbone of South Africa’s freight and logistics transportation network, as well as that of the wider Southern Africa Development community (SADC) regions.

- Durban is SA’s busiest port with over 80% of goods moving along this corridor by road
- The N3 carries circa 40 000 vehicles daily around Pietermaritzburg, increasing to over 100 000 towards Durban, with 25% being heavy vehicles on some sections
- Any blockage or closure on the N3 is tantamount to a national crisis (as illustrated in the July 2021 unrests)

- Transport and logistics companies / fleet operators / taxi operators and associations / bus operators and related associations / industry associations / car hire companies.
- A diverse audience – from the c-suite to fleet managers to entrepreneurs to drivers all need ‘notification/warning’.

Ongoing engagements are taking place with the Road Freight Association (RFA) and will have a representative on the marketing and comms team

#3: All other stakeholder groups

Other stakeholder may include:

- SANRAL board of directors and SANRAL staff
- Project contractors and staff
- Political: Ministers of Transport, Economic Development and Tourism. KZN MEC for Transport
- Municipal: eThekwini Metro through to the uMgungundlovu municipal heads
- Business: local and district business chambers. Private corporates to SMMEs
- Pressure groups: community pressure groups, trade unions, consumer associations
- Opinion formers: economists, political analysists, business analysts
- Environmentalists: pressure groups and SANRAL detractors
- Media: local, community and national broadcast media
- Hauliers from other African countries
- Business people and holiday makers from other South African provinces.

Many different stakeholders – requires targeted and tiered messaging. Ultimately all road users have the same need: get ‘there’ safely, timeously, efficiently…

11.2 Advertising plan

1‘Inform’ and ‘Involve’ Messaging

The rational educational messaging points:
Cluster #1: The big picture through to the nitty gritty for those inconvenienced.
Details of upgrades, partial closures, full closures.
Timing of the upgrades, partial closures, full closures.

Real-time information - expected delay times and alternative options.

Apologies - we are doing this for your community and to take the nation to new heights.

Thank you - for your understanding / patience / respecting workers - look where we are now.

End goal - bolster the capabilities of the economic lifeline from Durban to Gauteng.

For the upgrade as a whole and for each specific project as per campaign architecture.

Informative and engaging adverts / PSA's / TA's with all the necessary fact and details.

A. Challenges

11.3 **Multiple different projects happening simultaneously**

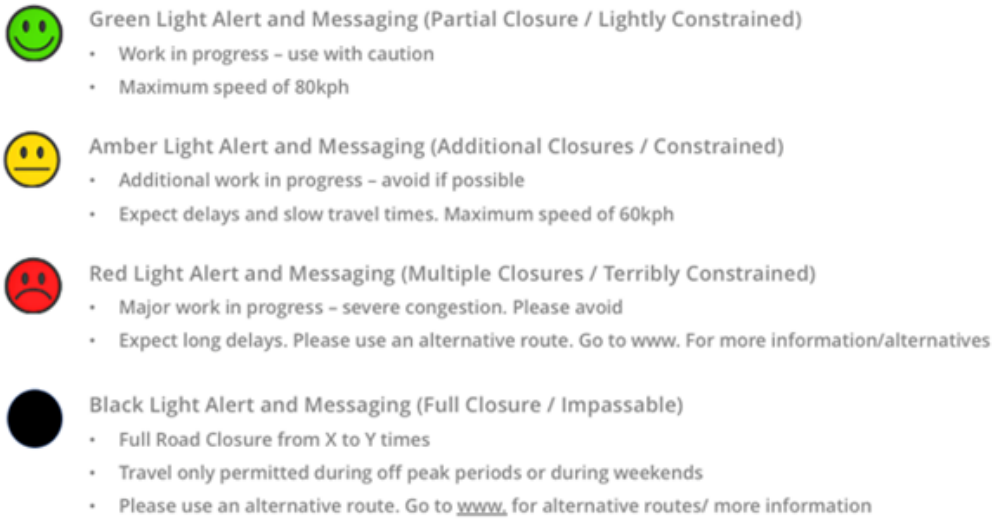
12 x N3 DBN-PMB Corridor Projects and 8 x N2 Projects
Each with varied and everchanging / fluid work status'
Each with varied and everchanging levels of customer disruption
Long term basic closure (e.g. 1 lane closed) - best scenario regards congestion
Medium term increased closures (e.g. 2 lanes closed) - increased congestion
Short term full road closures - terribly constrained to totally closed
Disruption levels will vary
Disruption will last for many years – frustrations will be immense

M**ultiple different projects happening simultaneously**
From a communications management perspective this requires:
A 'plug and play' templated approach in order to deliver the many messages over time
Templated creative solutions to ensure timeous communication
Creative solution for one Project will be shared, reviewed and refined
Then will serve as template to be rolled out to all active and the future projects
A central depositary for Roads Agency to inform/update Agencies as to Project status
Recommendation is for either a Google Docs site or a similar Teams Platform
From a messaging perspective this requires:
A multi-tiered approach – tiered by projects and by work status
Providing a real-time sense of understanding as the scale of the problem
A simplified layered messaging approach – Problem. Solution. KIS for Customers
An interactive approach – encourage involvement / drive engagement
For the upgrade as a whole and for each specific project

Unpacking each of the above elements.

B. Proposed Solutions

Provide a real-time sense of understanding as the scale of the problem(s)
For each specific project depending on work status
For Example: Cato Ridge to Dardenelles (But will be utilised for each project)



Real-time notifications need to be digitally led

- Need to leverage SANRAL properties – particularly i-Traffic for alternative routes
- Opportunity to create a simple info application ala Eskom SePush (i-Traffic/SANRAL App)

Opportunities to feed information to 'regional partners/stakeholders' – media to business groups

Simplified layered messaging approach – Problem. Solution

C. Problem

E.g. Partial Closure from Cato Ridge to Dardenelles

- One lane will be closed in both directions from X to Y months
- Expect Delays - Speed limit reduced to a maximum of 80 km/h

D. Solutions

- Avoid the congestion and disruption
- Please consider changing what you do
- Think about using alternative routes, working from home or car-pooling
- Go to Section 7 for alternative routes/more information
- Apologies, we do understand your frustrations
- Please bear with us; this is the drive for a better KZN

An interactive approach – encourage involvement / drive engagement

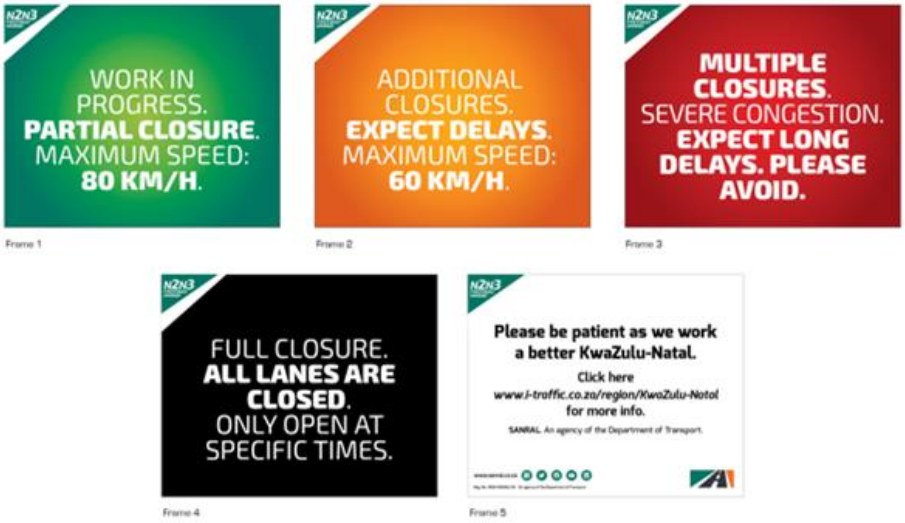
Problem and Solution as above – and encourage participation

- Follow us on i-Traffic / NRA / Social Media Pages
- Report incidents here: (To Be Confirmed)

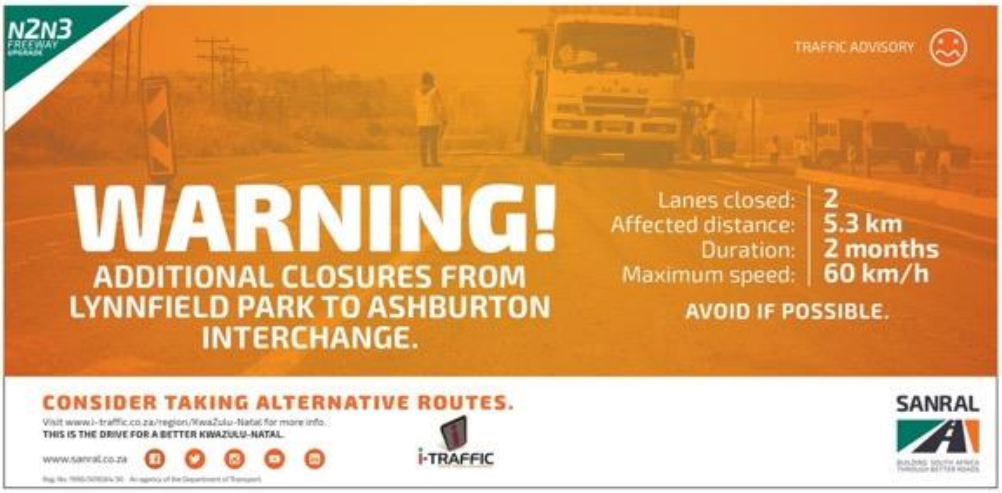
E. Creative Solutions

ADVISORY PRINT

ADVISORY SOCIAL MEDIA CAROUSEL



DIGITAL BANNER



SOCIAL MEDIA CAROUSEL

Frame 1

Frame 2

Frame 3

Frame 4

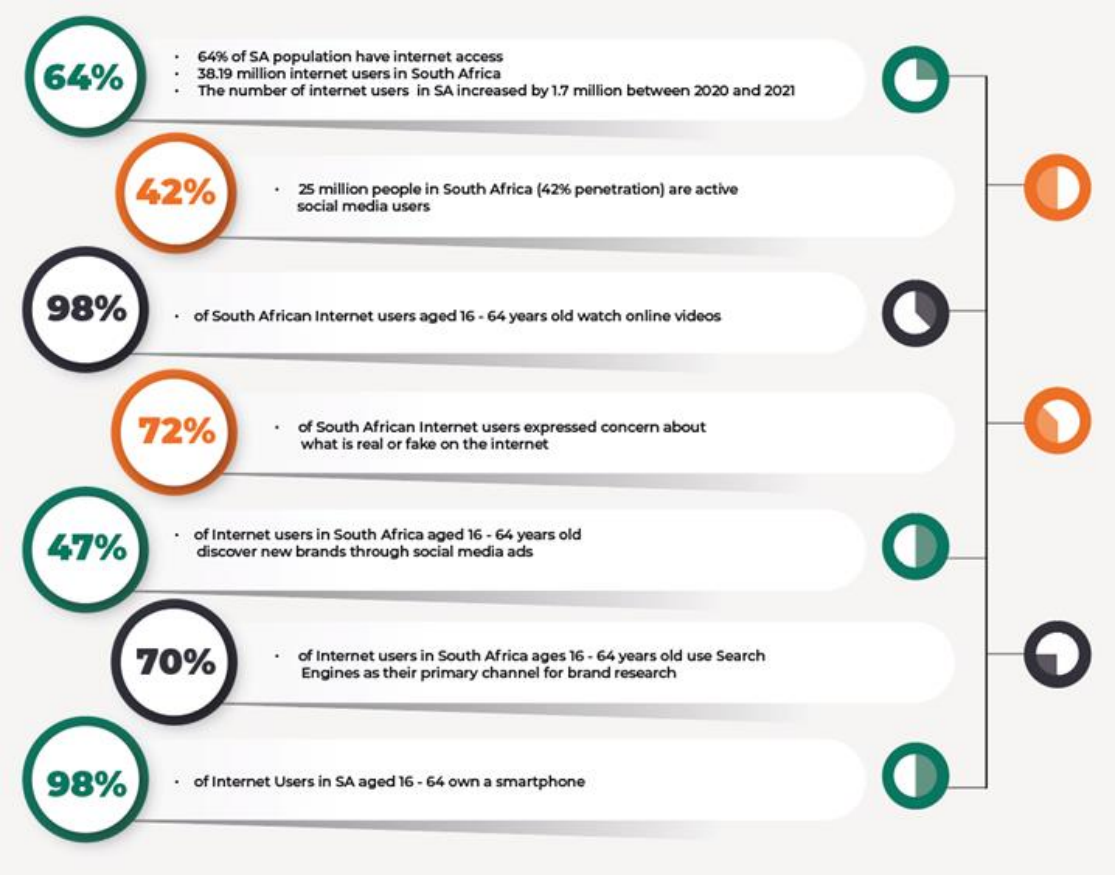
11.4 Media Buying Implementation Plan

The Traffic Management Plan (TMP) will be supported using a combination of the following channels which provide for regional targeting with minimal wastage. The plans will have the flexibility to deliver multiple (rational and educational) messages over time and include the following:

- Mainstream regional radio, e.g. Ukhozi, Gagasi, East Coast
- Community radio, e.g. Highway Radio, Izwi Lomzansi, Umgungundlovu FM
- Community TV – 1KZN TV
- Print will be used on an ad hoc basis when there is a need to deliver detailed information and/or visual images such as maps. These will be placed in regional and targeted community newspapers.
- Digital - regional and community geo-targeting will be used to target key stakeholders and affected communities. Display banners and mobile text messages will drive exposure across the region via WiFi ads at taxi ranks, spaza shops etc. Social media posts on Facebook, Instagram and Twitter will be deployed to communicate real time updates across SANRAL's platforms.

11.5 Digital Plan

Digital Snapshot



Social Media Snapshot

	Audience size in SA	Compared to Total Pop	Female	Male
	23,000,000	51,40%	52,20%	47,80%
	24,000,000	51,40%	49,30%	50,70%
	8,300,000	21%	46,80%	53,20%
	5,400,000	21,10%	53,70%	46,30%
	2,300,000	5,10%	43,10%	56,90%

The aim for digital communications is get our message, at the right time to the right audience. Information needs to be relayed in real time and updated in real time for maximum effect. For digital communication to be successful we need to be

- Prepared
- Agile
- Quick

Communication Channels

- Website
- WhatsApp
- Email
- Social Media (Facebook, Instagram, LinkedIn & Twitter)
- Paid Media (Google Ads, Social Media Ads)
- Geo-Targeted Media banners
- Video

11.6 Below the Line Plan

Ongoing series of activations including an exhibition of the upgrade main benefits at Shopping centres

- Leafleting
- Truck Stops
- Taxi Ranks
- Toll Plazas
- Rest & Service Stops.

Targeted Light Motor Vehicle events - Provide the overall backdrop to the project in model and map format. The aim is to inform, inspire and educate, in order to build some tolerance for the travel inconvenience. To communicate the alternative routes and the mitigation of the congestion.

Familiarize road users with the green, yellow, red and black quick reference creative Distribute leaflets split by area – point users to other media.

Exhibitions at primarily major shopping centres in the affected areas:

- Far North as Ballito? (Region to advise)
- Far South as Shepstone/Uvongo
- Far West as Pietermaritzburg
- Central
- Secondary exhibitions can be set up at R&S Stops

HMW – Truck Stop and toll Plaza:

- Leafleting at Truck Stops and Weigh bridges
- Leafleting at Toll Plazas
- Demonstrate the colour alert guide

- Focus on scheduling of trips to avoid peak times at choke points
- Primarily on N3 from Harrismith East to the coast

11.7 Public Relations and Publications

A. Key Messages

N2N3 upgrades – how its contributing to the economy

- Upgrades are made with safety on top of mind
- N2 and N3 has been designed with the needs of all road users in mind – including pedestrians, non-motorised road users and local communities and businesses.
- SANRAL continues to conduct all necessary consultations with communities and is following due process in developing the project, ensuring that it works together with community members.
- Sanral has made an effort to ensure that youth, women, the disabled and other designated groups benefit from its projects
- Approximate number of jobs that will be created for the duration of the project
- Sanral wants to share business and job opportunities with the communities where it operates.

B. Messengers

- Eastern Region Manager
- Programme Managers
- Project Managers for the project packages
- RIMS.

C. **Tactics to enhance Communications**

- Traffic Advisory
- Planned road closures, diversions, reduction of traffic lanes
- Incidences on N2N3 Freeway (RIMS to FTI and vice versa)
- Incidents on alternative routes (KZDOT or Municipalities)
- Planned Roadworks/Maintenance on alternative routes (KZDOT, Municipalities)
- Encourage safe driving.

Communication Channels

TARGETED MEDIA

Ilanga
Isolezwe
Community Print and Radio
Mercury
The Witness
Daily News
INL
Ukhozi FM
ECR
Lotus FM
Izwi Lomzansi
SAFM
Radio 2000
Radio 702
Gagasi 995
Vuma FM
Highway Radio
Radio Al-Ansar

INTERVIEW SCHEDULE

MEDIA	SPOKESPERSON	SECONDARY
Ukhozi FM	Vusi Mona	Dumi Nkabinde
702	Skhumbuzo Macozoma	Dumi Nkabinde
Radio 2000	Dumi Nkabinde	Tsepo Matekane
SA FM	Dumi Nkabinde	Mabuyi Mhlanga
Gagasi FM	Tsepo Matekane	PM
Vuma FM	Mabuyi Mhlanga	PM
ECR	Nomsa Modise	PM
Izwi Lomzansi	Dumi Nkabinde	Nomsa Modise
Radio Al-Ansar	Ravi Ronny	PM
Hindvani Radio	Ravi Ronny	PM
Highway Radio	Dumi Nkabinde	Mabuyi Mhlanga
Umgungundlovu Community Radio	Nomsa Modise	PM
Lotus FM	Ravi Ronny	Tsepo Matekane

11.8 Stakeholder Relations and Social Facilitation

Targeted Stakeholders

- MEC of Transport
- MEC of Economic Development and Tourism
- KwaZulu Natal Dept of Transport
- Transnet
- Trade and Investment KZN
- uMgungundlovu Development Agency
- Umgungundlovu District Municipality
- eThekwini Metropolitan Municipality
- Msunduzi Local Municipality
- Richmond Local Municipality
- uMshwathi Local Municipality
- Mkhambathini Municipality
- uMngeni Local Municipality
- Durban Chambers of Business
- Local Transport Authorities
- Pietermaritzburg Chamber of Business
- uMgungundlovu Chamber of Business
- KwaNalu
- The Road Freight Association
- eThekwini Transport Authority
- Taxi Associations
- Southern African Bus Asoiciation
- KZN Emergency Services

The following sessions are recommended with the targeted Stakeholders:

- Information Sharing Session
- Round Tables
- Virtual Engagements

The detailed Communication plan can be access on EDMS Doc No #17447079

12. CONCLUSIONS AND RECOMMENDATIONS

12.1 Conclusions

The following conclusions can be made:

- The upgrade of the N2 will focus on 55 kms of the route, from Lovu River in the South to Umdloti in the North.
- The N3 upgrade will focus on 80 kms of the route, from Durban to Pietermaritzburg.
- The purpose of the TMP is to document the analyses conducted and the proposed traffic management plan for the N2 and N3 freeway upgrading, including the impacted alternative routes.
- Data (signal timings, intersection counts and link counts) was obtained from eThekwini Municipality, KwaZulu-Natal Department of Transport and from SANRAL.
- The proposed traffic accommodation as documented in the latest construction and tender documents was reviewed as part of the analysis.
- Queue lengths were estimated for the different traffic scenarios on the N2 and N3 on the approaches to EB Cloete Interchange, the queue ranges for different traffic scenarios are:
  - 10% traffic reduction - queue ranges from 1.6 km to 22 km;
  - 20% traffic reduction - queue ranges from 0.8 km to 10 km; and
  - 30% traffic reduction - queue ranges from 0.5 km to 3 km.
- The analyses showed that the EB Cloete interchange could, under certain extreme circumstances cause major queues on both N2 and N3. This could be mitigated to some extent by introduction of a proactive and successful communications plan influencing driver choice and behaviour. The intention would be to increase traffic deviation from the N2 and N3 to alternative routes or to promote non-driving reliant activities (e.g. working from home, virtual meetings, car sharing etc.) under these certain extreme circumstances.
- The reduced mobility (reduced sign posted speeds) and LOS drop susceptibility from minor incidents (e.g. a breakdown) on the N2 and N3 freeways will likely result in natural traffic diversion to the alternative routes.
- The following major alternative routes were identified within Ethekwini Municipality: R102, M1, M4, MR577, M7, M13, M19 and Harry Gwala Road.
- The following major alternatives routes were identified within Pietermaritzburg (although investigation and analysis is in its infancy and is ongoing): R103, CB

Downes Road, Market Road, Alan Paton Avenue, Gladys Manzi Road, Hesketh Drive, New England Road / R56.

- Mitigation measures would be required on the alternative routes such as intersection upgrades, re-painting of intersections for additional lanes, re-timing of signals, general maintenance such as improvement of road marking, road studs, road signs, guardrails, pothole repair, street lighting, drainage improvement and pavement maintenance/improvement.
- There are a number of other very important traffic management elements, such as the use of variable message signs, signage, incident management, routine maintenance elements, public transport accommodation, freight aspects, law enforcement, port and airport accessibility which are currently being assessed and utilised.

12.2 Recommendations

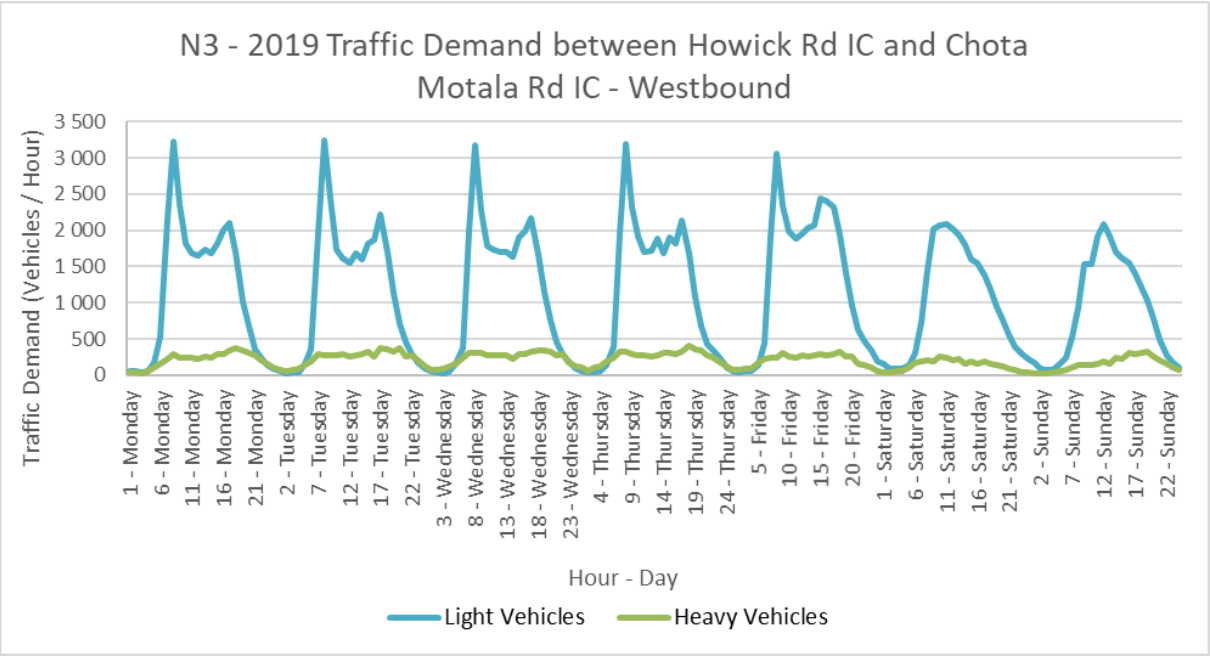
The following recommendations are made:

- The traffic signal timing plans for the signals on the identified alternative routes should be reviewed and optimised. It should also be considered to reduce the green time on the other phases to increase the green time for the through movement on the alternative route to increase capacity.
- The proposed intersections that were identified for upgrading and/or re-painting should be considered for implementation.
- The communication plan will be critical to achieve the required change in driver choice and behaviour to minimise queueing on both the N2/N3 freeways and alternative road network. The communication plan is to proactively manage driver expectations, driver choice and behaviour.
- Traffic congestion during the construction period should be monitored on the N2, N3 and the supporting road network to determine locations for optimisation and further mitigation measures.
- The proposed detailed traffic accommodation within the EB Cloete should be reviewed by a Traffic Engineer before implementation to ensure maximum capacity is provided at the merge points while still ensuring optimum traffic safety. The exact lane configuration within these merge areas (Figure 5-5) will be critical to ensure the optimisation of available roadway capacity.
- Short-term and very short-term lane closures that be might be more extensive than the assumed one lane closure in this report need to be evaluated by a Traffic Engineer on a case by case basis.

Annexure A – Figures

Annexure B – Capacity vs Traffic Demand on Mainline N2 and N3

N3 between Howick Road Interchange and Chota Motala Road Interchange


N3 - 2019 Traffic Demand between Howick Rd IC and Chota Motala Rd IC - Westbound
Traffic Demand (Vehicles / Hour)
3 500
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1 - Monday
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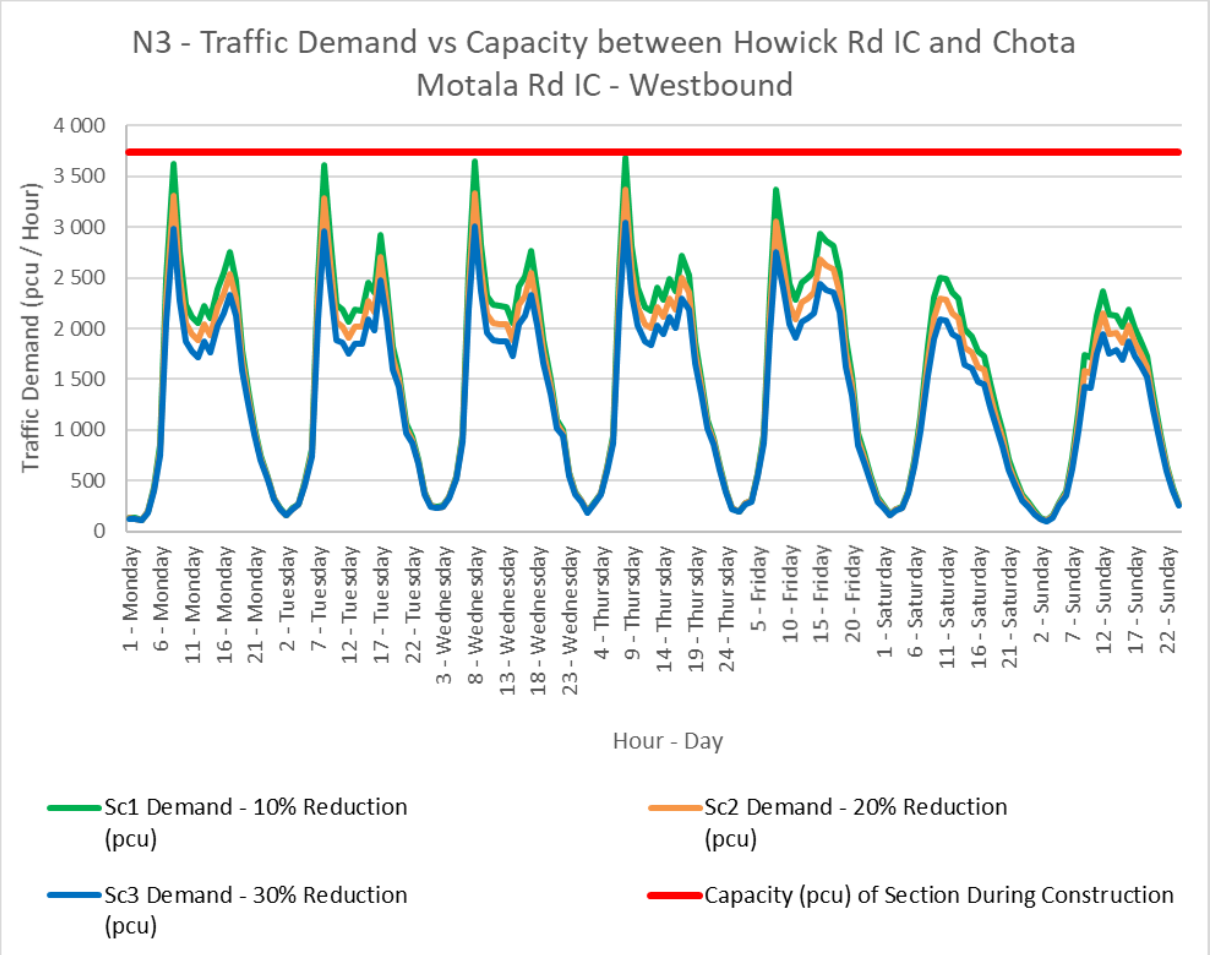
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between Howick Rd IC and Chota Motala Rd IC - Westbound
Traffic Demand (pcu / Hour)
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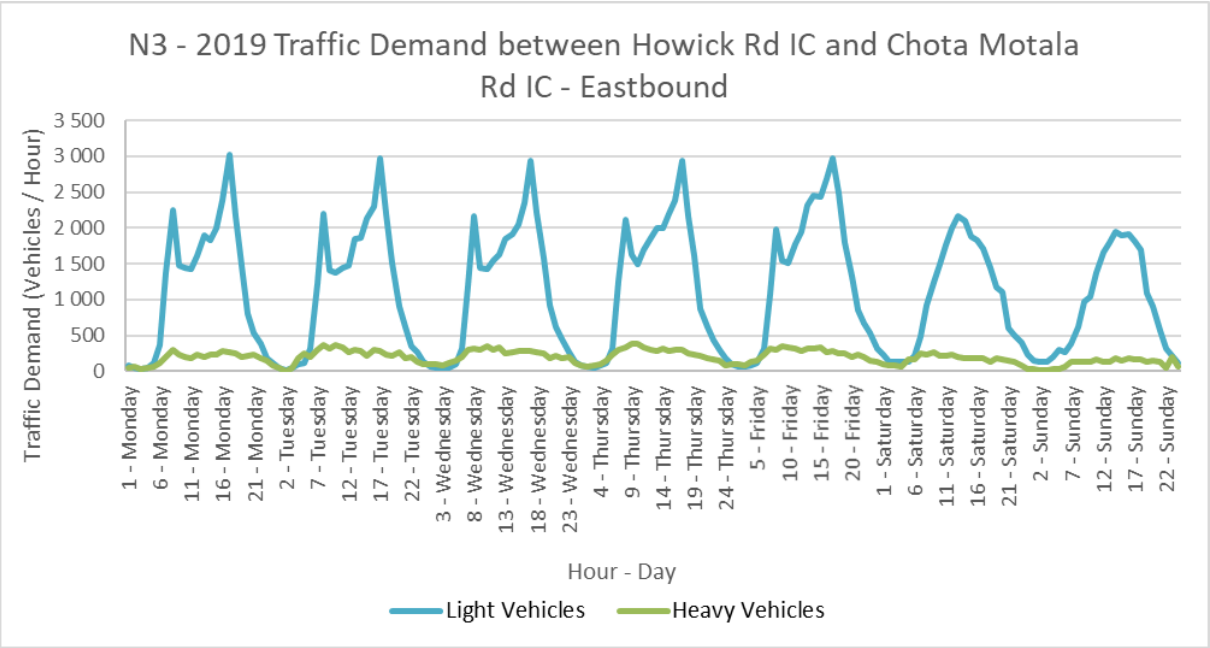
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N3 - 2019 Traffic Demand between Howick Rd IC and Chota Motala Rd IC - Eastbound
Traffic Demand (Vehicles / Hour)
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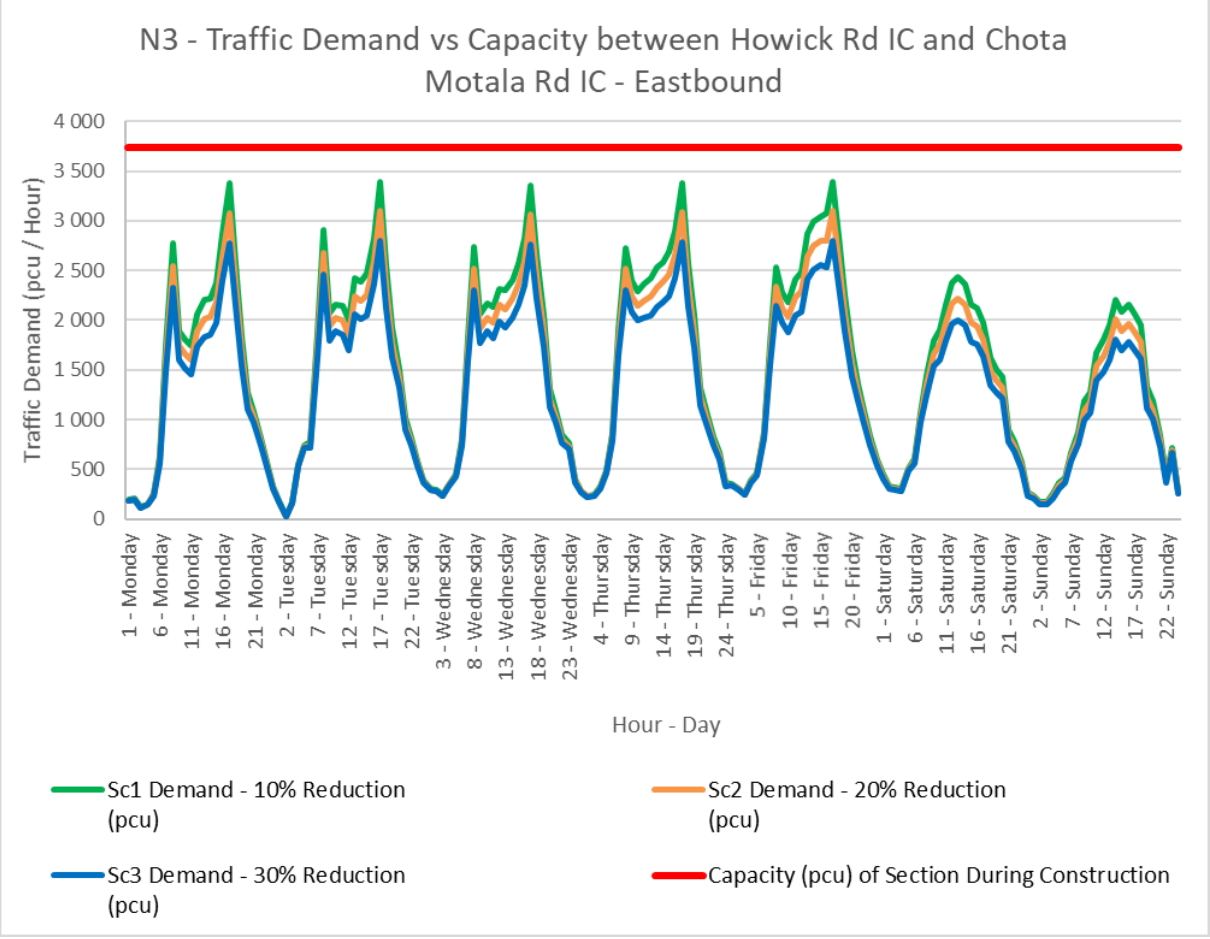
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles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Traffic Demand (pcu / Hour)
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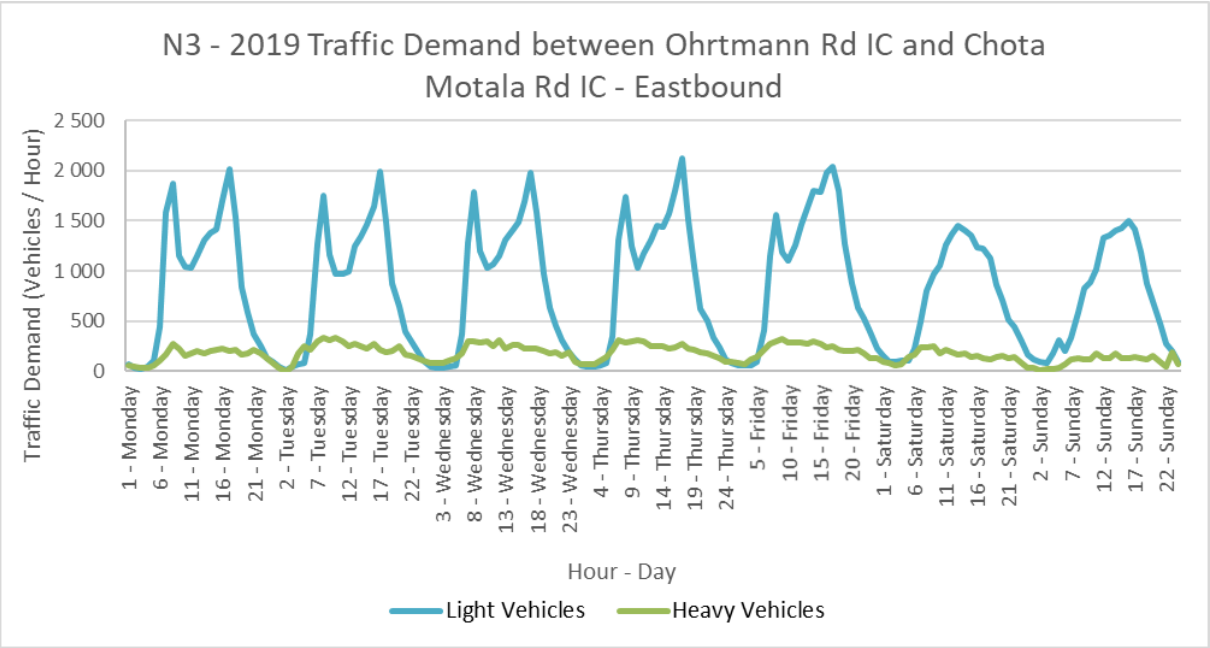
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N3 between Ohrtmann Road Interchange and Chota Motala Road Interchange


N3 - 2019 Traffic Demand between Ohrtmann Rd IC and Chota Motala Rd IC - Eastbound
Traffic Demand (Vehicles / Hour)
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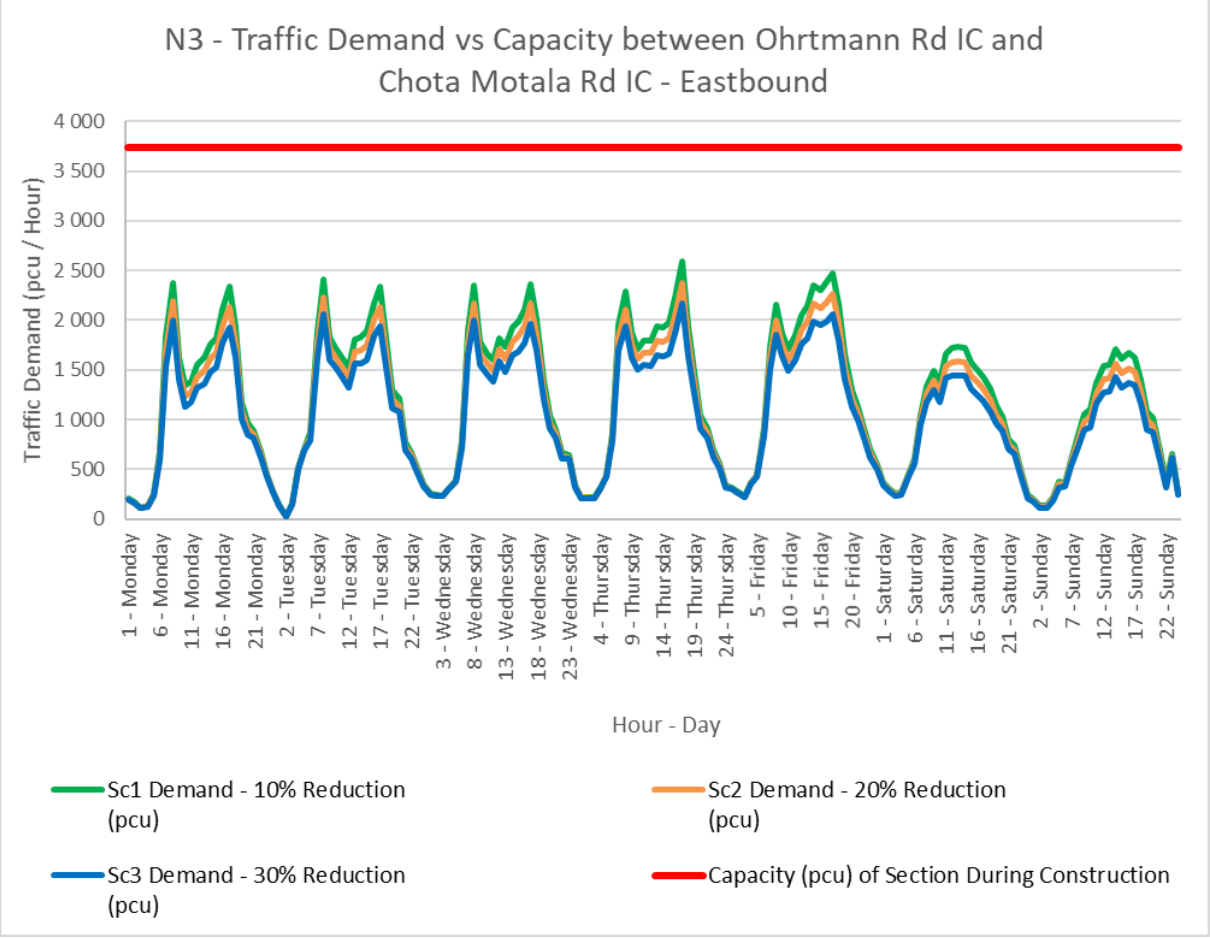
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between Ohrtmann Rd IC and Chota Motala Rd IC - Eastbound
Traffic Demand (pcu / Hour)
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Hour - Day
Sc1 Demand - 10% Reduction (pcu)
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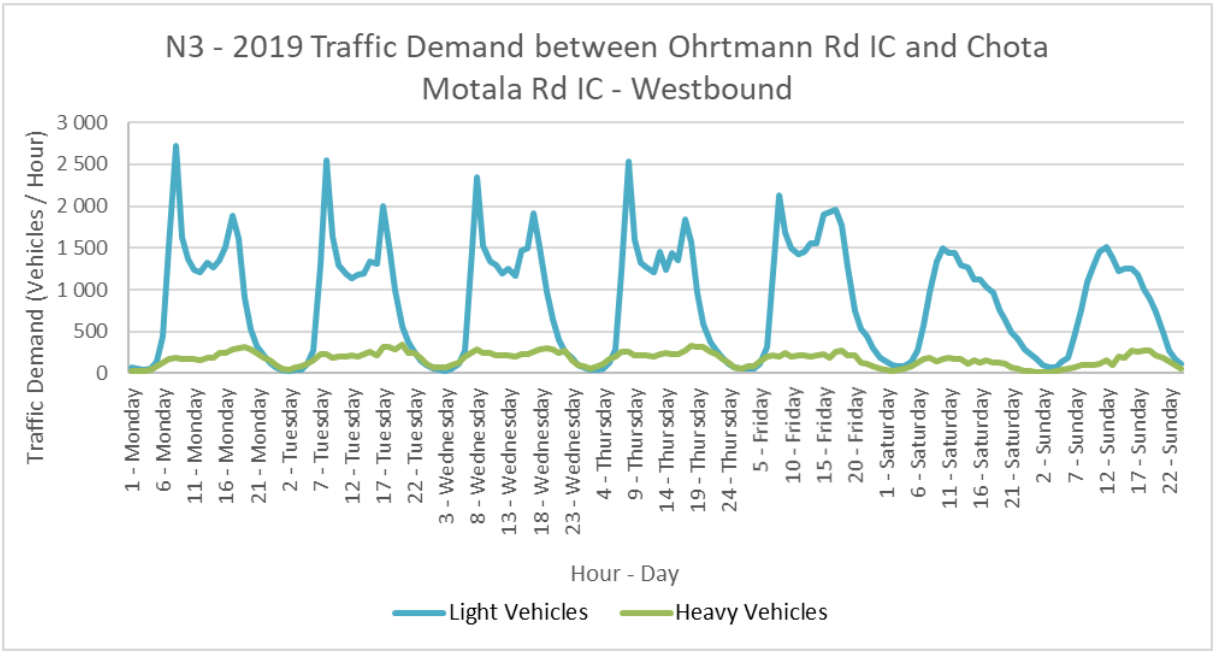
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N3 - 2019 Traffic Demand between Ohrtmann Rd IC and Chota Motala Rd IC - Westbound
Traffic Demand (Vehicles / Hour)
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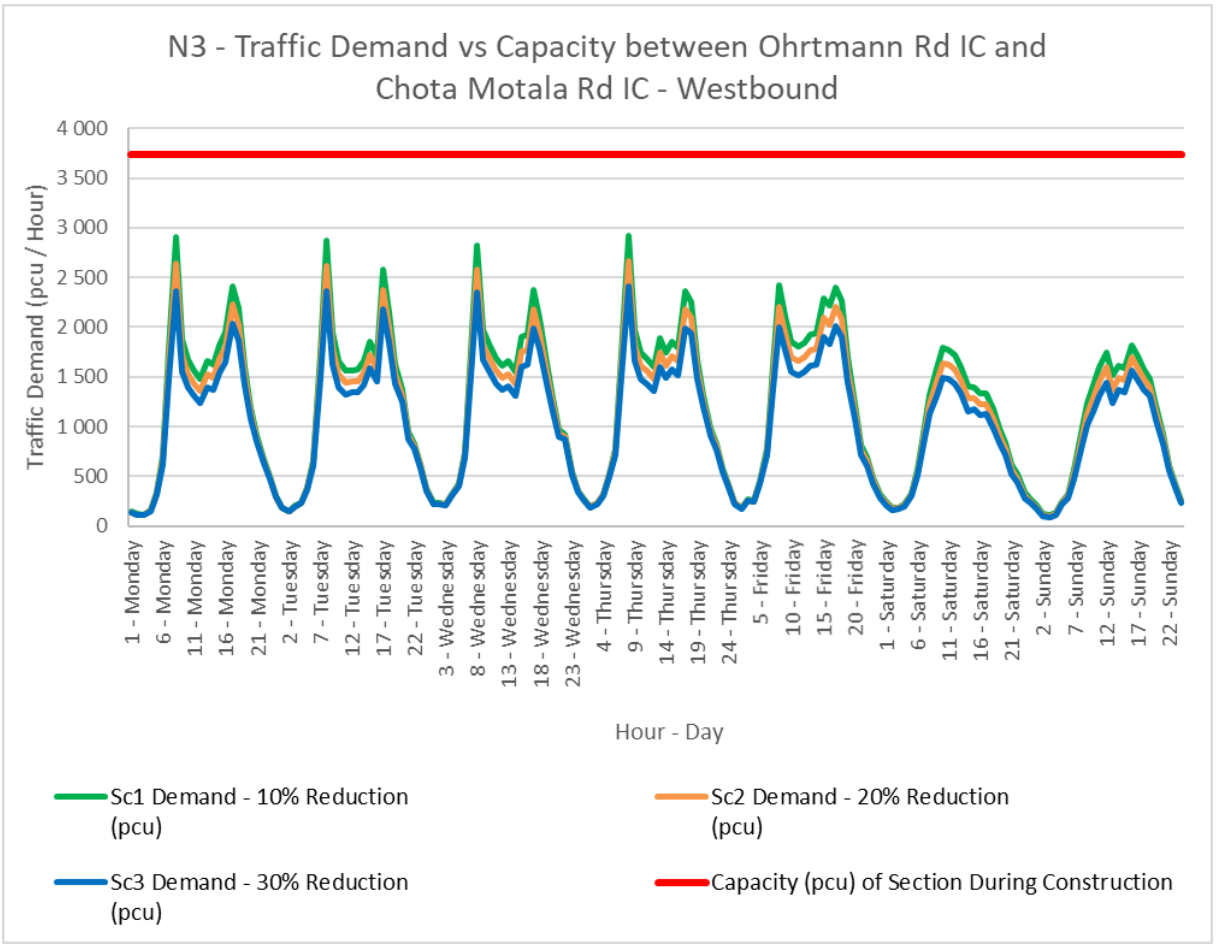
N3 - Traffic Demand vs Capacity between Ohrtmann Rd IC and Chota Motala Rd IC - Westbound
Traffic Demand (pcu / Hour)
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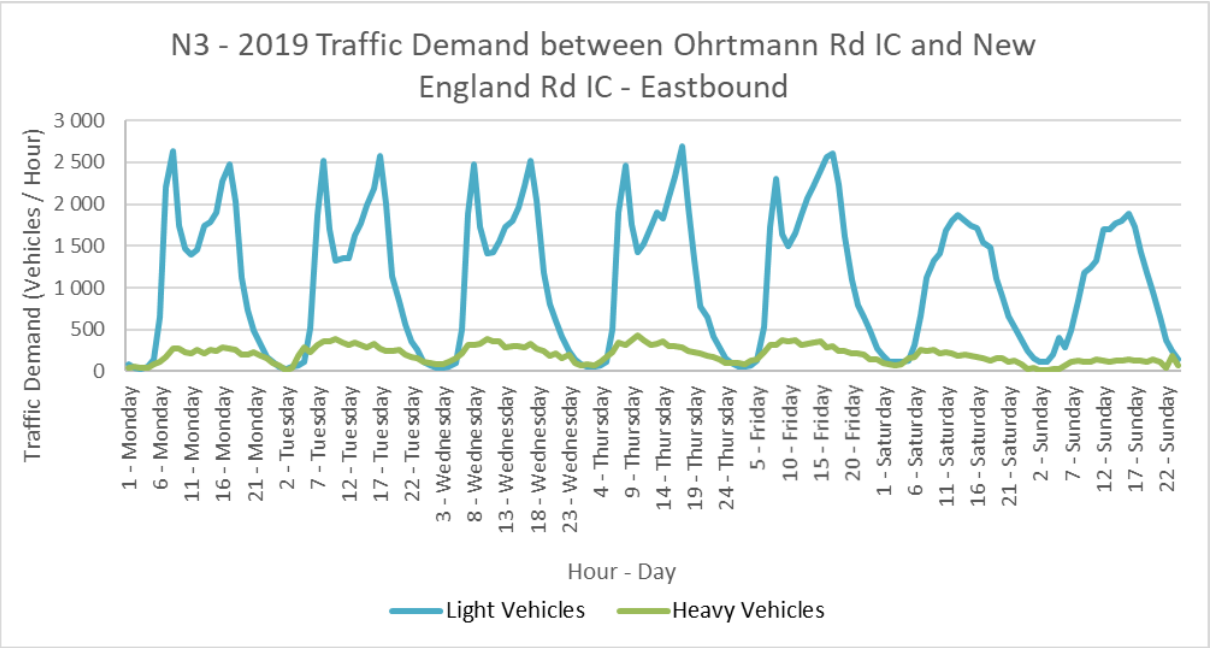
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N3 between Ohrtmann Road Interchange and New England Road Interchange


N3 - 2019 Traffic Demand between Ohrtmann Rd IC and New England Rd IC - Eastbound
Traffic Demand (Vehicles / Hour)
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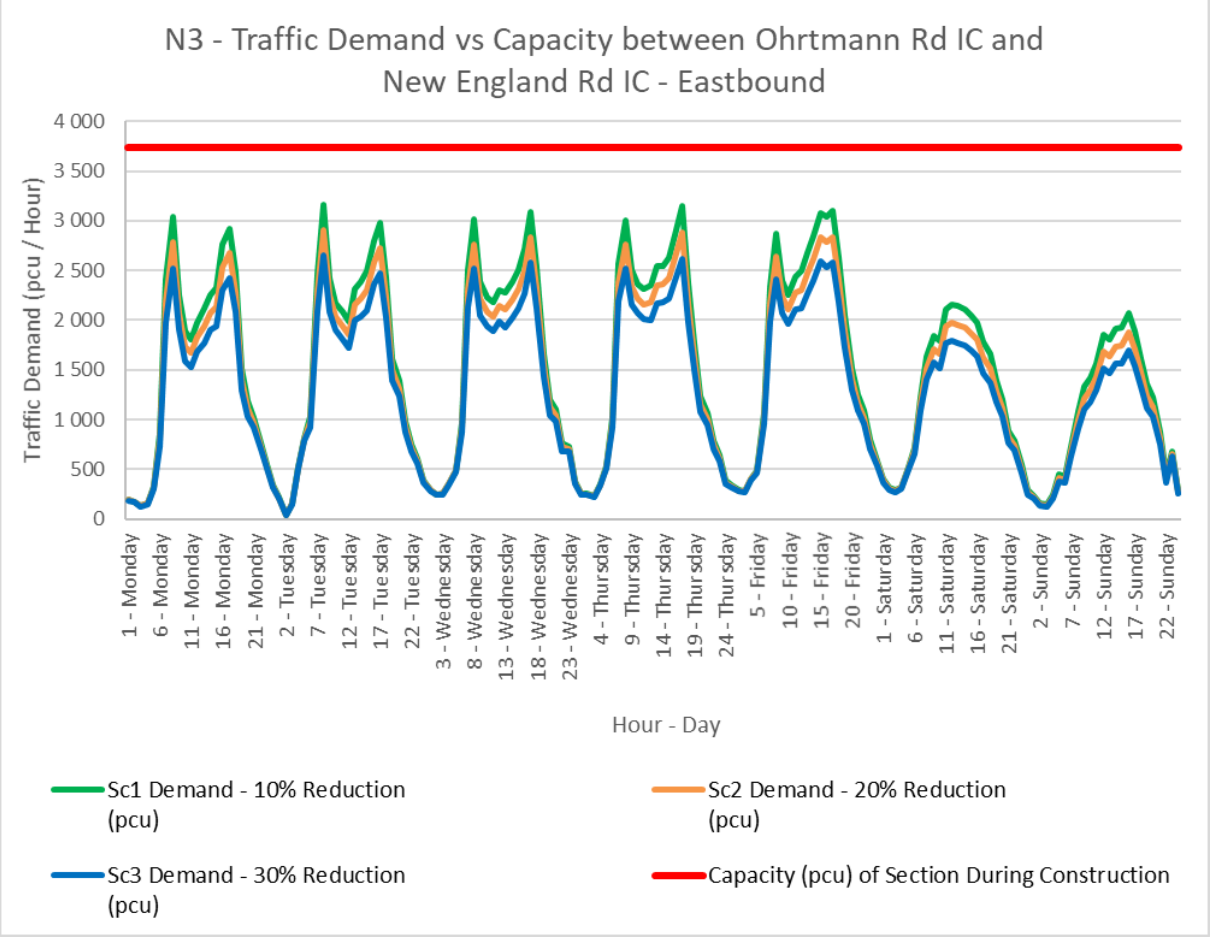
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between Ohrtmann Rd IC and New England Rd IC - Eastbound
Traffic Demand (pcu / Hour)
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Hour - Day
Sc1 Demand - 10% Reduction (pcu)
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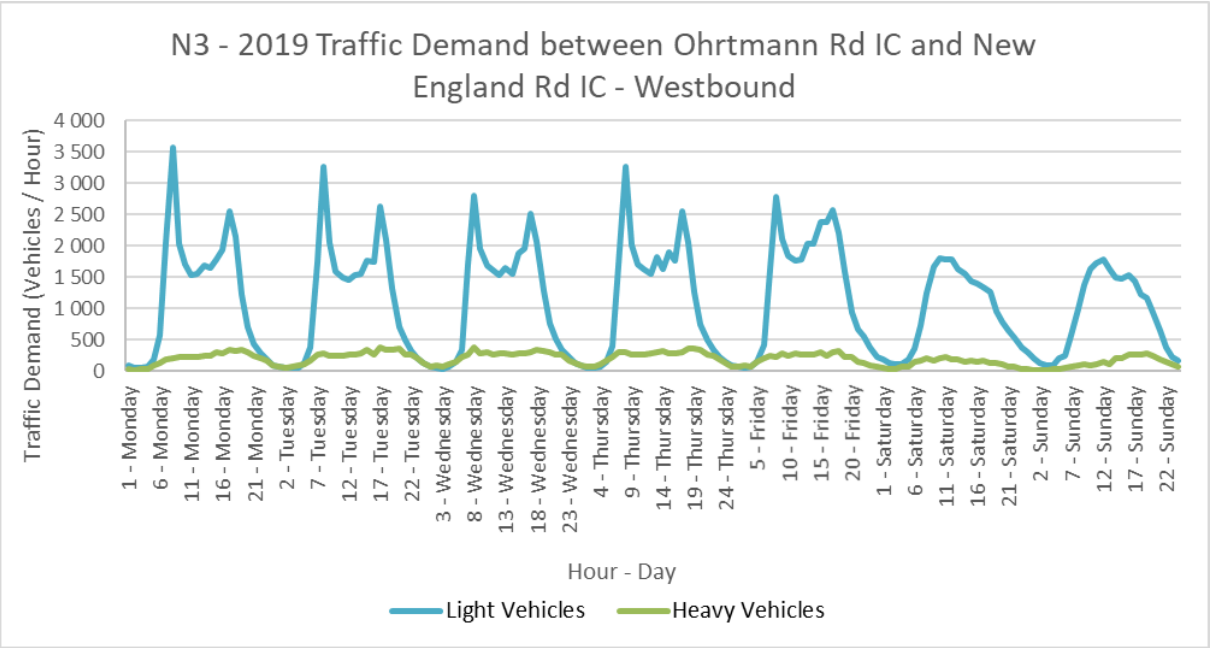
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N3 - 2019 Traffic Demand between Ohrtmann Rd IC and New England Rd IC - Westbound
Traffic Demand (Vehicles / Hour)
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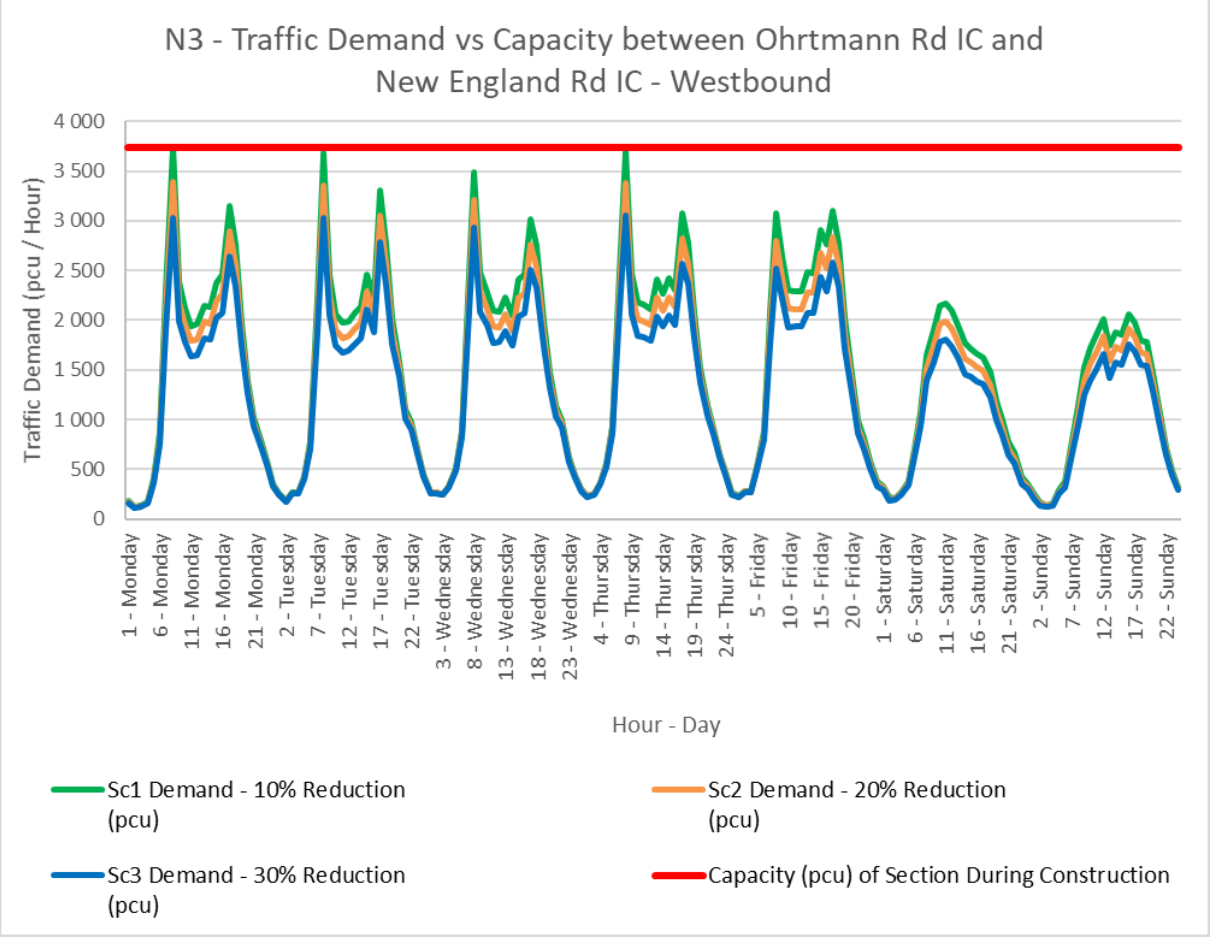
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between Ohrtmann Rd IC and New England Rd IC - Westbound
Traffic Demand (pcu / Hour)
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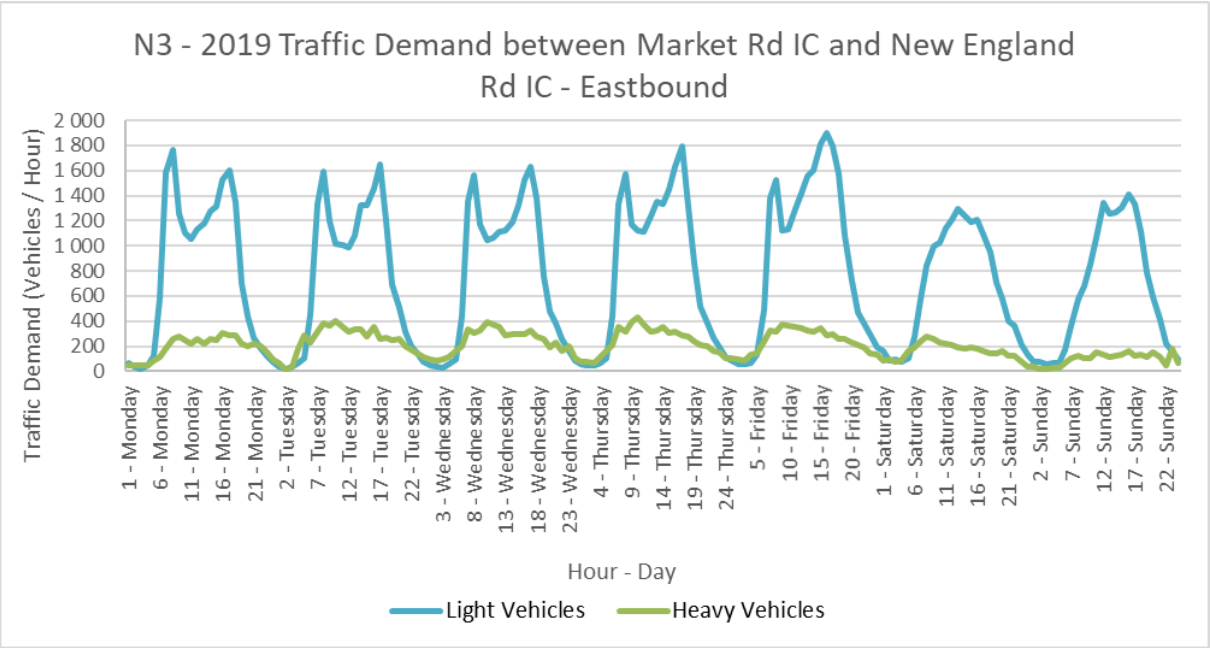
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N3 between Market Road Interchange and New England Road Interchange


N3 - 2019 Traffic Demand between Market Rd IC and New England Rd IC - Eastbound
Traffic Demand (Vehicles / Hour)
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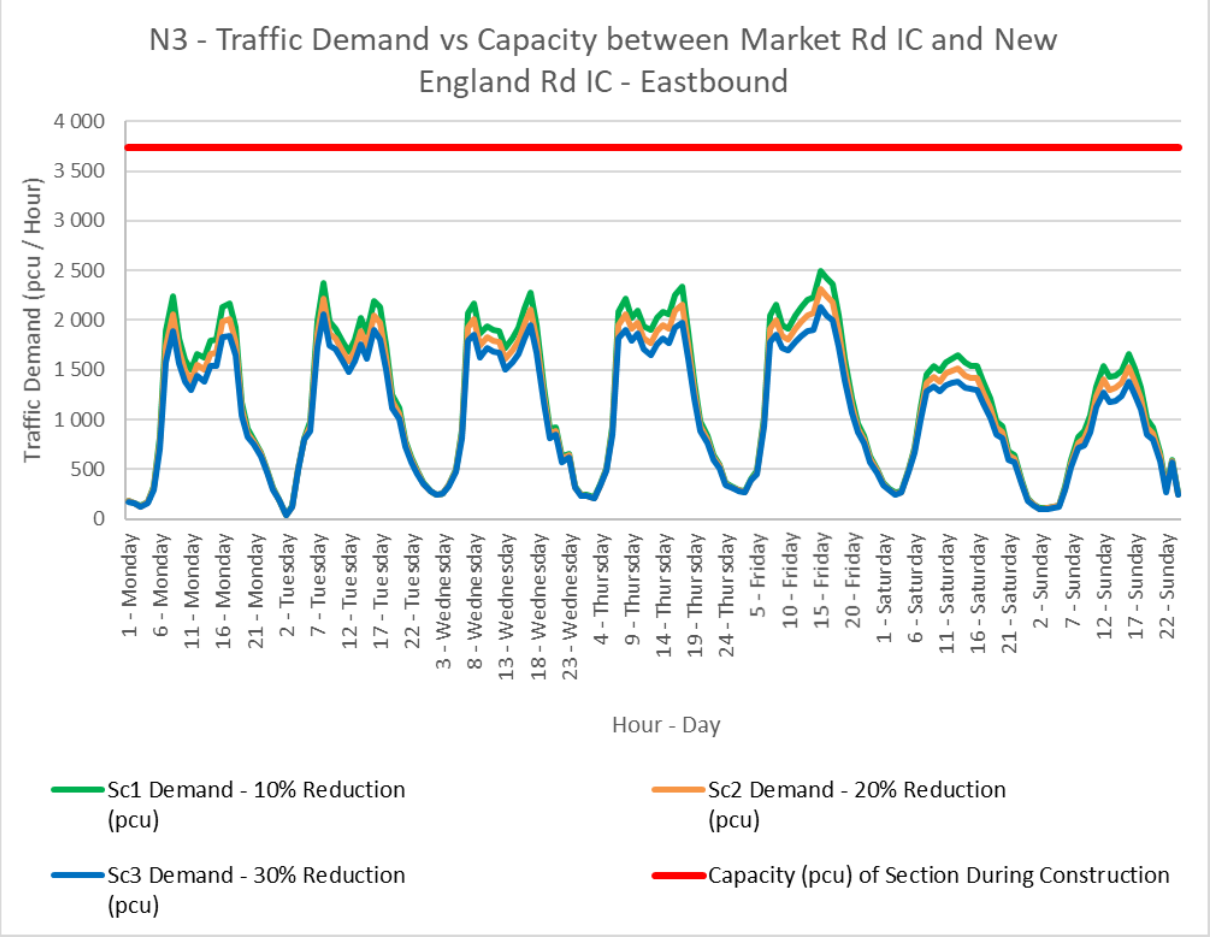
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between Market Rd IC and New England Rd IC - Eastbound
Traffic Demand (pcu / Hour)
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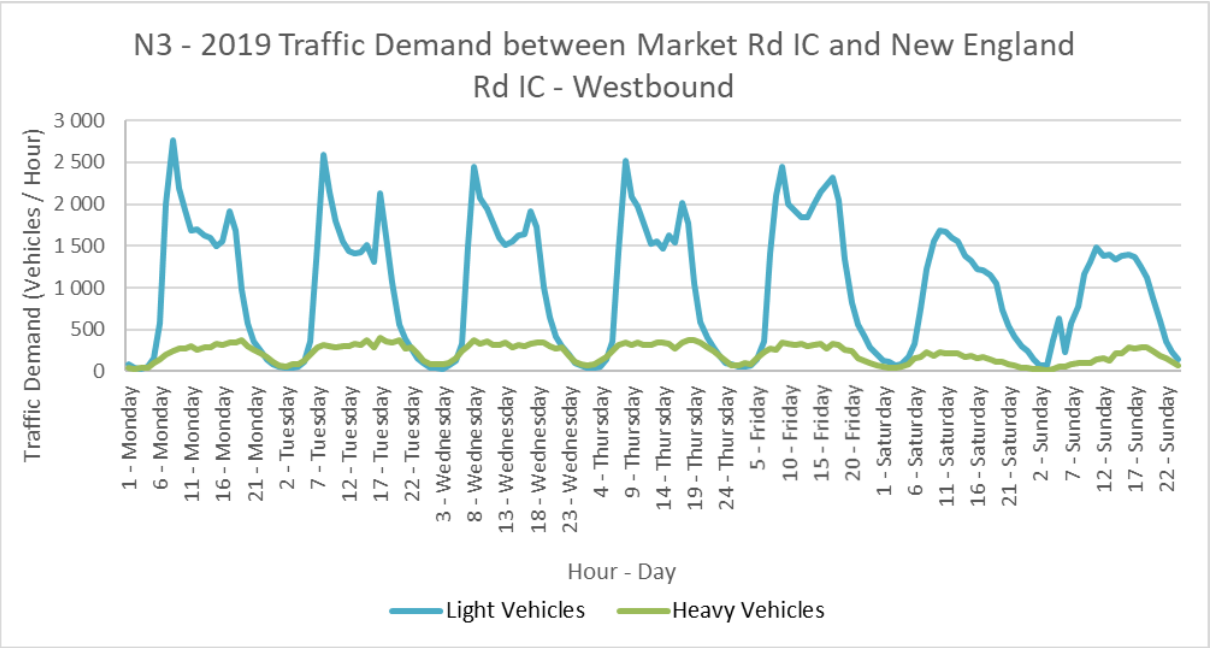
Capacity (pcu) of Section During Construction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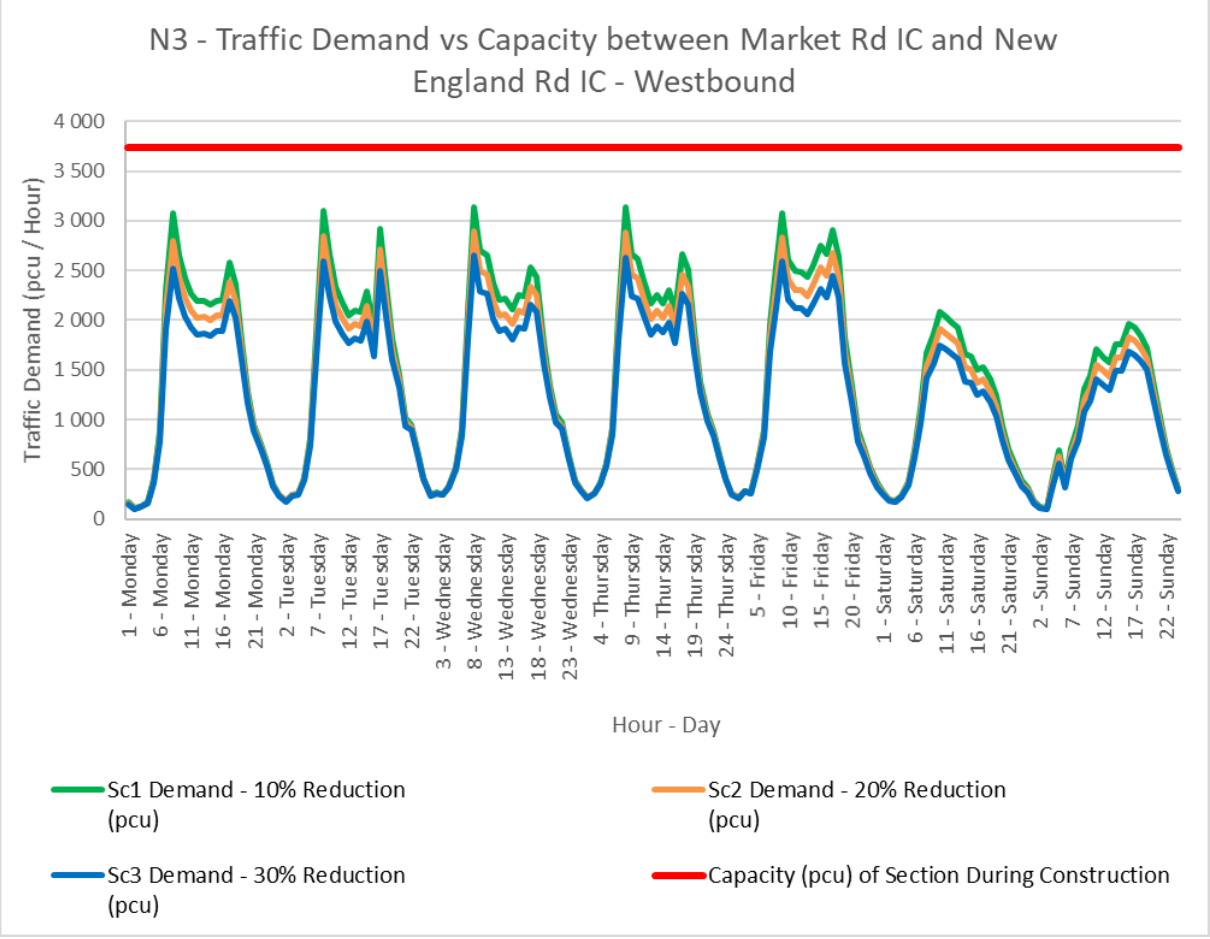
N3 - Traffic Demand vs Capacity between Market Rd IC and New England Rd IC - Westbound
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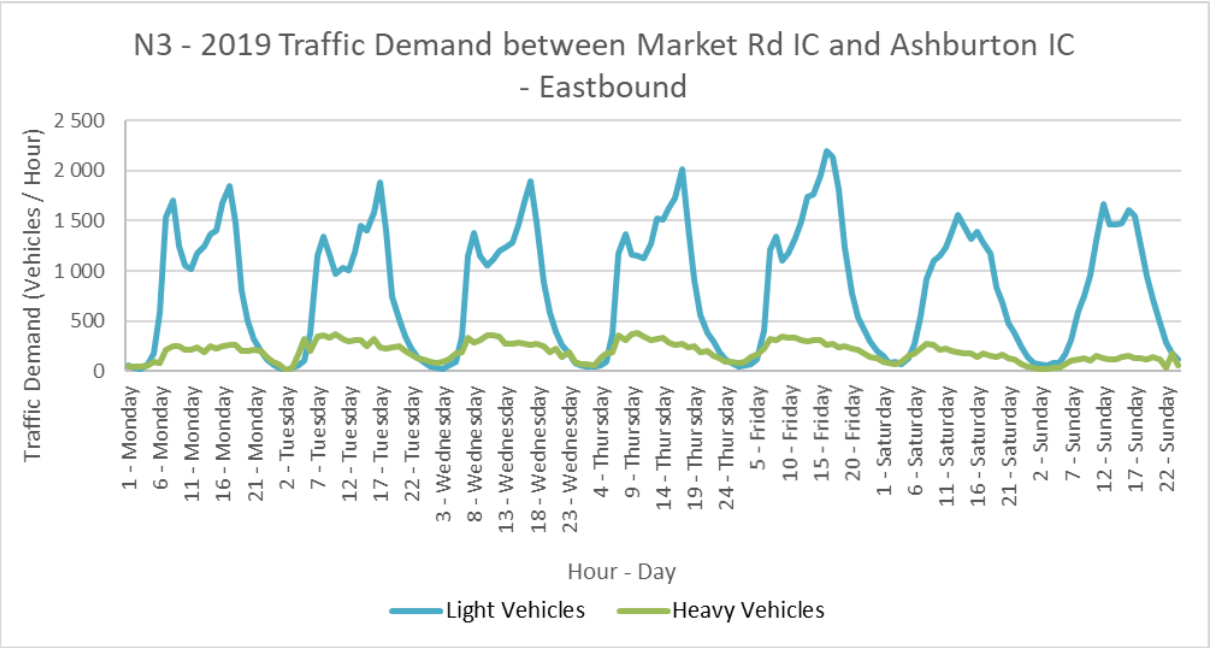
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N3 between Market Road Interchange and Ashburton Interchange


N3 - 2019 Traffic Demand between Market Rd IC and Ashburton IC - Eastbound
Traffic Demand (Vehicles / Hour)
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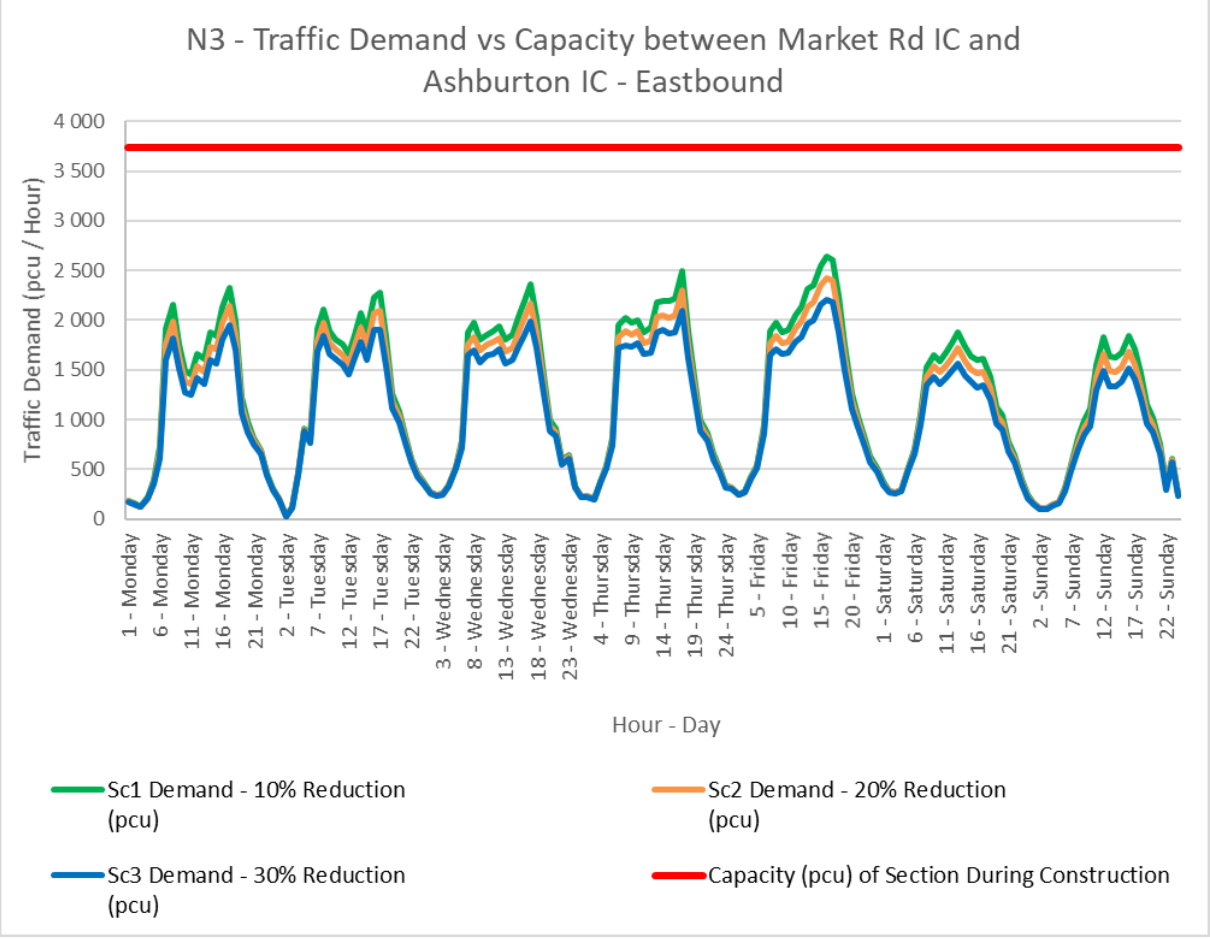
N3 - Traffic Demand vs Capacity between Market Rd IC and Ashburton IC - Eastbound
Traffic Demand (pcu / Hour)
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Hour - Day
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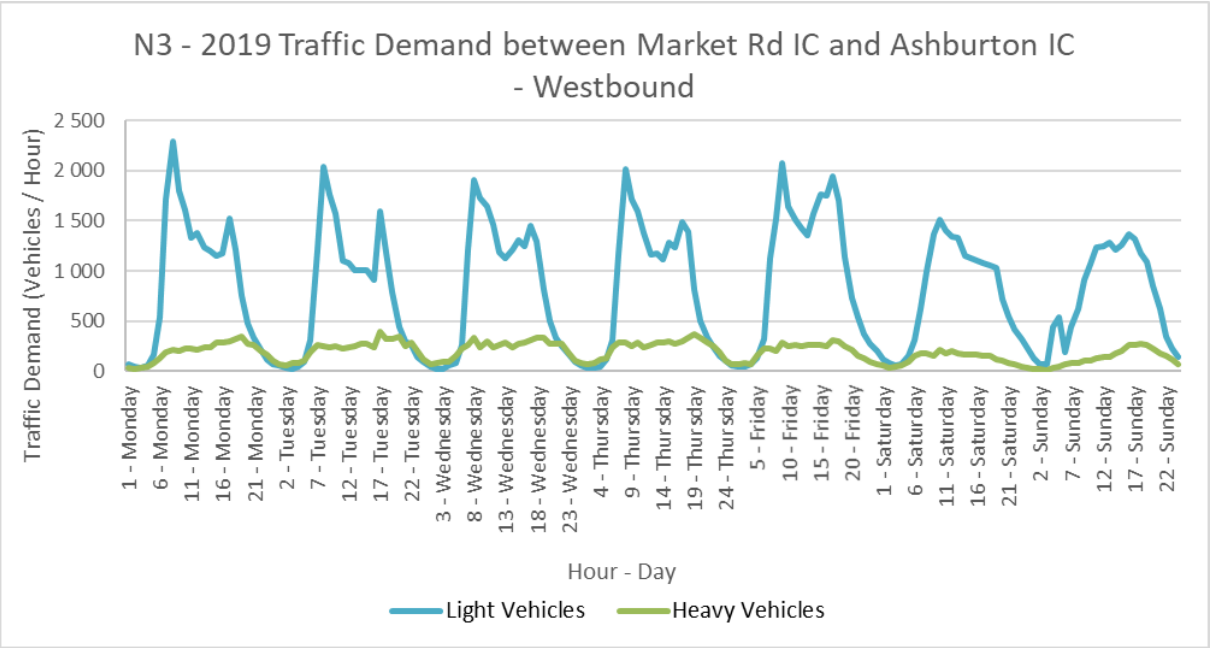
Capacity (pcu) of Section During Construction


N3 - 2019 Traffic Demand between Market Rd IC and Ashburton IC - Westbound
Traffic Demand (Vehicles / Hour)
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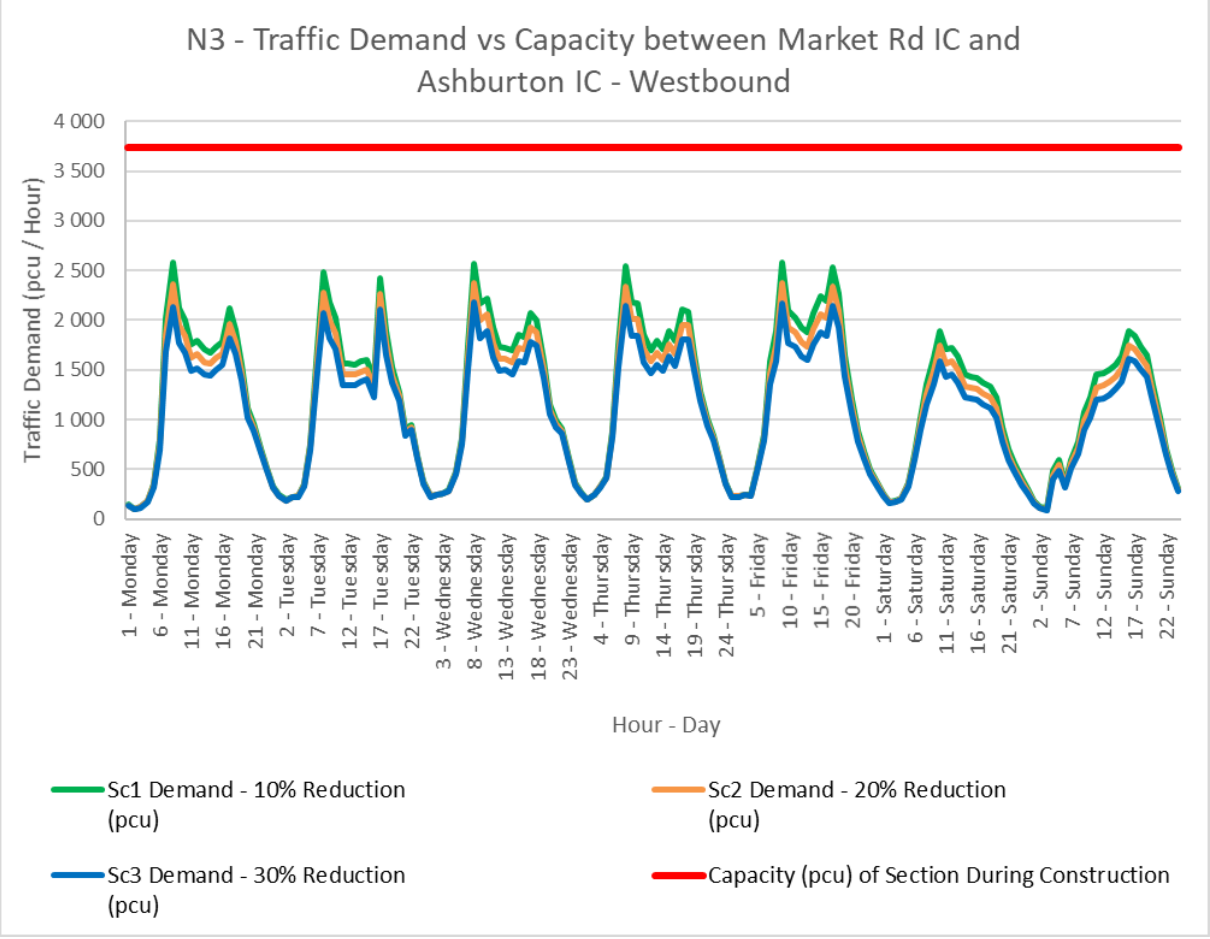
N3 - Traffic Demand vs Capacity between Market Rd IC and Ashburton IC - Westbound
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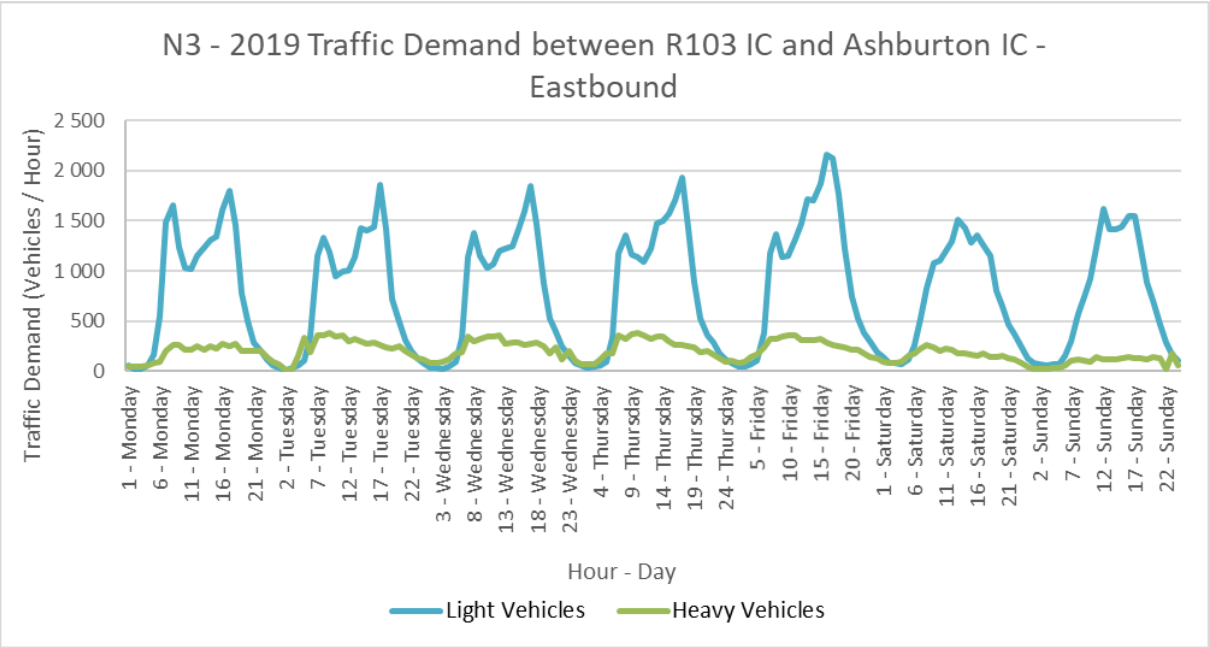
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N3 between R103 Interchange and Ashburton Interchange


N3 - 2019 Traffic Demand between R103 IC and Ashburton IC - Eastbound
Traffic Demand (Vehicles / Hour)
2 500
2 000
1 500
1 000
500
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
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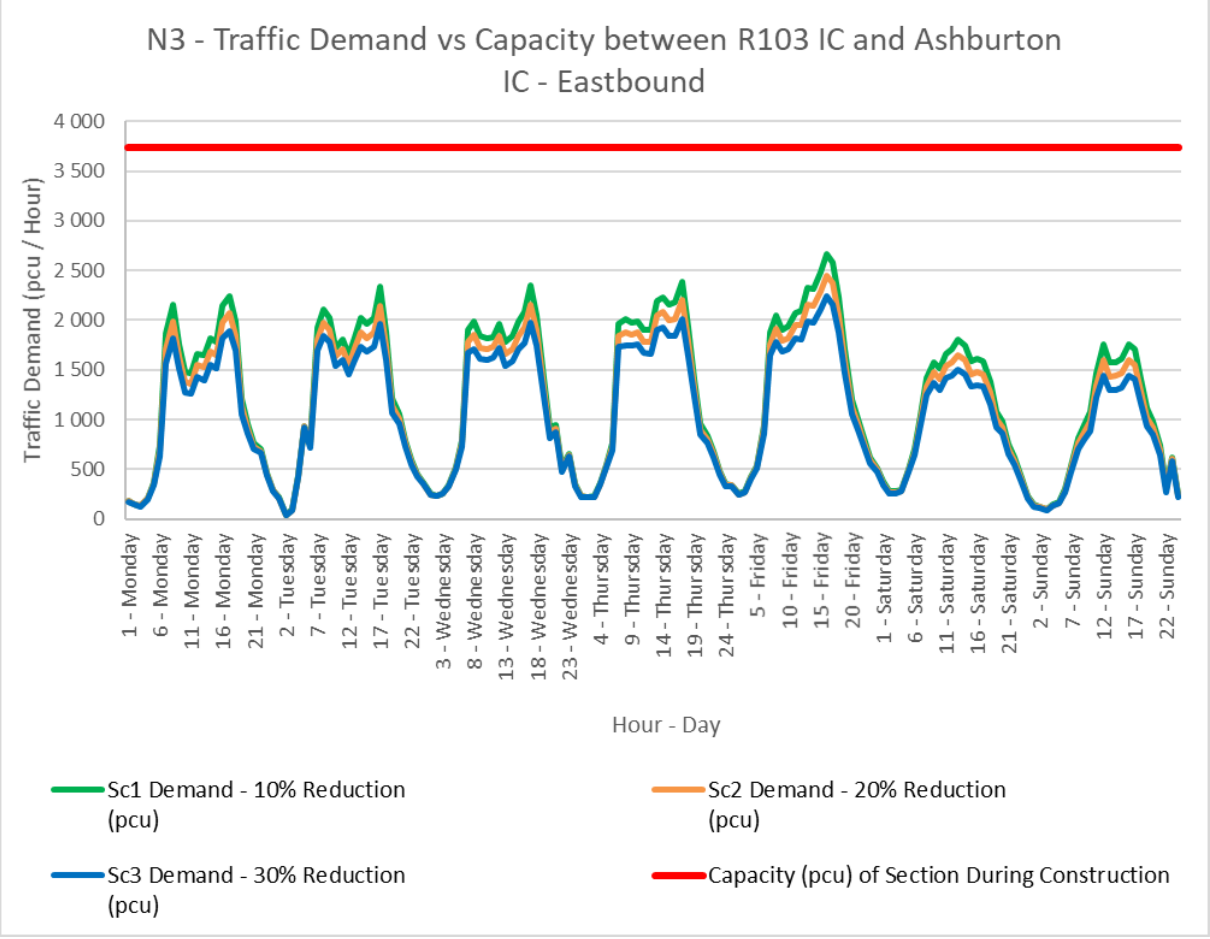
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between R103 IC and Ashburton IC - Eastbound
Traffic Demand (pcu / Hour)
4 000
3 500
3 000
2 500
2 000
1 500
1 000
500
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
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10 - Friday
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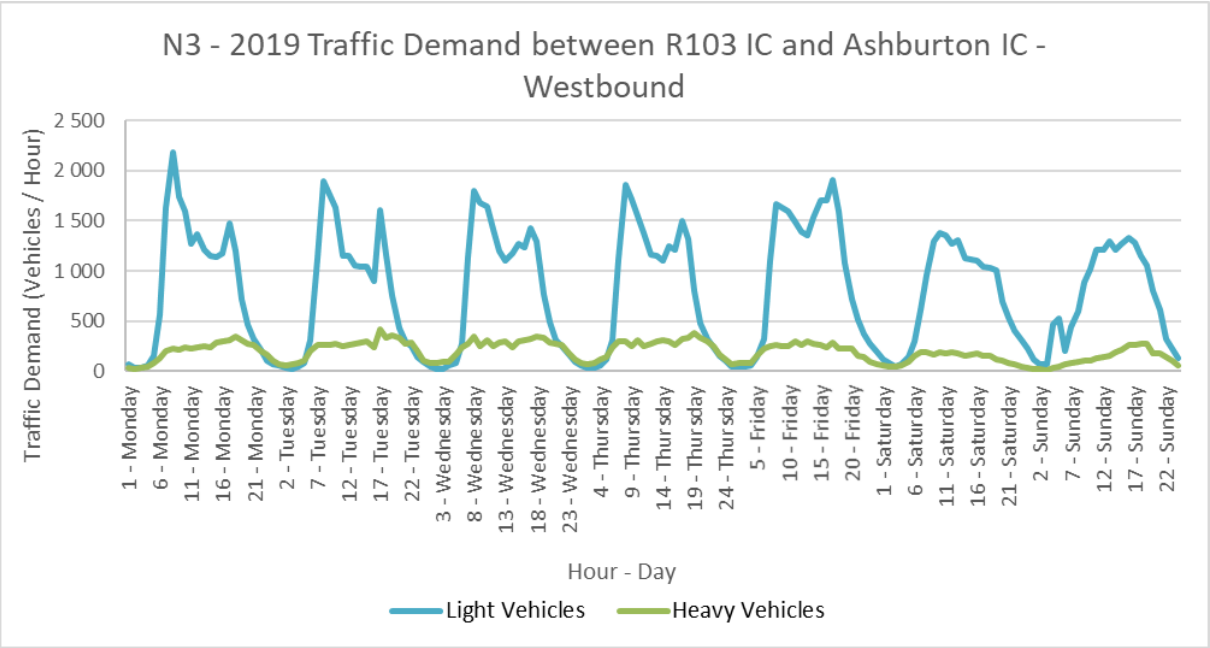
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N3 - 2019 Traffic Demand between R103 IC and Ashburton IC - Westbound
Traffic Demand (Vehicles / Hour)
2 500
2 000
1 500
1 000
500
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
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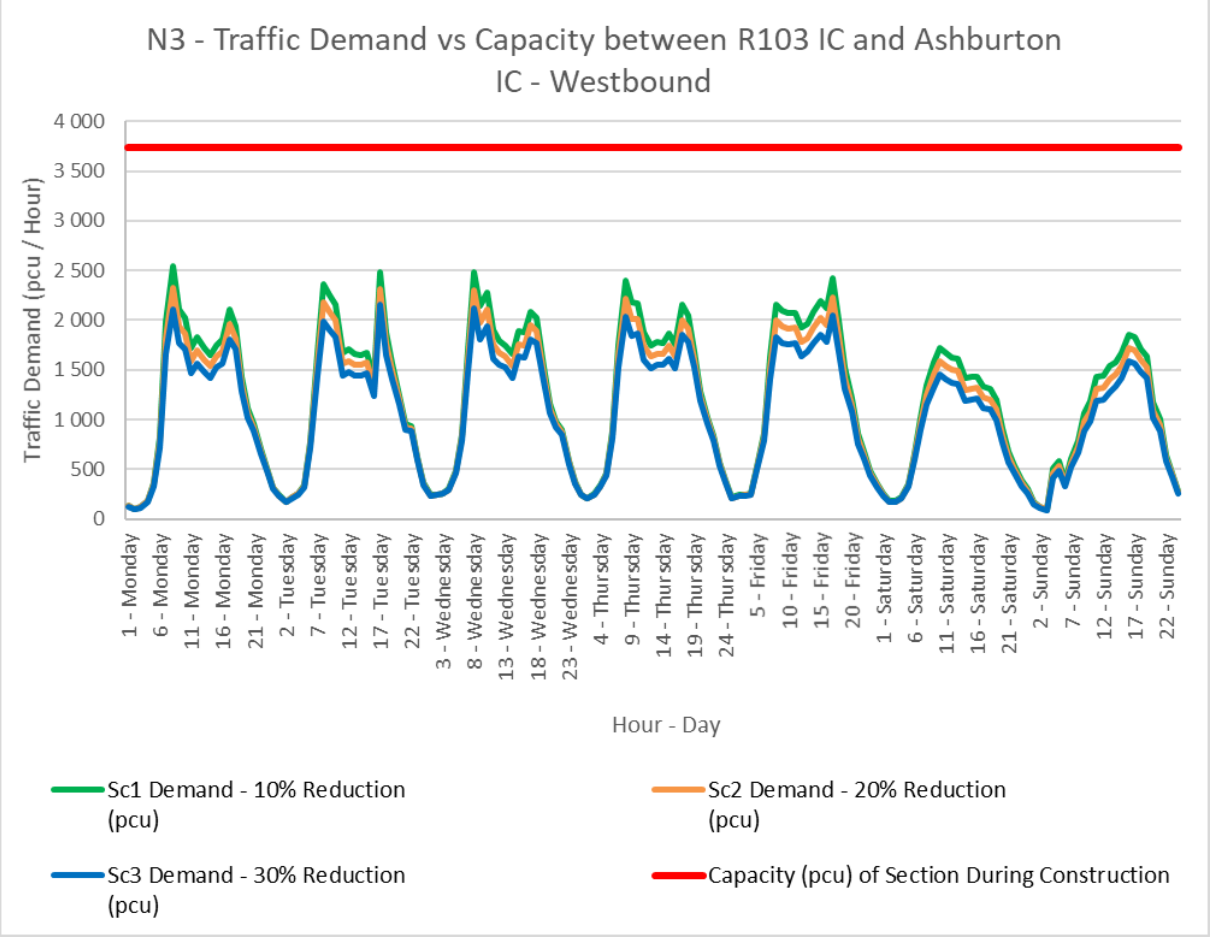
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between R103 IC and Ashburton IC - Westbound
Traffic Demand (pcu / Hour)
4 000
3 500
3 000
2 500
2 000
1 500
1 000
500
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
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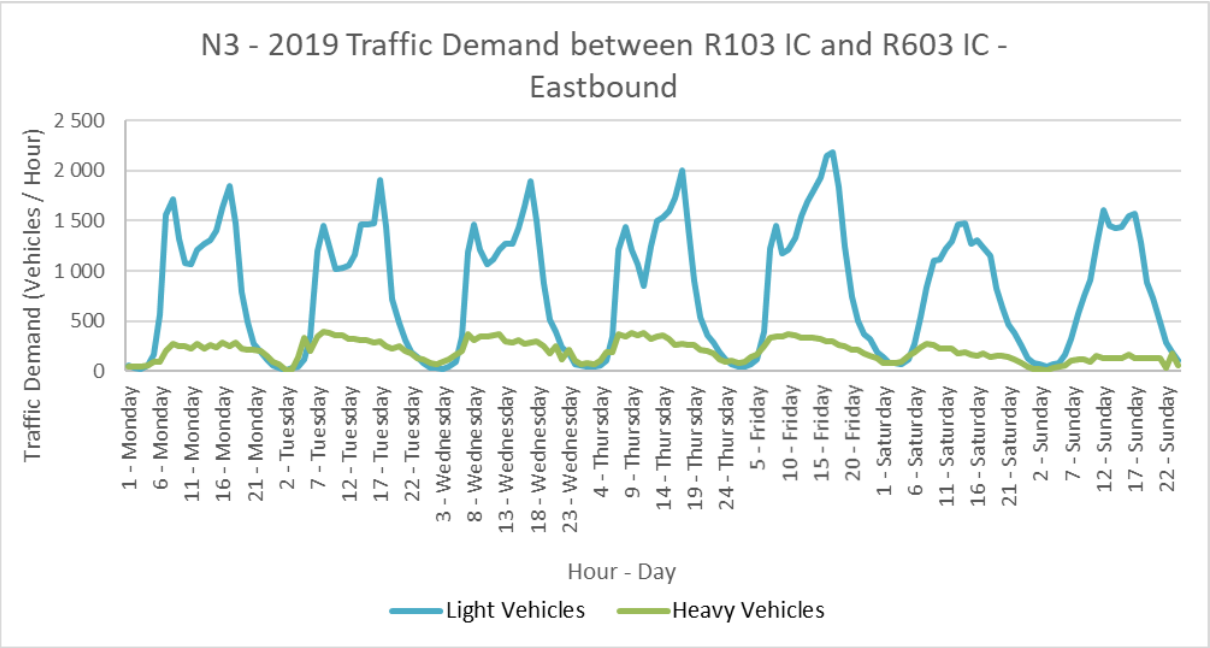
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N3 between R103 Interchange and R603 Interchange


N3 - 2019 Traffic Demand between R103 IC and R603 IC - Eastbound
Traffic Demand (Vehicles / Hour)
2 500
2 000
1 500
1 000
500
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
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16 - Saturday
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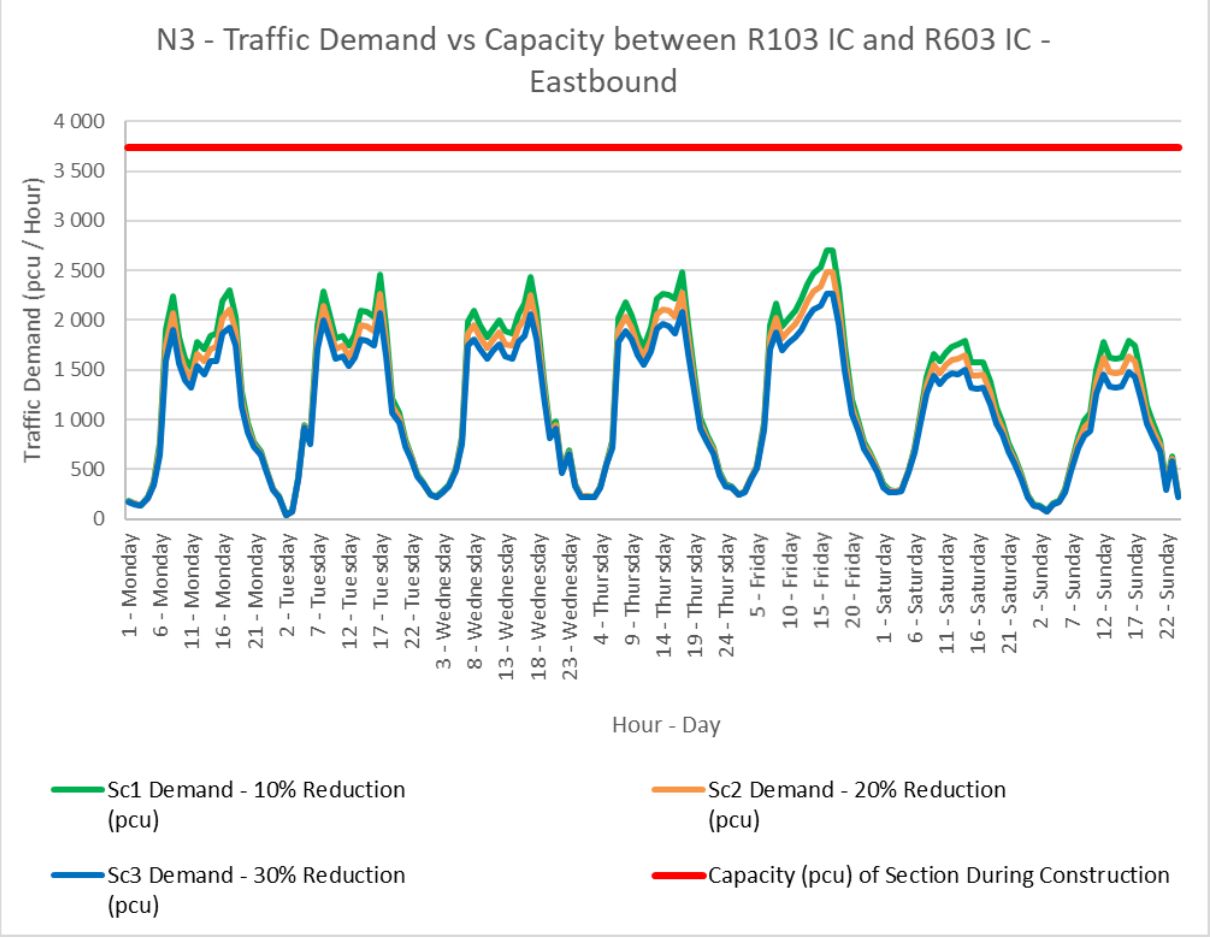
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between R103 IC and R603 IC - Eastbound
Traffic Demand (pcu / Hour)
4 000
3 500
3 000
2 500
2 000
1 500
1 000
500
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
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1 - Saturday
6 - Saturday
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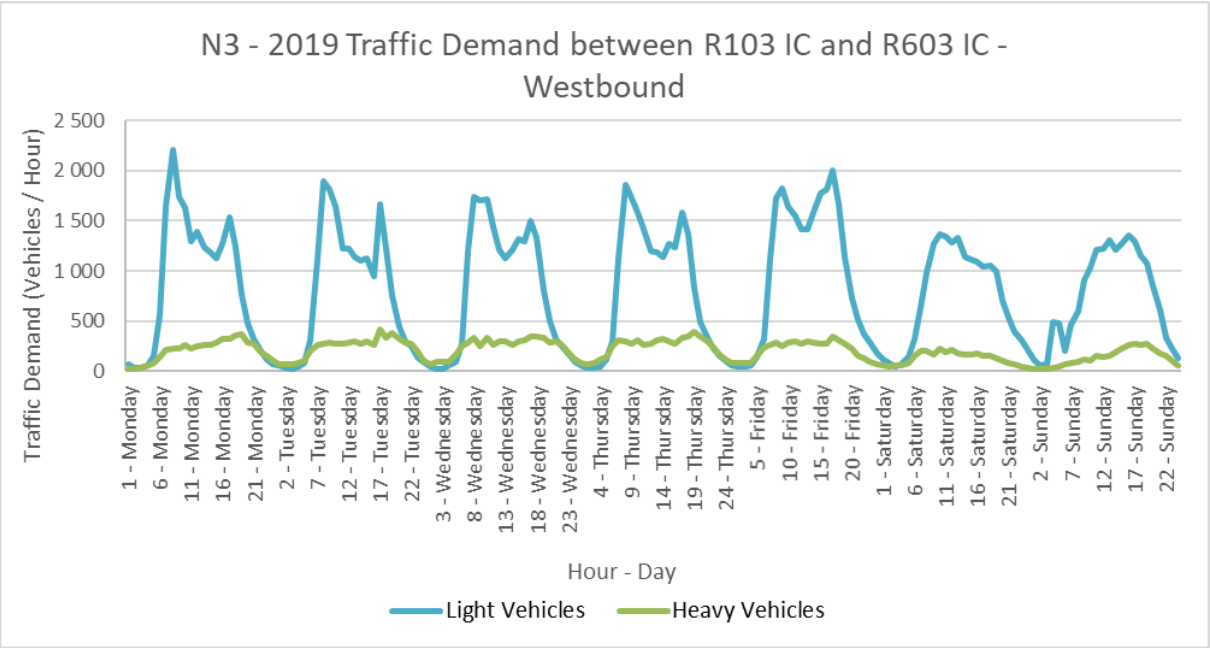
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N3 - 2019 Traffic Demand between R103 IC and R603 IC - Westbound
Traffic Demand (Vehicles / Hour)
2 500
2 000
1 500
1 000
500
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
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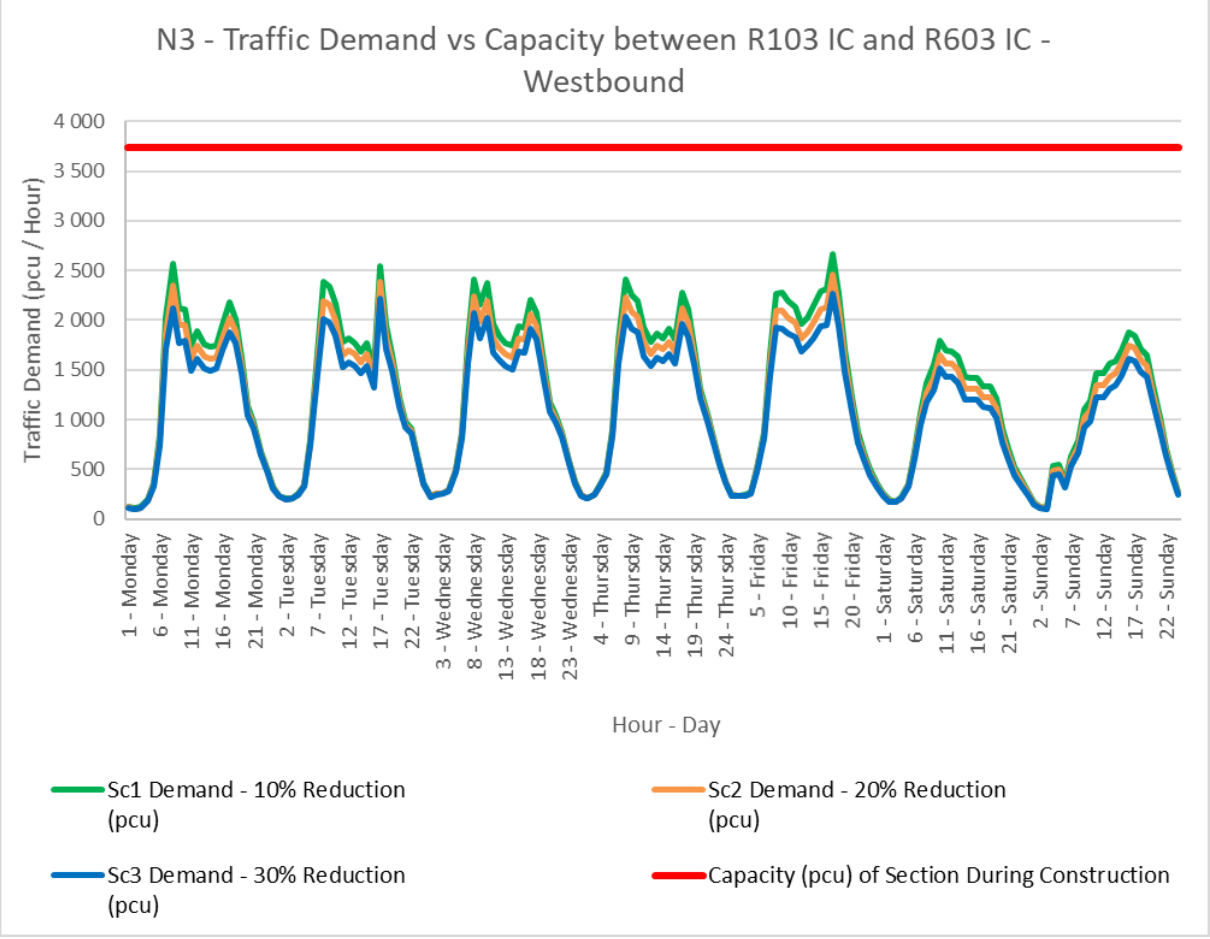
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between R103 IC and R603 IC - Westbound
Traffic Demand (pcu / Hour)
4 000
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3 000
2 500
2 000
1 500
1 000
500
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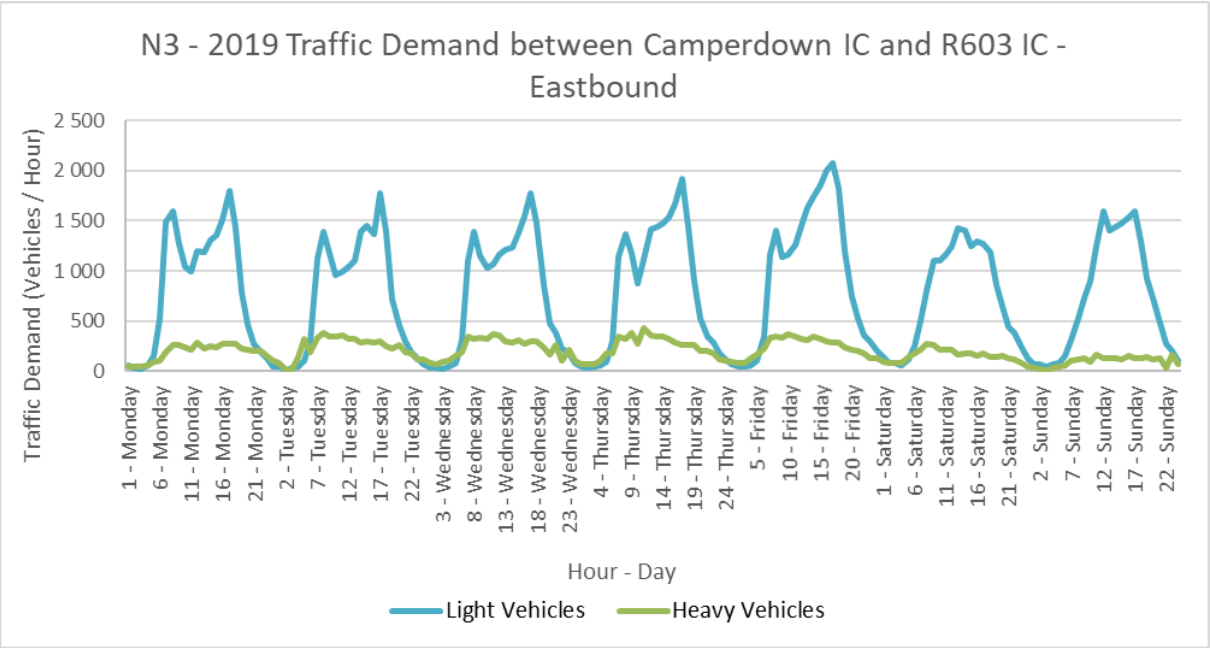
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N3 between Camperdown Interchange and R603 Interchange


N3 - 2019 Traffic Demand between Camperdown IC and R603 IC - Eastbound
Traffic Demand (Vehicles / Hour)
2 500
2 000
1 500
1 000
500
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
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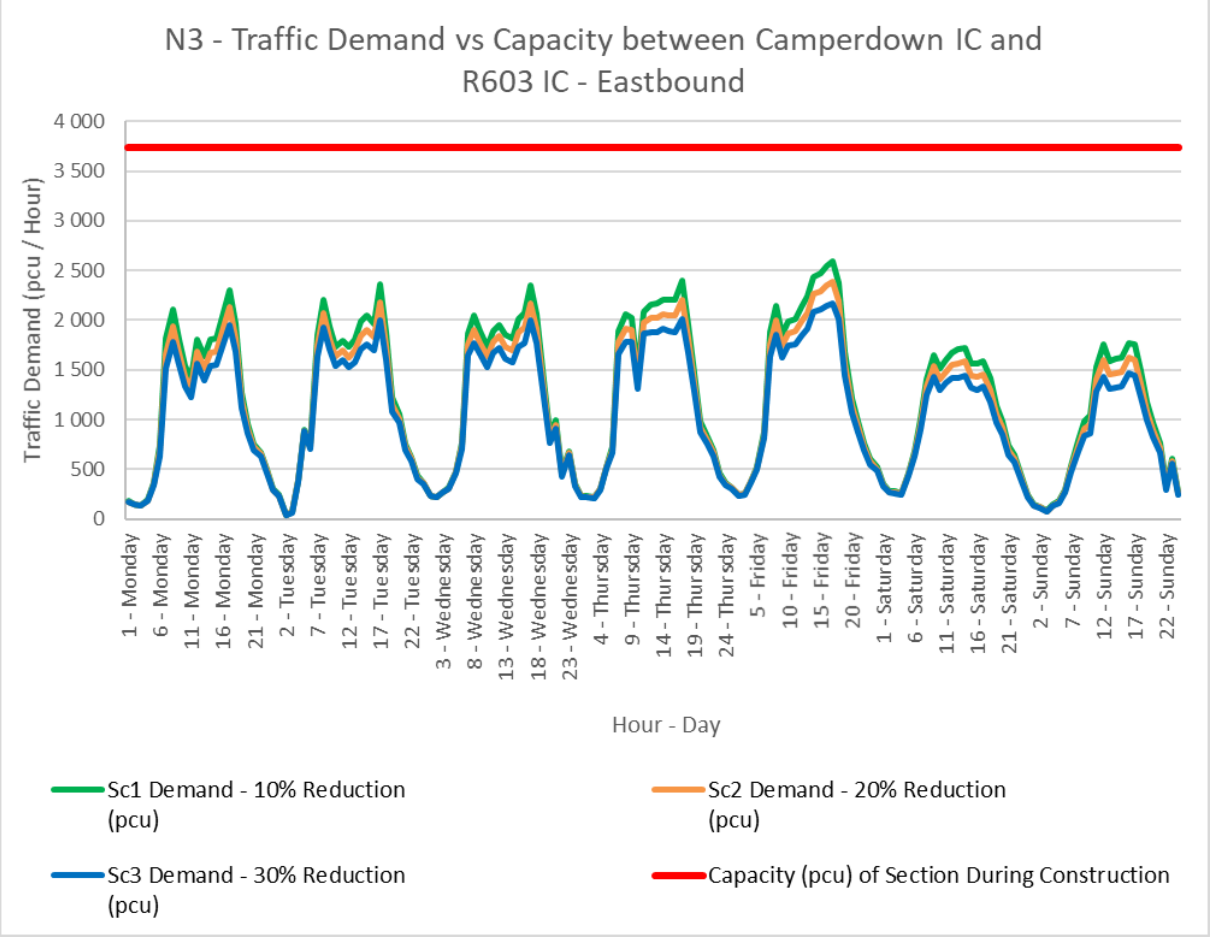
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between Camperdown IC and R603 IC - Eastbound
Traffic Demand (pcu / Hour)
4 000
3 500
3 000
2 500
2 000
1 500
1 000
500
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
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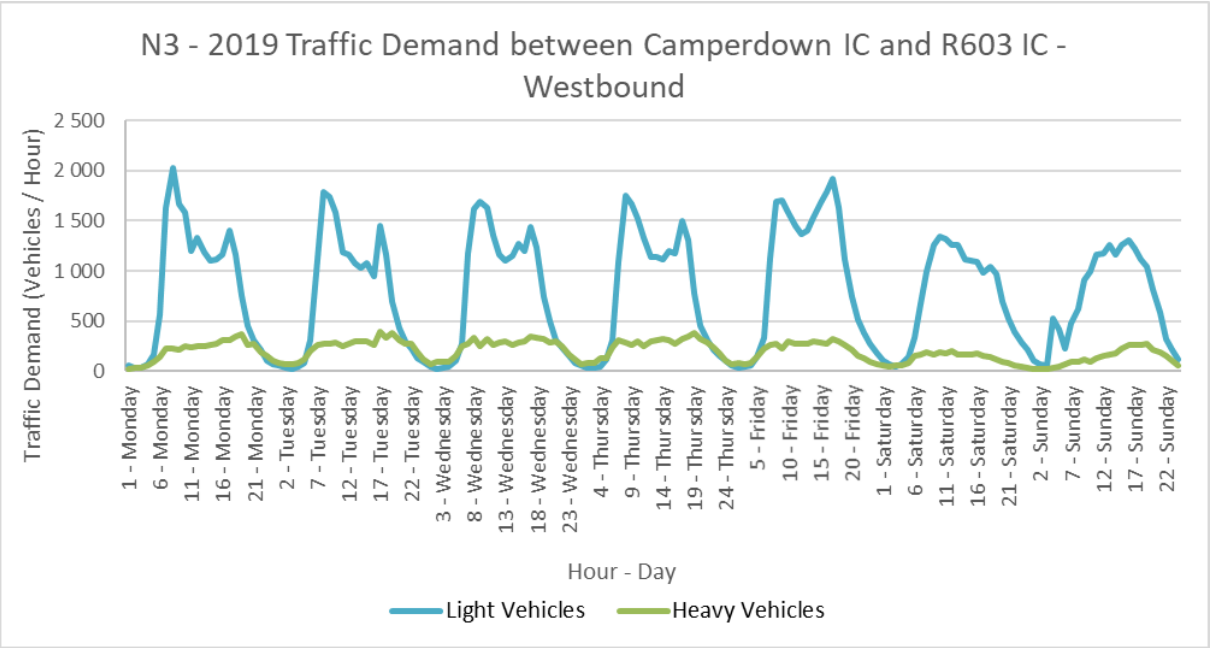
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N3 - 2019 Traffic Demand between Camperdown IC and R603 IC - Westbound
Traffic Demand (Vehicles / Hour)
2 500
2 000
1 500
1 000
500
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
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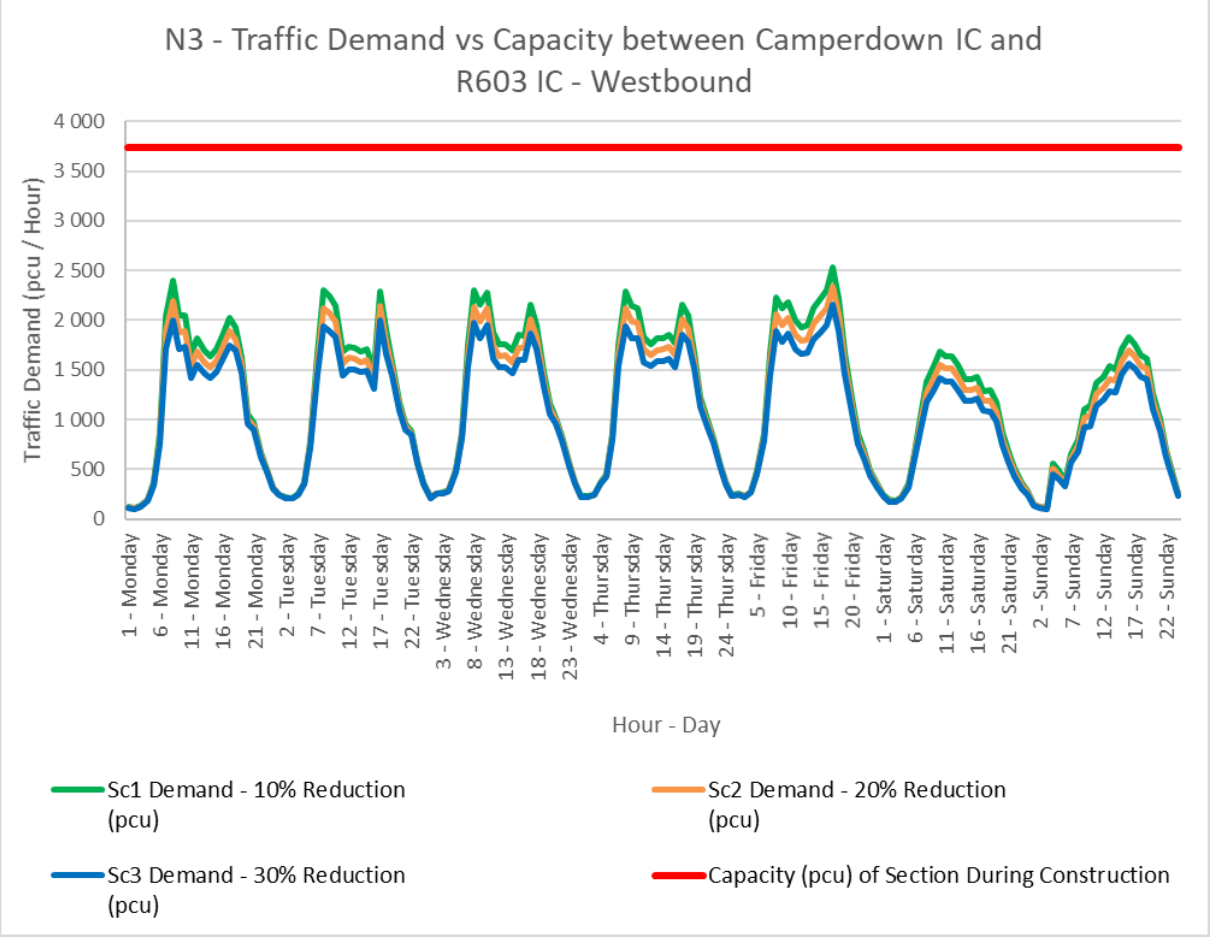
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between Camperdown IC and R603 IC - Westbound
Traffic Demand (pcu / Hour)
4 000
3 500
3 000
2 500
2 000
1 500
1 000
500
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
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12 - Tuesday
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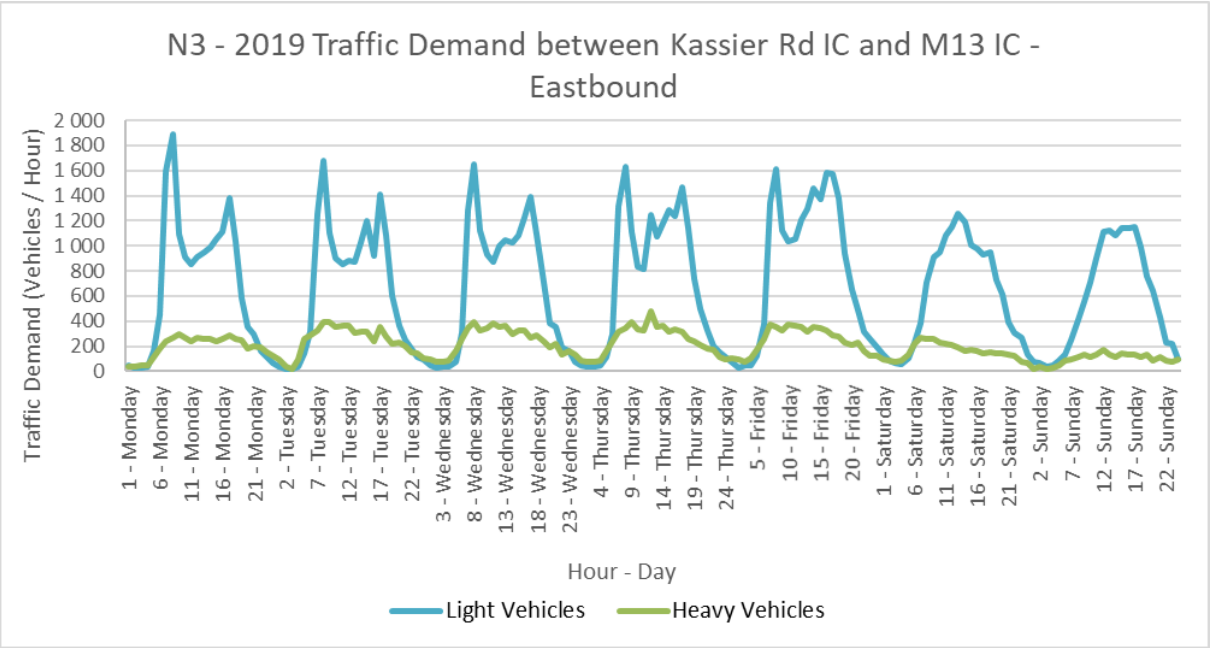
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N3 between Kassier Road Interchange and M13 Interchange


N3 - 2019 Traffic Demand between Kassier Rd IC and M13 IC - Eastbound
Traffic Demand (Vehicles / Hour)
2 000
1 800
1 600
1 400
1 200
1 000
800
600
400
200
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
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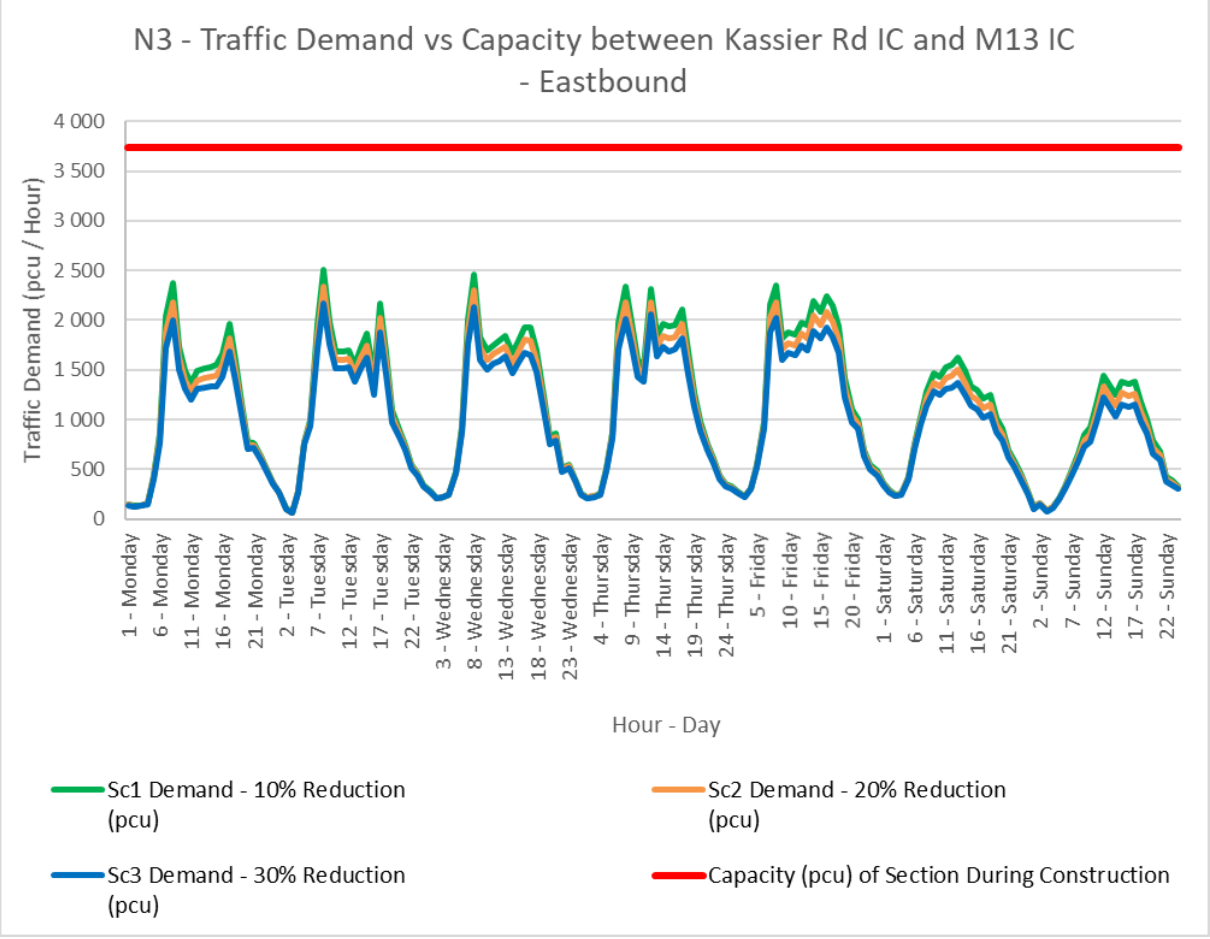
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between Kassier Rd IC and M13 IC - Eastbound
Traffic Demand (pcu / Hour)
4 000
3 500
3 000
2 500
2 000
1 500
1 000
500
0
1 - Monday
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11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
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8 - Wednesday
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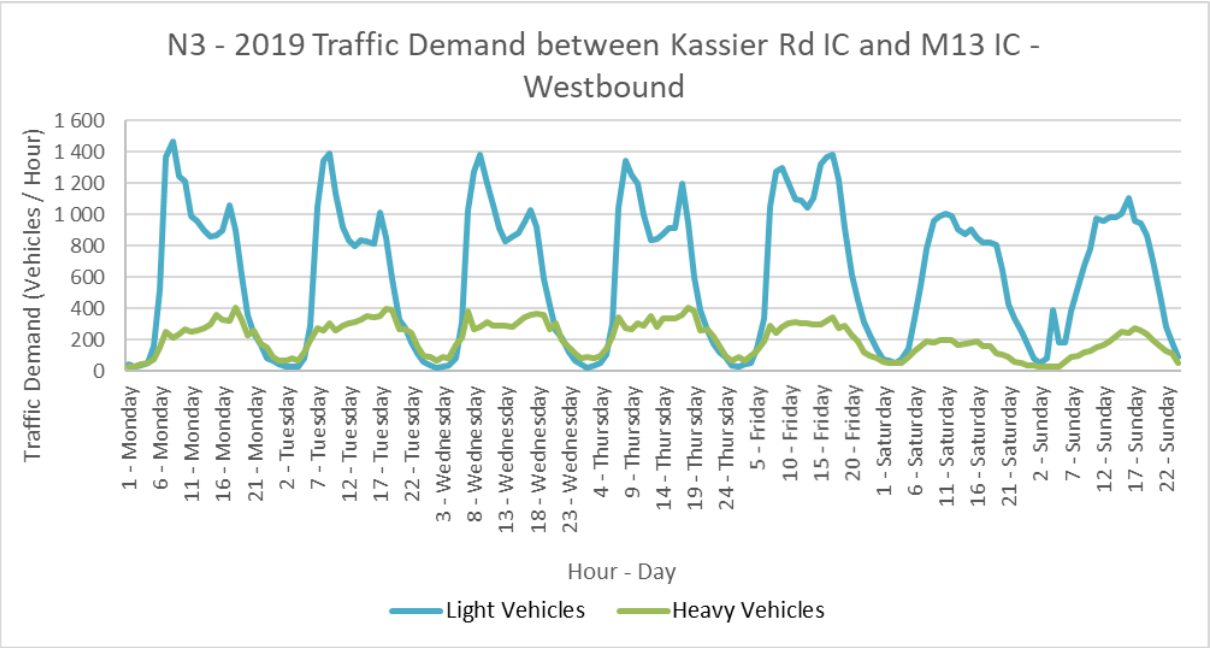
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N3 - 2019 Traffic Demand between Kassier Rd IC and M13 IC - Westbound
Traffic Demand (Vehicles / Hour)
1 600
1 400
1 200
1 000
800
600
400
200
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
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3 - Wednesday
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13 - Wednesday
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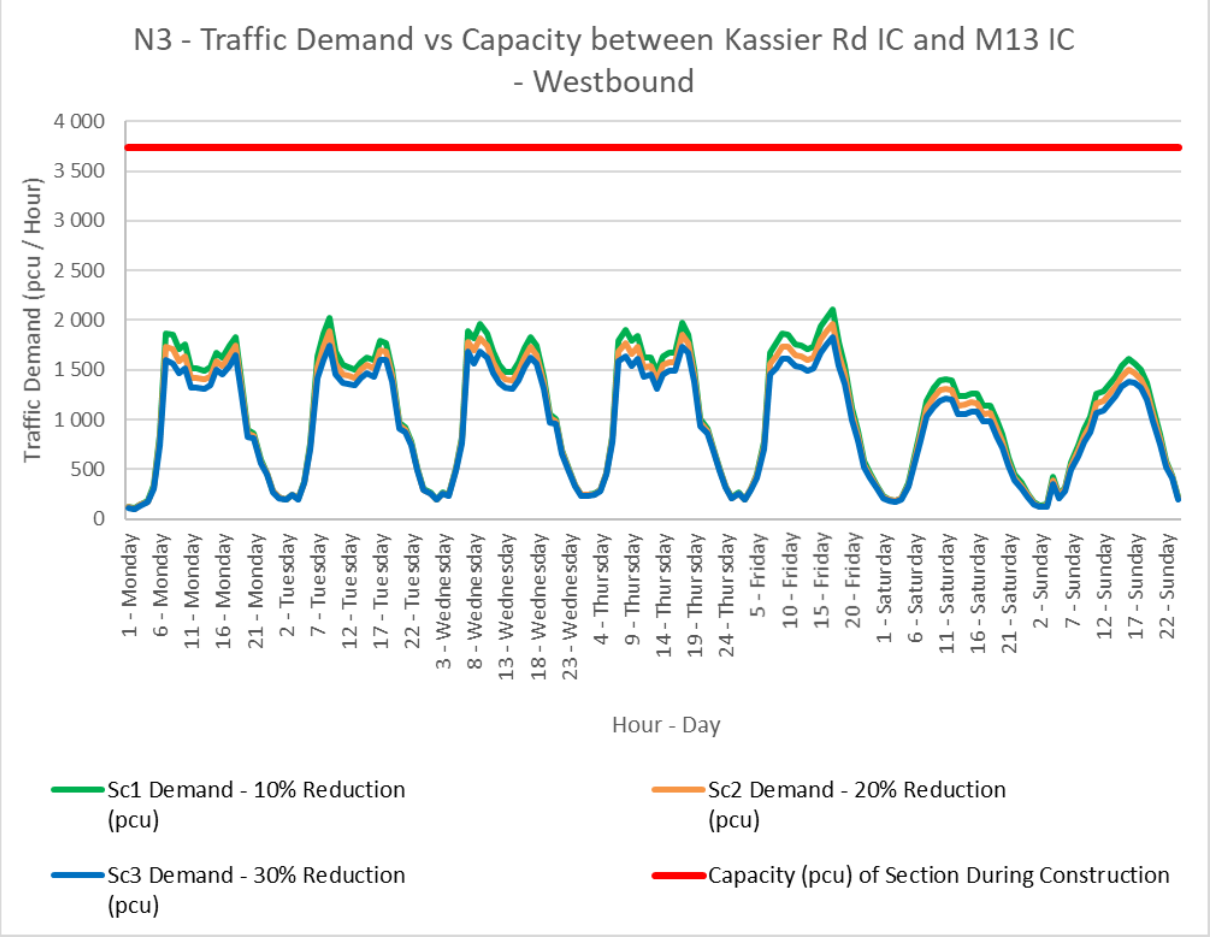
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between Kassier Rd IC and M13 IC - Westbound
Traffic Demand (pcu / Hour)
4 000
3 500
3 000
2 500
2 000
1 500
1 000
500
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1 - Monday
6 - Monday
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16 - Monday
21 - Monday
2 - Tuesday
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12 - Tuesday
17 - Tuesday
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24 - Thursday
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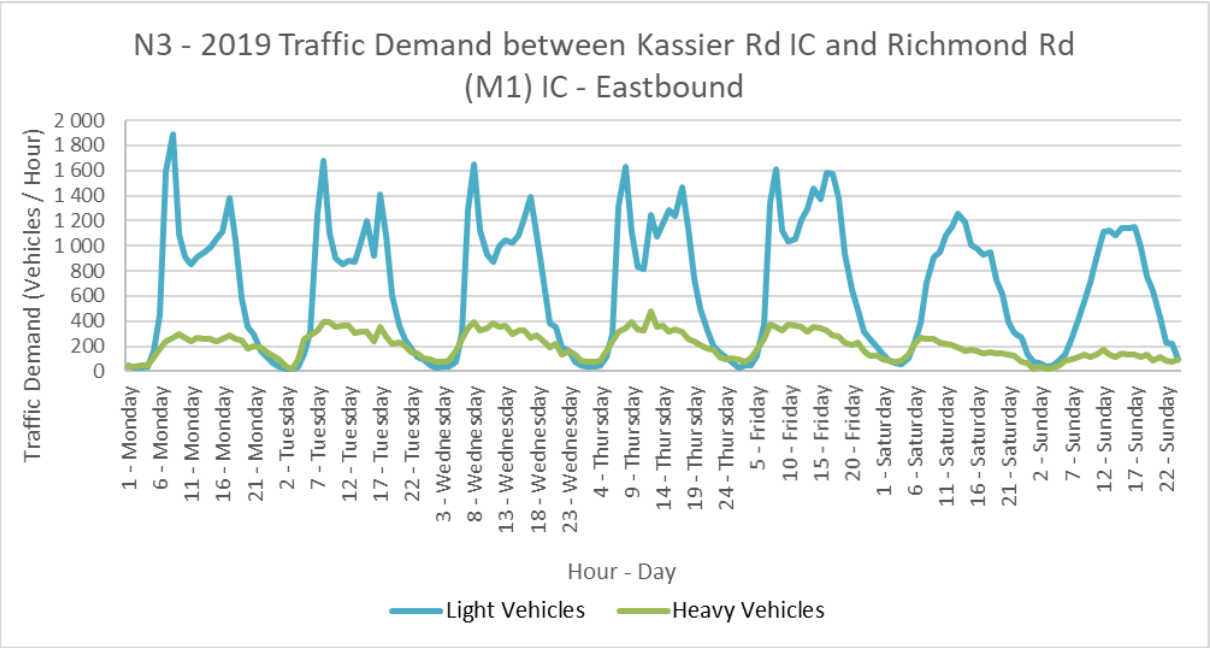
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N3 between Kassier Road Interchange and M1 Interchange


N3 - 2019 Traffic Demand between Kassier Rd IC and Richmond Rd (M1) IC - Eastbound
Traffic Demand (Vehicles / Hour)
2 000
1 800
1 600
1 400
1 200
1 000
800
600
400
200
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
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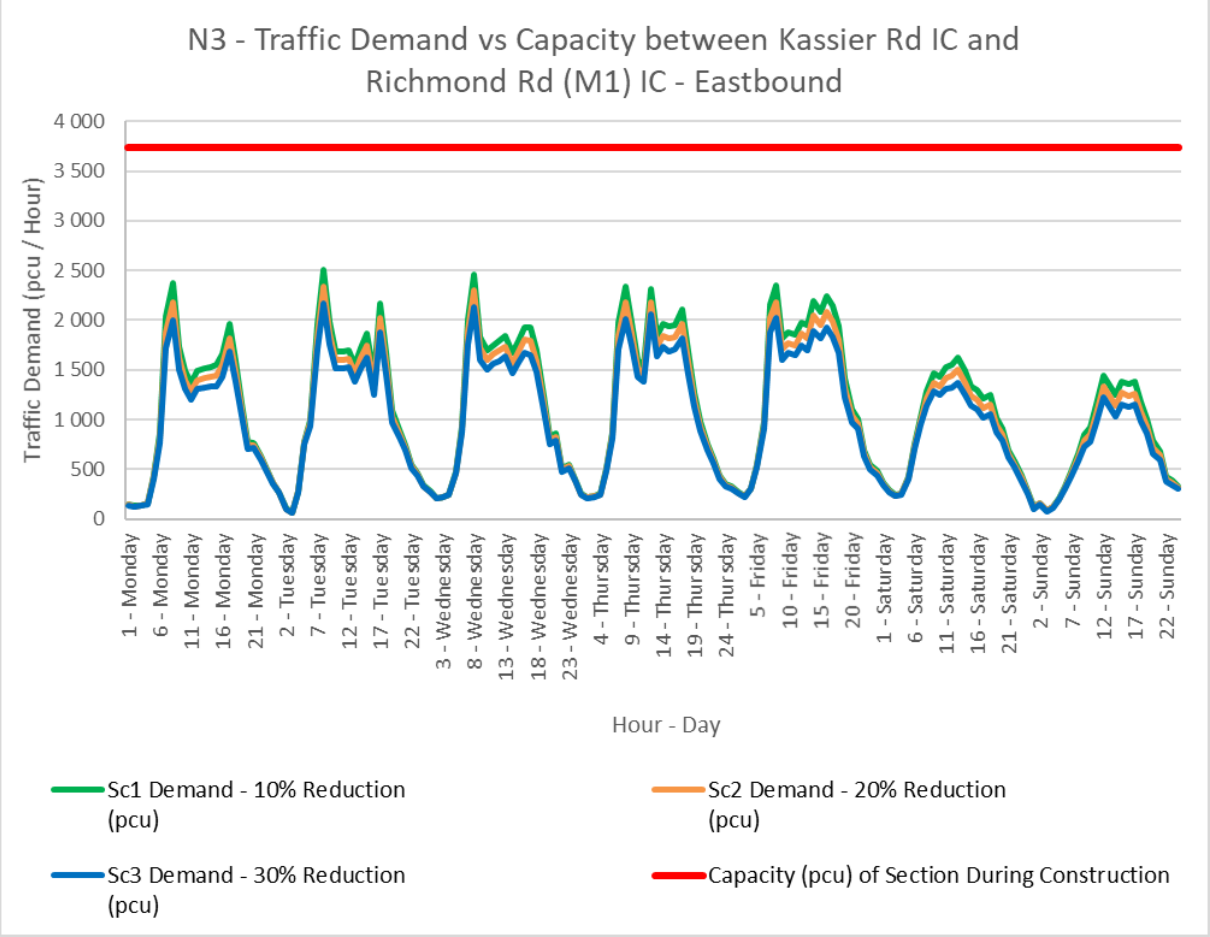
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between Kassier Rd IC and Richmond Rd (M1) IC - Eastbound
Traffic Demand (pcu / Hour)
4 000
3 500
3 000
2 500
2 000
1 500
1 000
500
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
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9 - Thursday
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19 - Thursday
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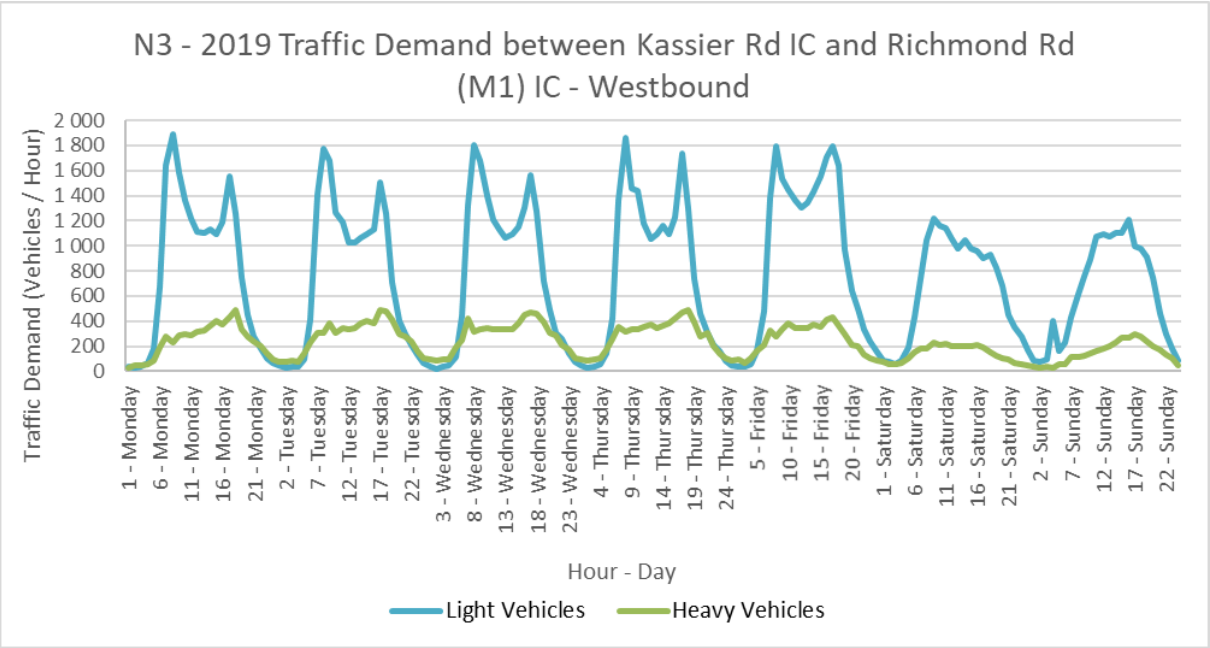
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N3 - 2019 Traffic Demand between Kassier Rd IC and Richmond Rd (M1) IC - Westbound
Traffic Demand (Vehicles / Hour)
2 000
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1 600
1 400
1 200
1 000
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600
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1 - Monday
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10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
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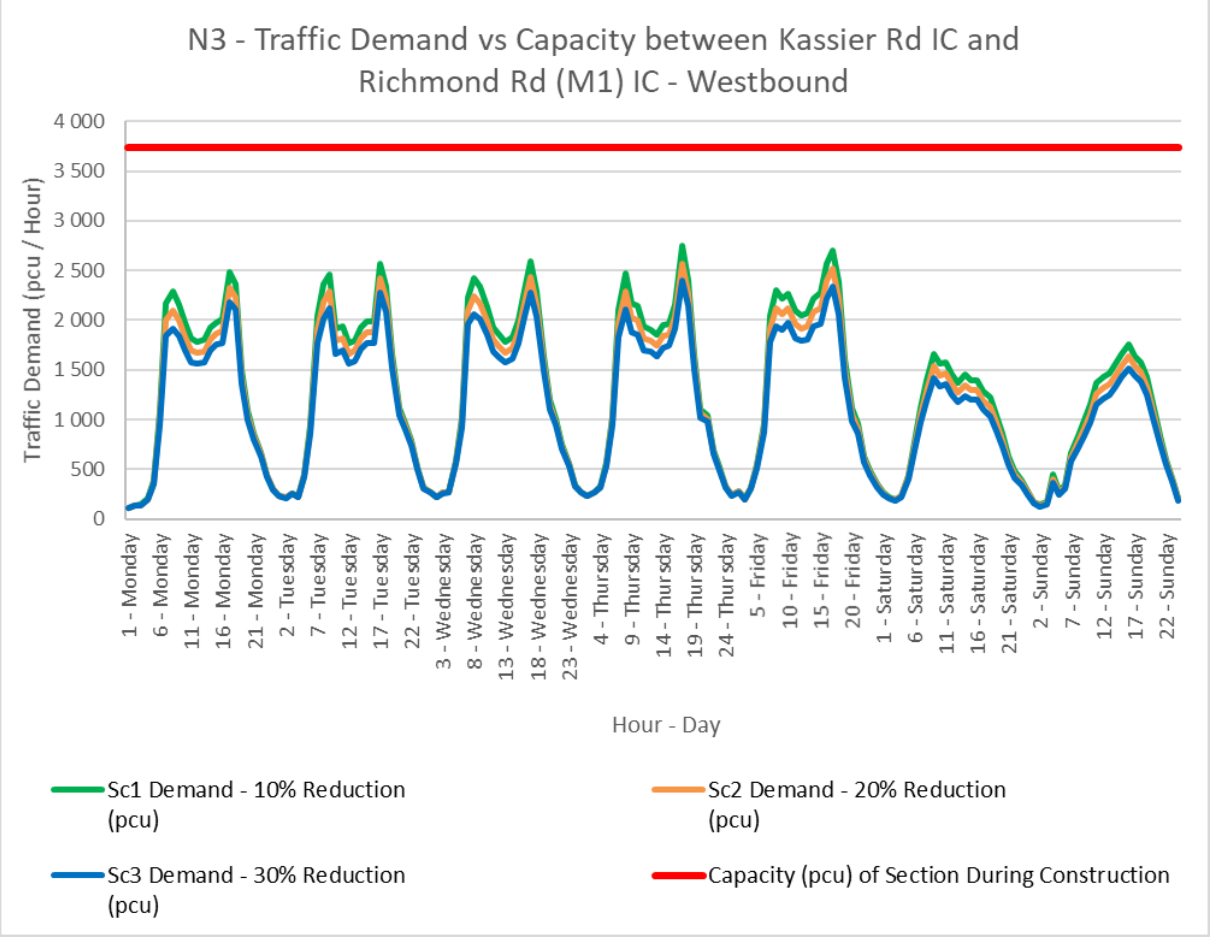
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between Kassier Rd IC and Richmond Rd (M1) IC - Westbound
Traffic Demand (pcu / Hour)
4 000
3 500
3 000
2 500
2 000
1 500
1 000
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1 - Monday
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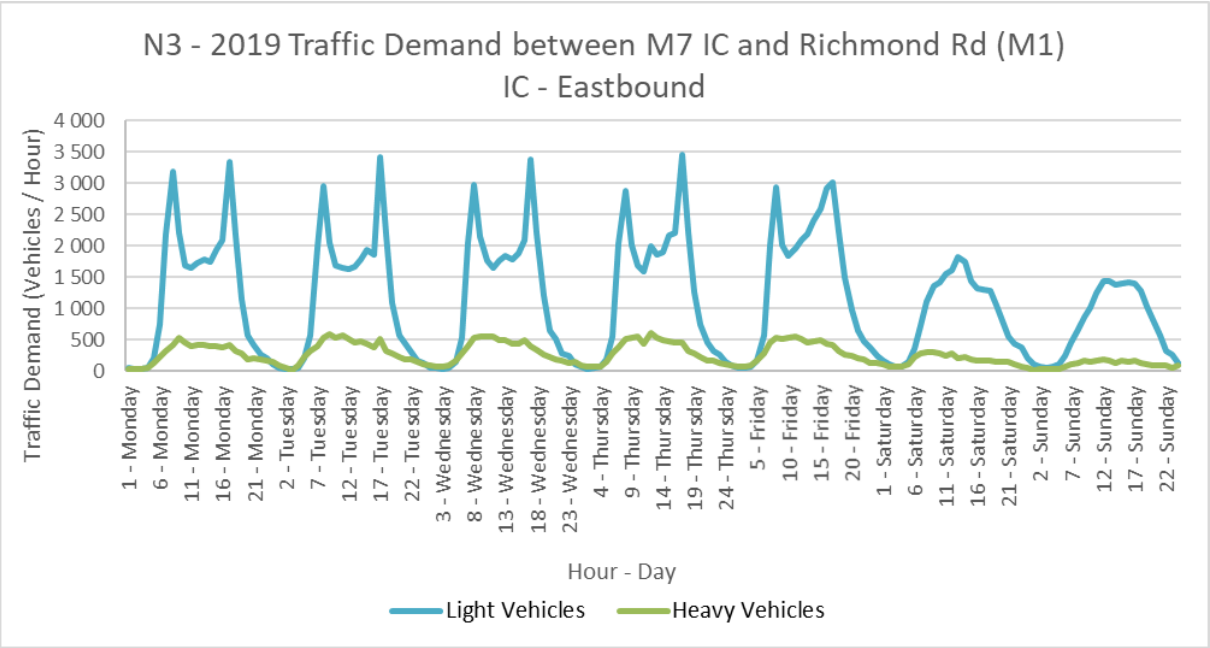
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N3 between M7 Interchange and M1 Interchange


N3 - 2019 Traffic Demand between M7 IC and Richmond Rd (M1) IC - Eastbound
Traffic Demand (Vehicles / Hour)
4 000
3 500
3 000
2 500
2 000
1 500
1 000
500
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1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
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1 - Saturday
6 - Saturday
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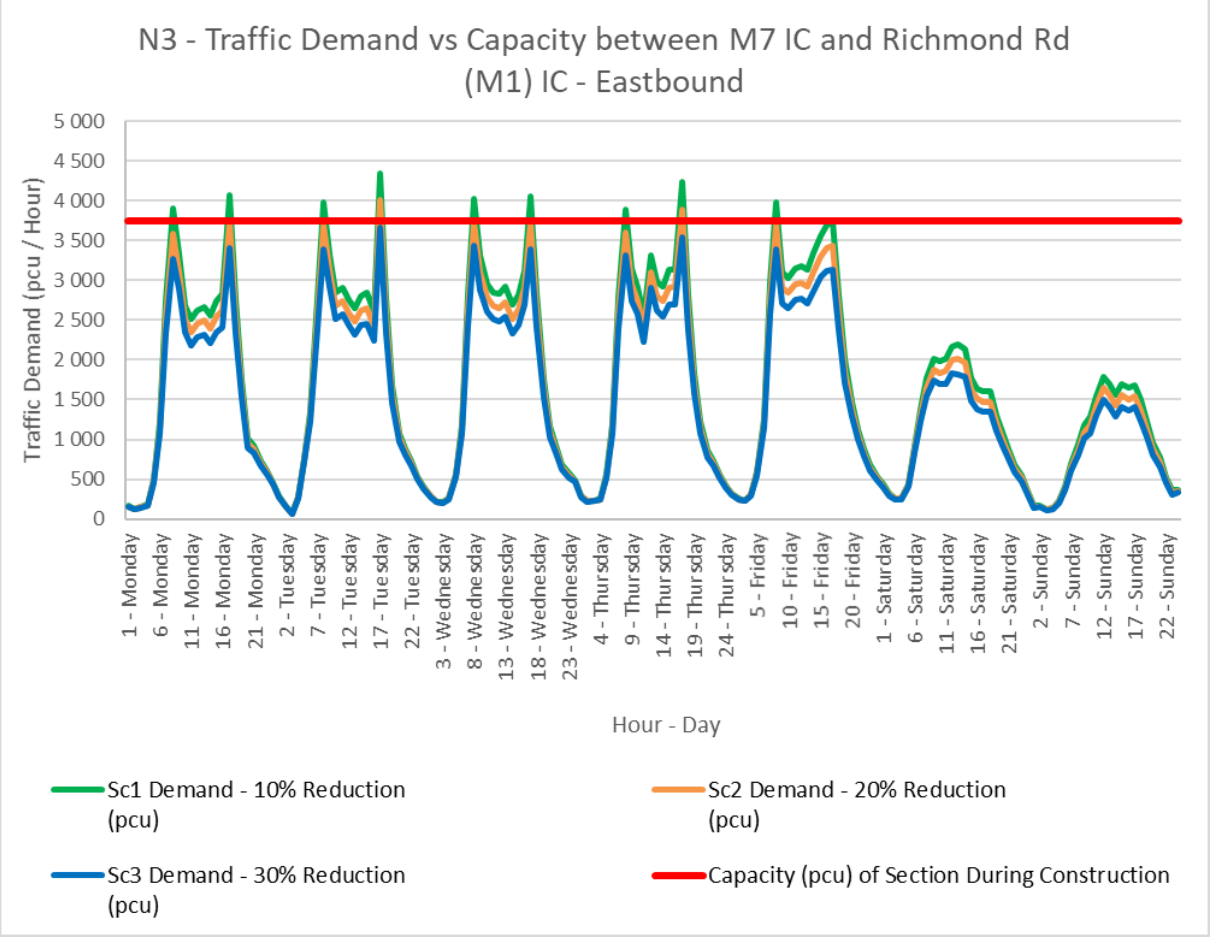
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between M7 IC and Richmond Rd (M1) IC - Eastbound
Traffic Demand (pcu / Hour)
5 000
4 500
4 000
3 500
3 000
2 500
2 000
1 500
1 000
500
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1 - Monday
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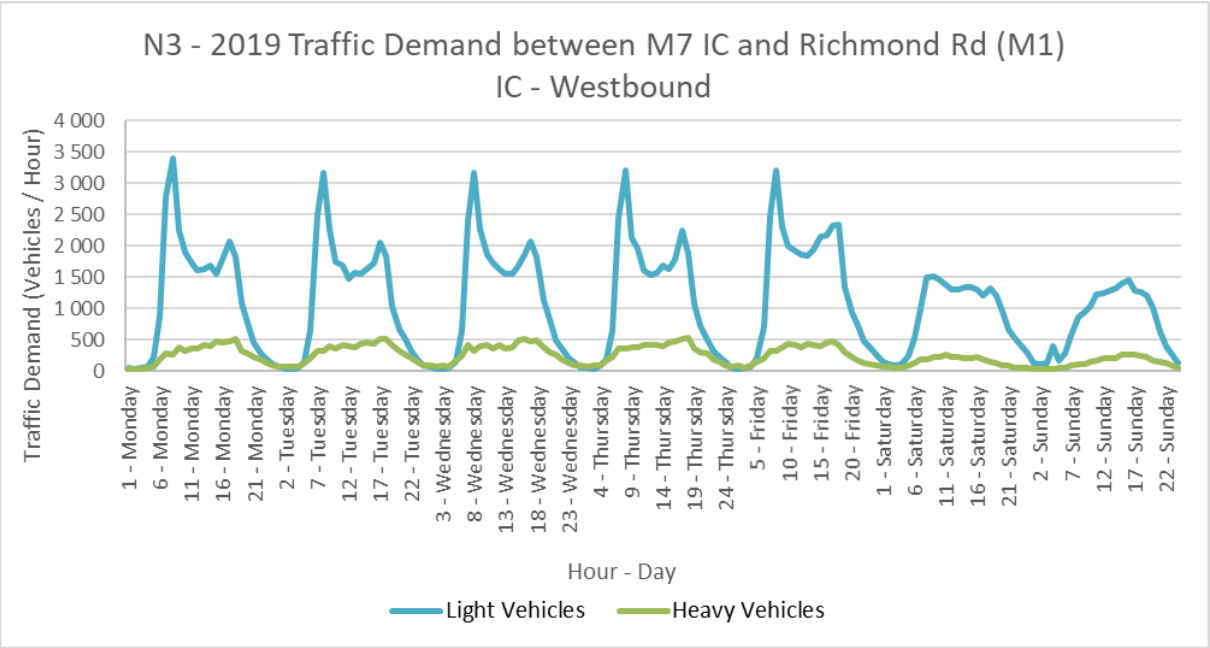
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N3 - 2019 Traffic Demand between M7 IC and Richmond Rd (M1) IC - Westbound
Traffic Demand (Vehicles / Hour)
4 000
3 500
3 000
2 500
2 000
1 500
1 000
500
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1 - Monday
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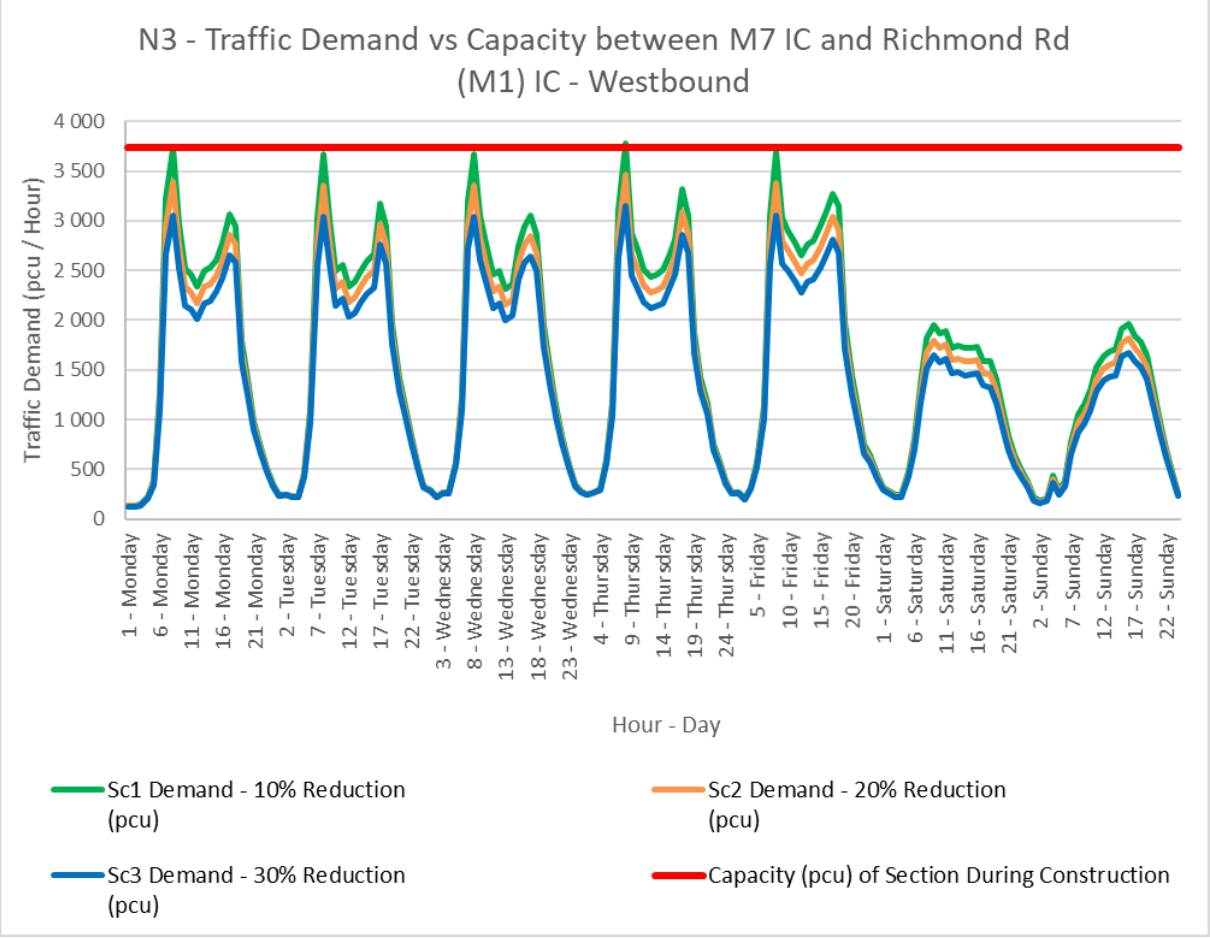
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between M7 IC and Richmond Rd (M1) IC - Westbound
Traffic Demand (pcu / Hour)
4 000
3 500
3 000
2 500
2 000
1 500
1 000
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1 - Monday
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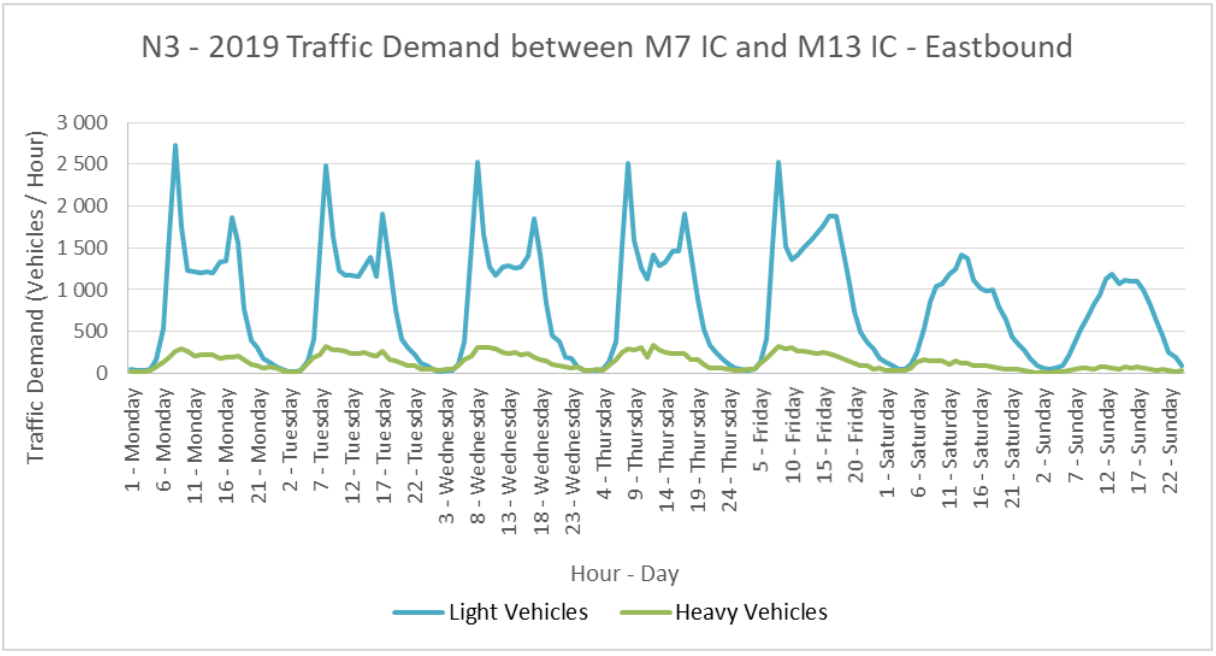
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N3 between M7 Interchange and M13 Interchange


N3 - 2019 Traffic Demand between M7 IC and M13 IC - Eastbound
Traffic Demand (Vehicles / Hour)
3 000
2 500
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1 - Monday
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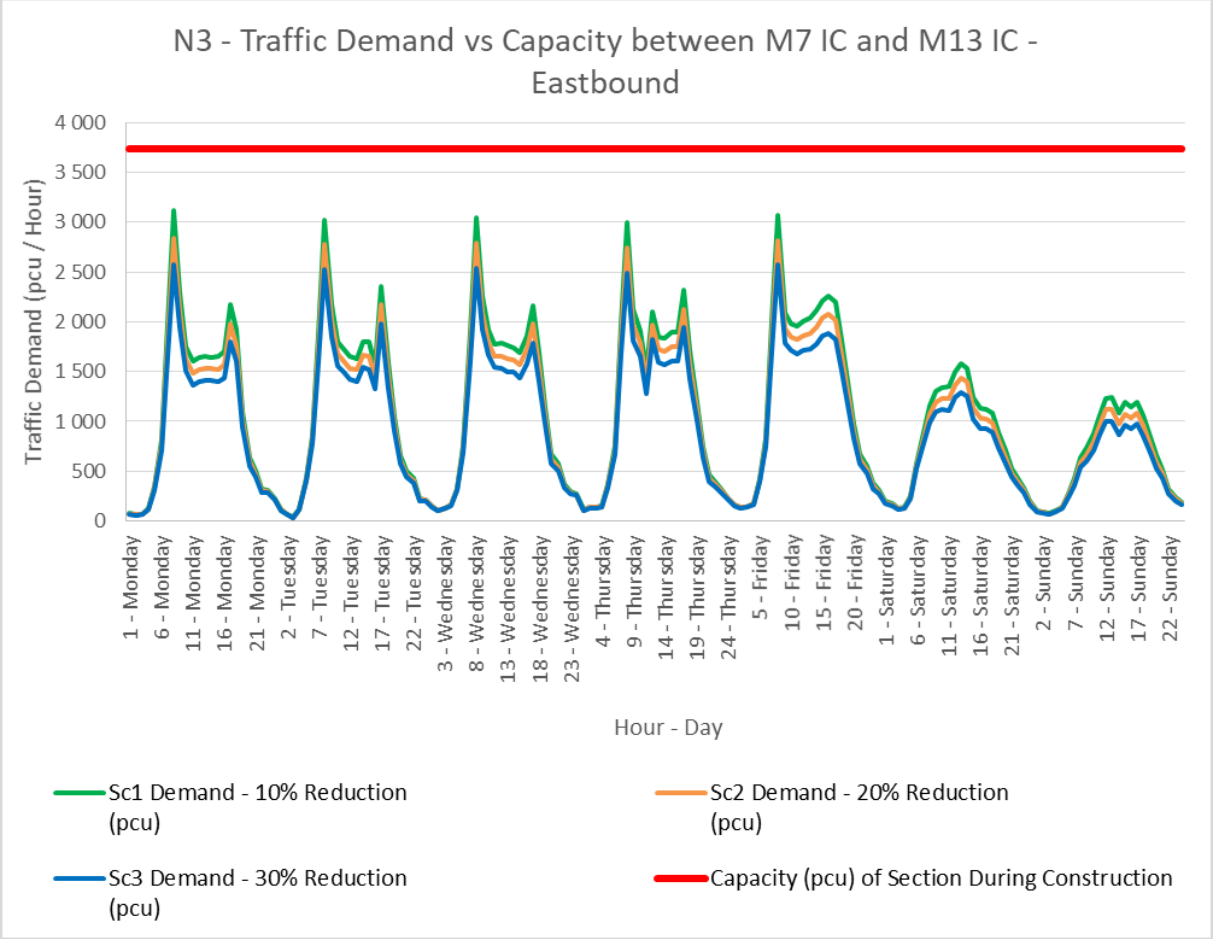
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between M7 IC and M13 IC - Eastbound
Traffic Demand (pcu / Hour)
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2 500
2 000
1 500
1 000
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1 - Monday
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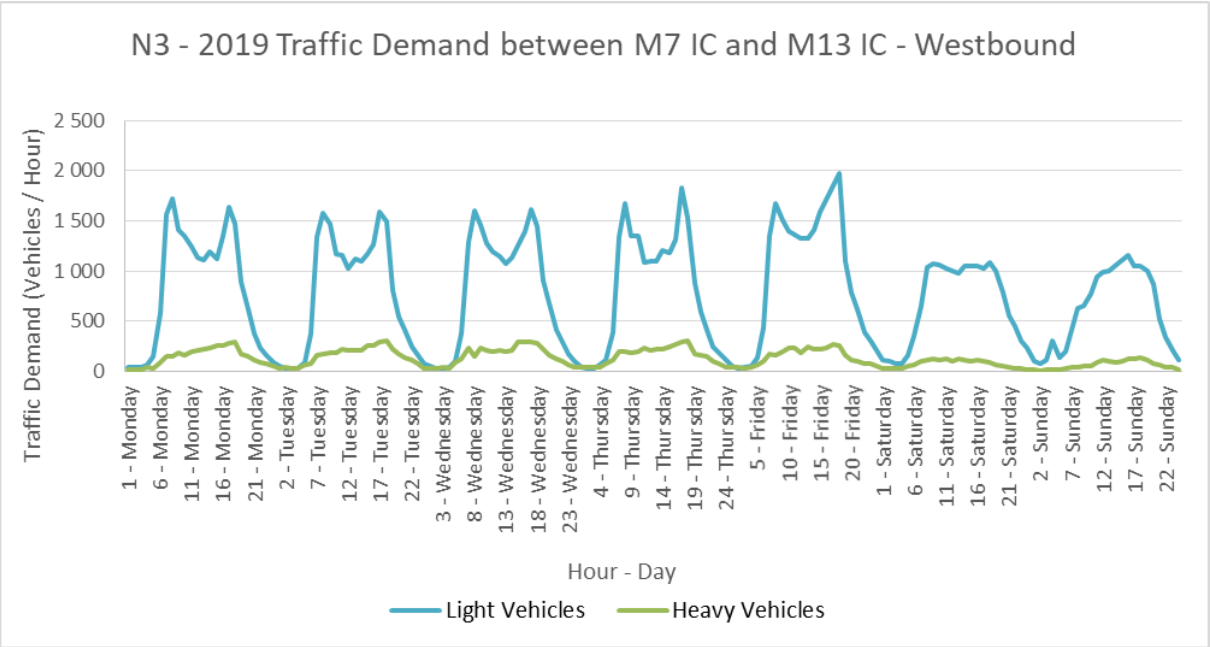
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N3 - 2019 Traffic Demand between M7 IC and M13 IC - Westbound
Traffic Demand (Vehicles / Hour)
2 500
2 000
1 500
1 000
500
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1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
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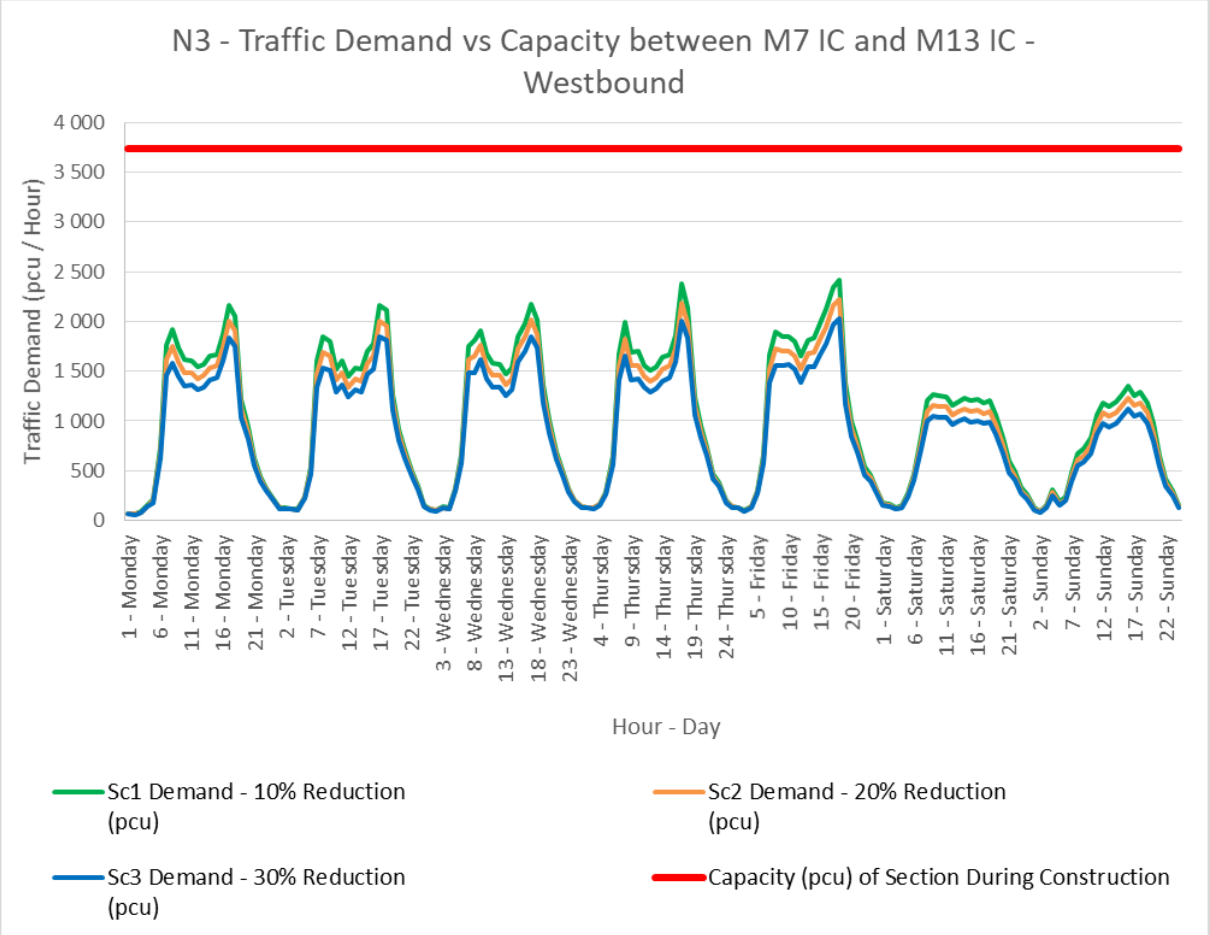
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between M7 IC and M13 IC - Westbound
Traffic Demand (pcu / Hour)
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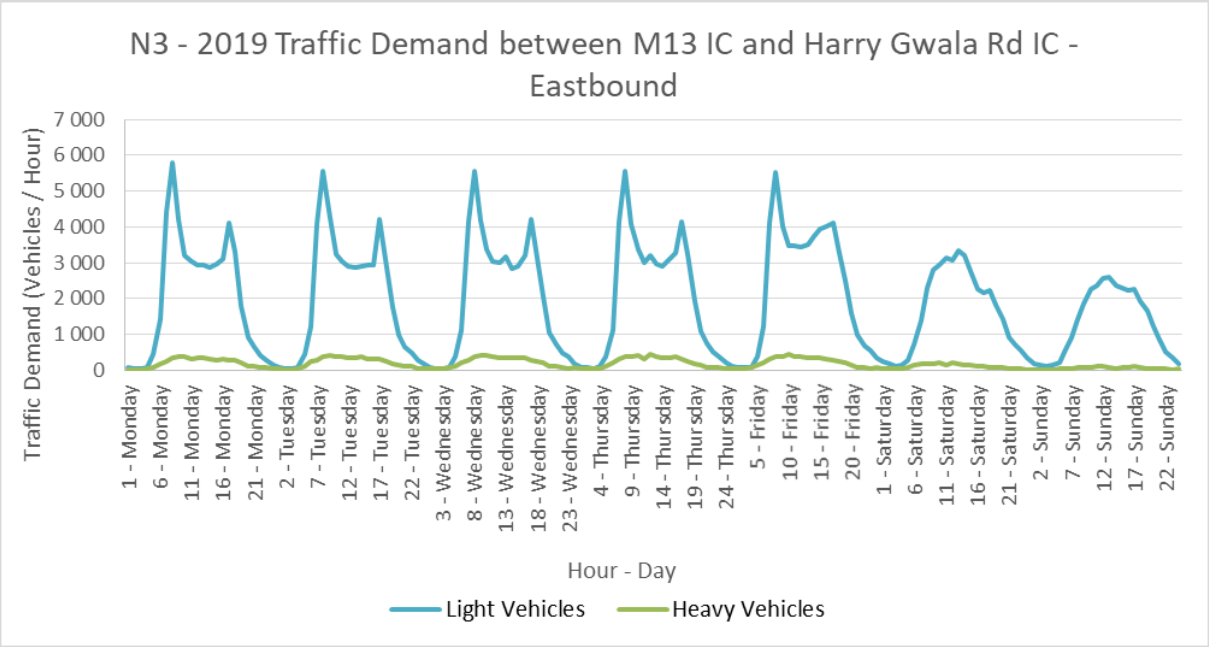
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N3 between M13 Interchange and Harry Gwala Road Interchange


N3 - 2019 Traffic Demand between M13 IC and Harry Gwala Rd IC - Eastbound
Traffic Demand (Vehicles / Hour)
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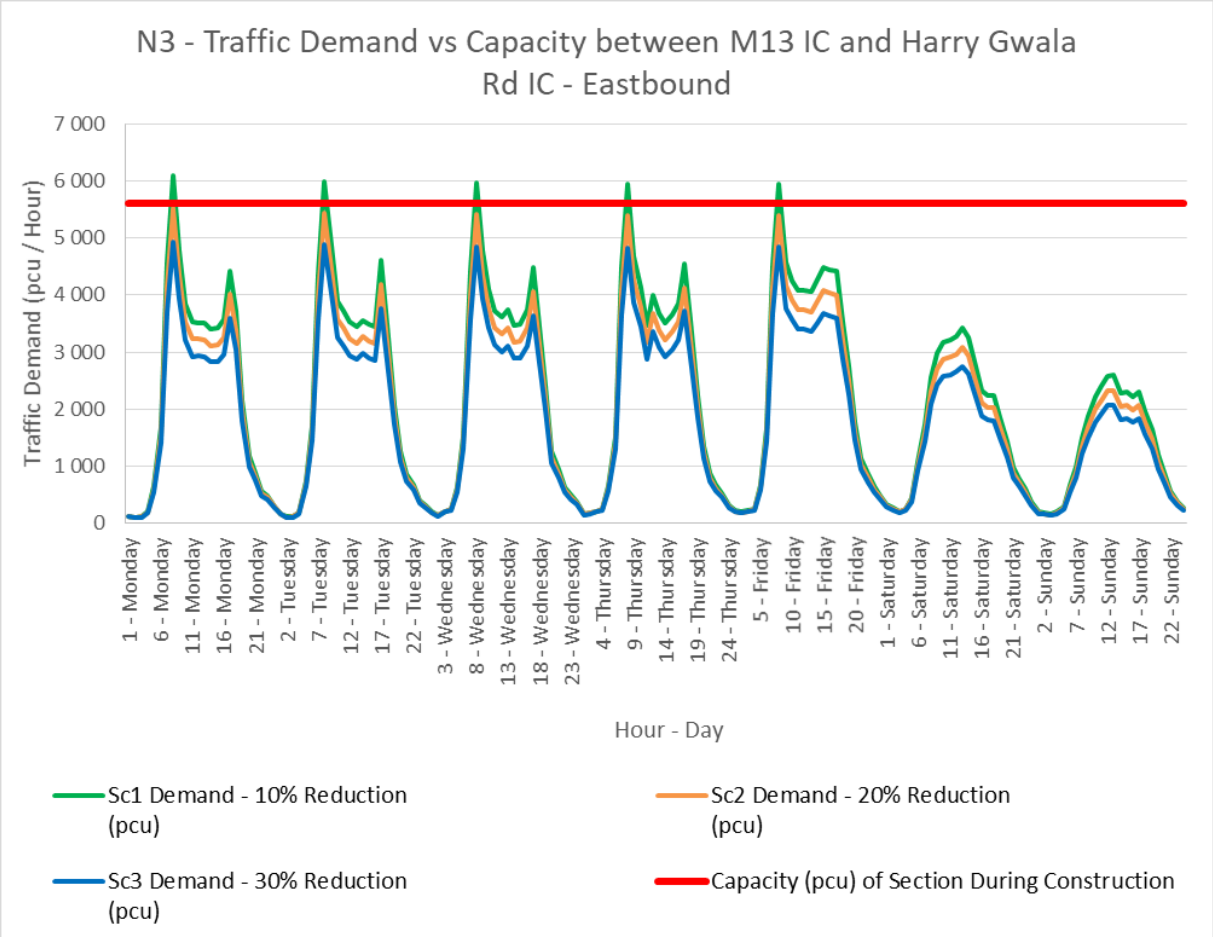
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between M13 IC and Harry Gwala Rd IC - Eastbound
Traffic Demand (pcu / Hour)
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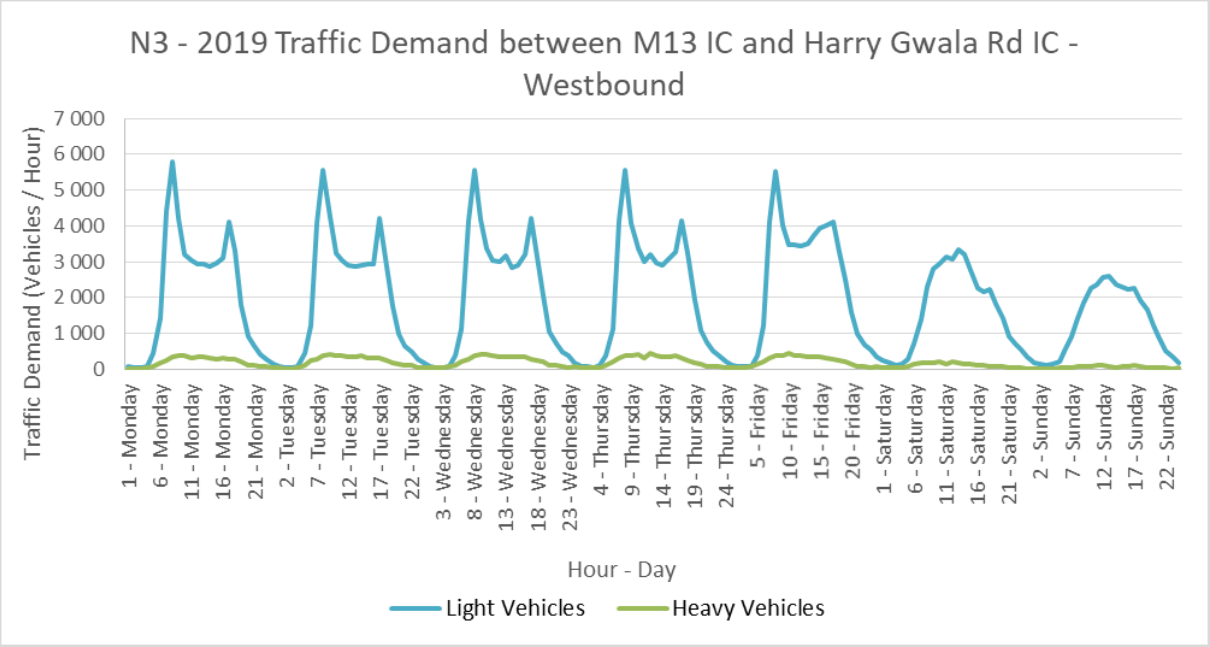
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N3 - 2019 Traffic Demand between M13 IC and Harry Gwala Rd IC - Westbound
Traffic Demand (Vehicles / Hour)
7 000
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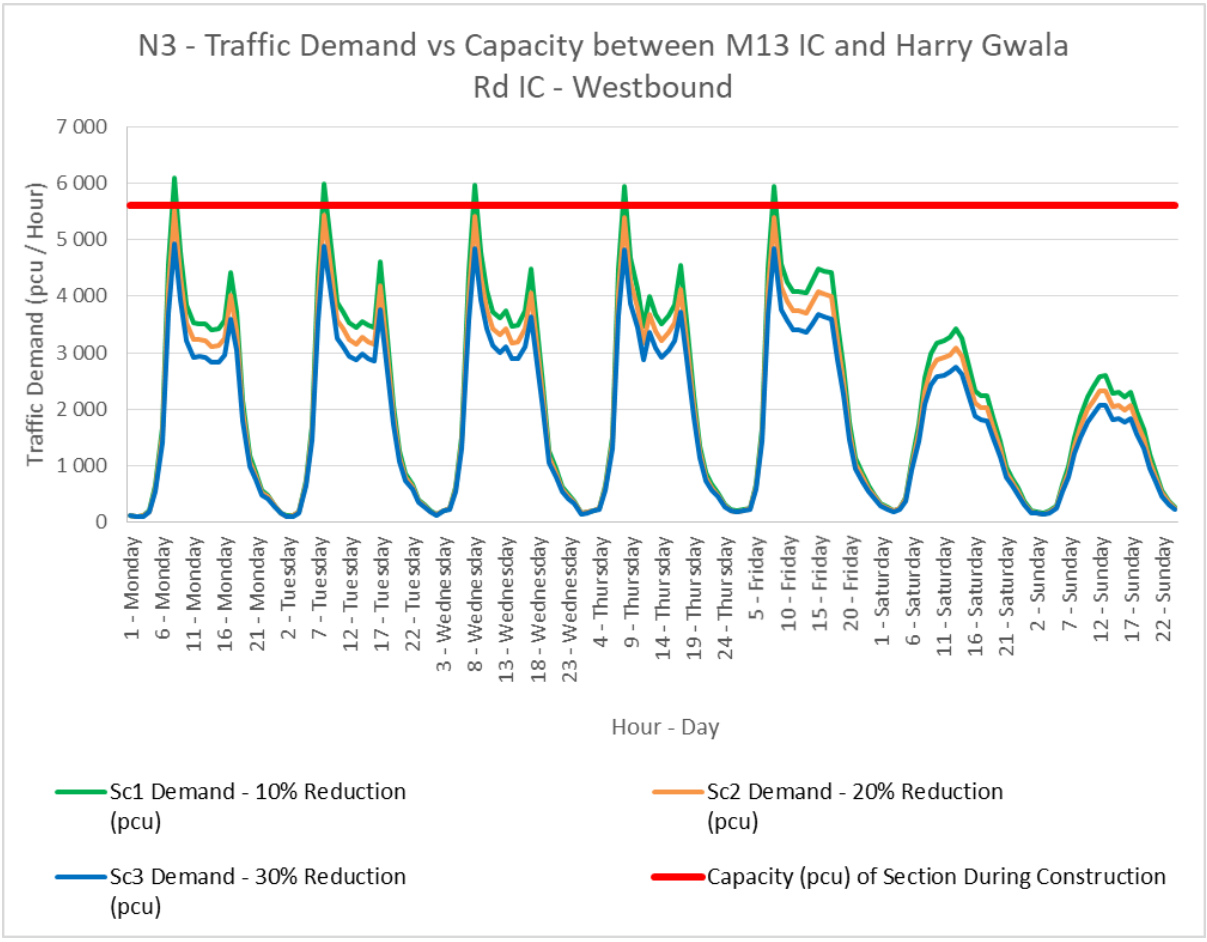
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between M13 IC and Harry Gwala Rd IC - Westbound
Traffic Demand (pcu / Hour)
7 000
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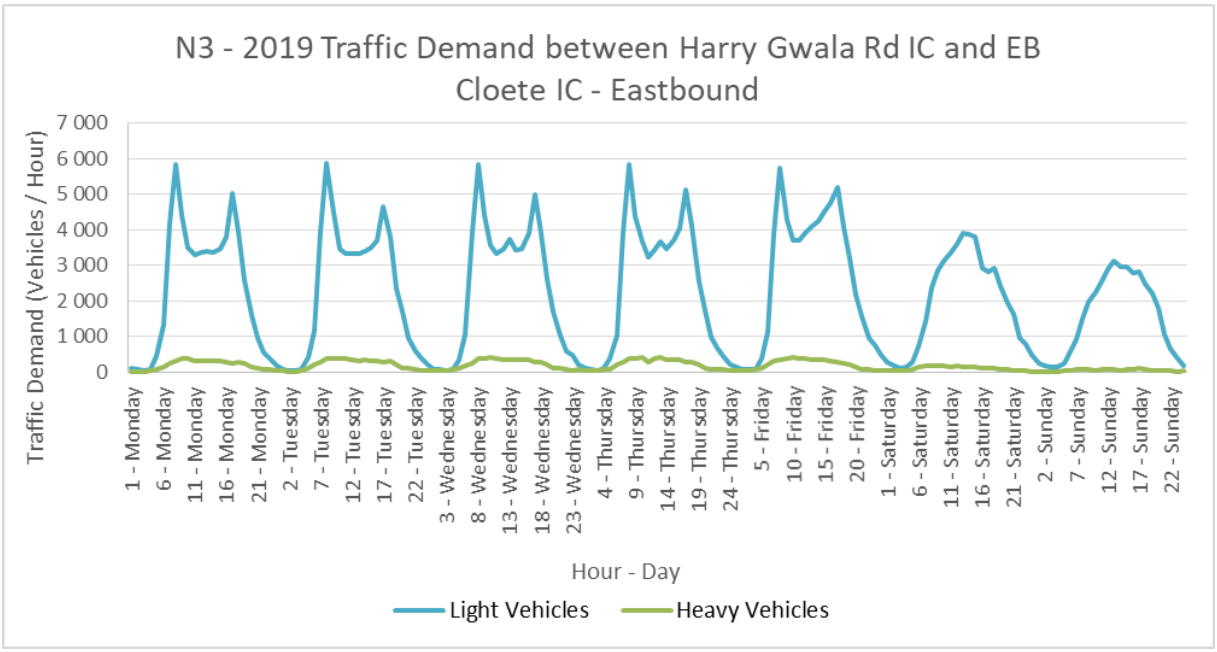
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N3 - 2019 Traffic Demand between Harry Gwala Rd IC and EB Cloete IC - Eastbound
Traffic Demand (Vehicles / Hour)
7 000
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1 - Monday
6 - Monday
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16 - Monday
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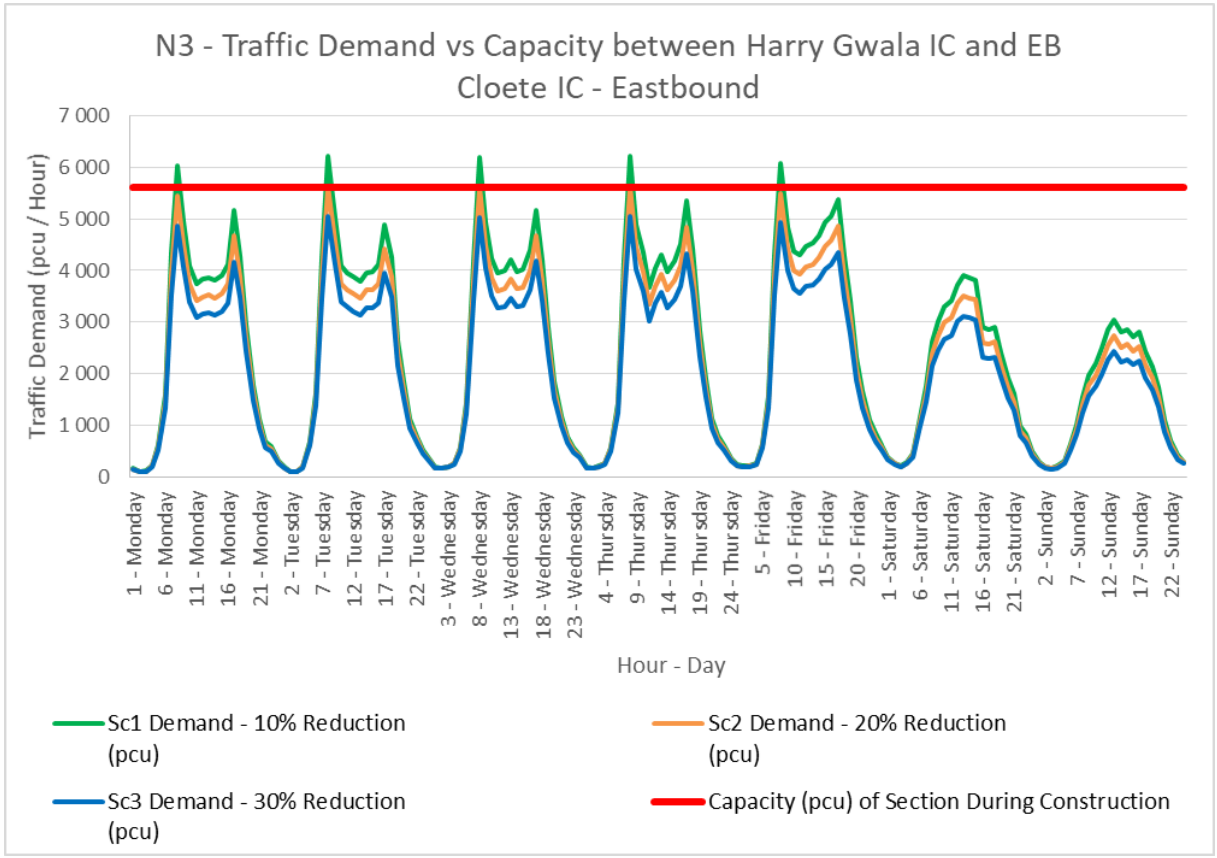
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between Harry Gwala IC and EB Cloete IC - Eastbound
Traffic Demand (pcu / Hour)
7 000
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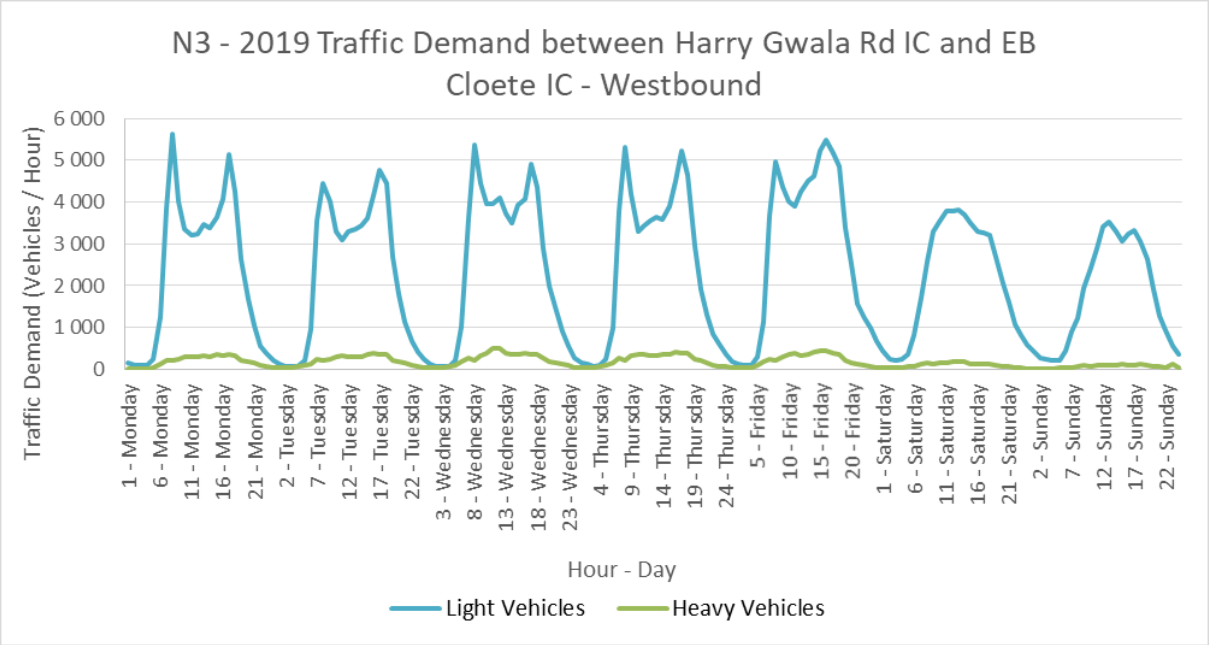
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N3 - 2019 Traffic Demand between Harry Gwala Rd IC and EB Cloete IC - Westbound
Traffic Demand (Vehicles / Hour)
6 000
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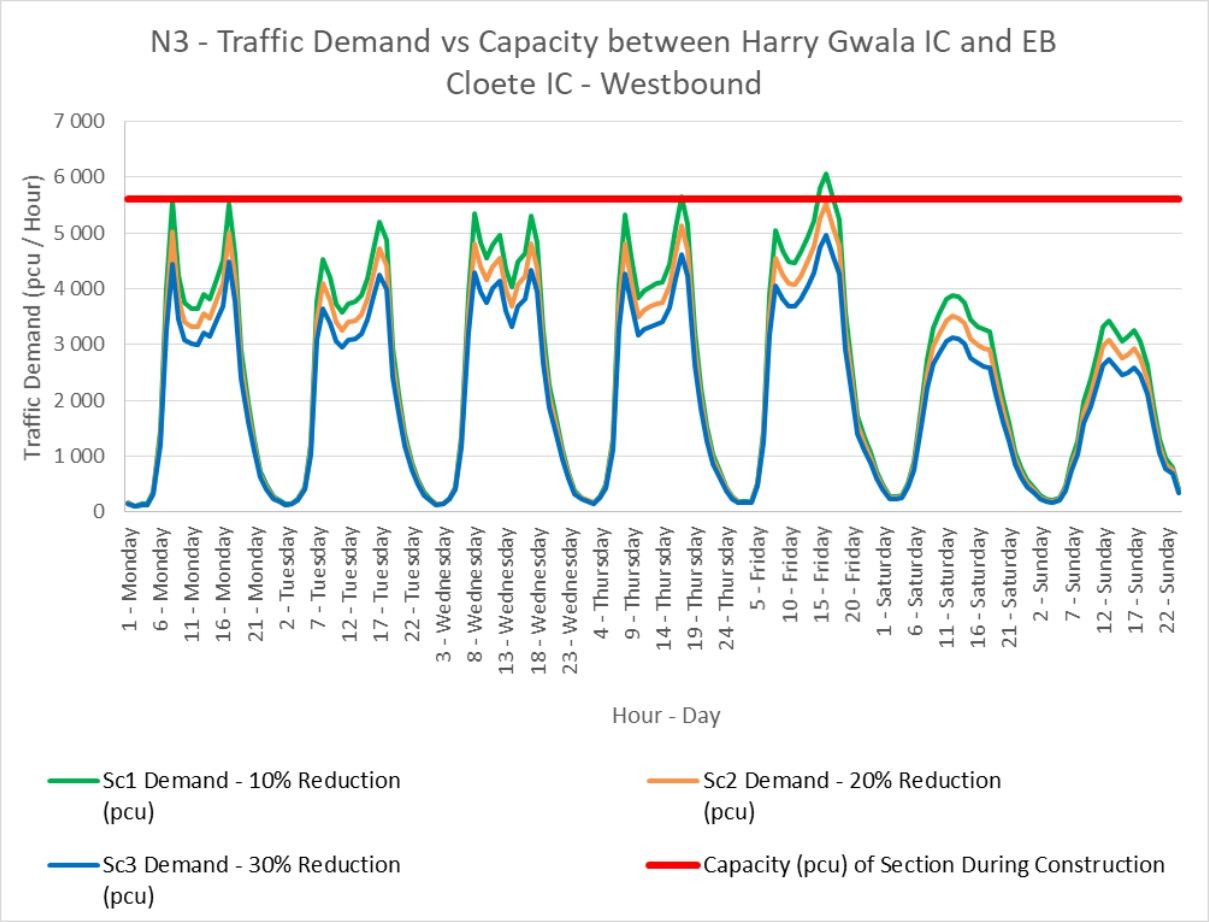
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between Harry Gwala IC and EB Cloete IC - Westbound
Traffic Demand (pcu / Hour)
7 000
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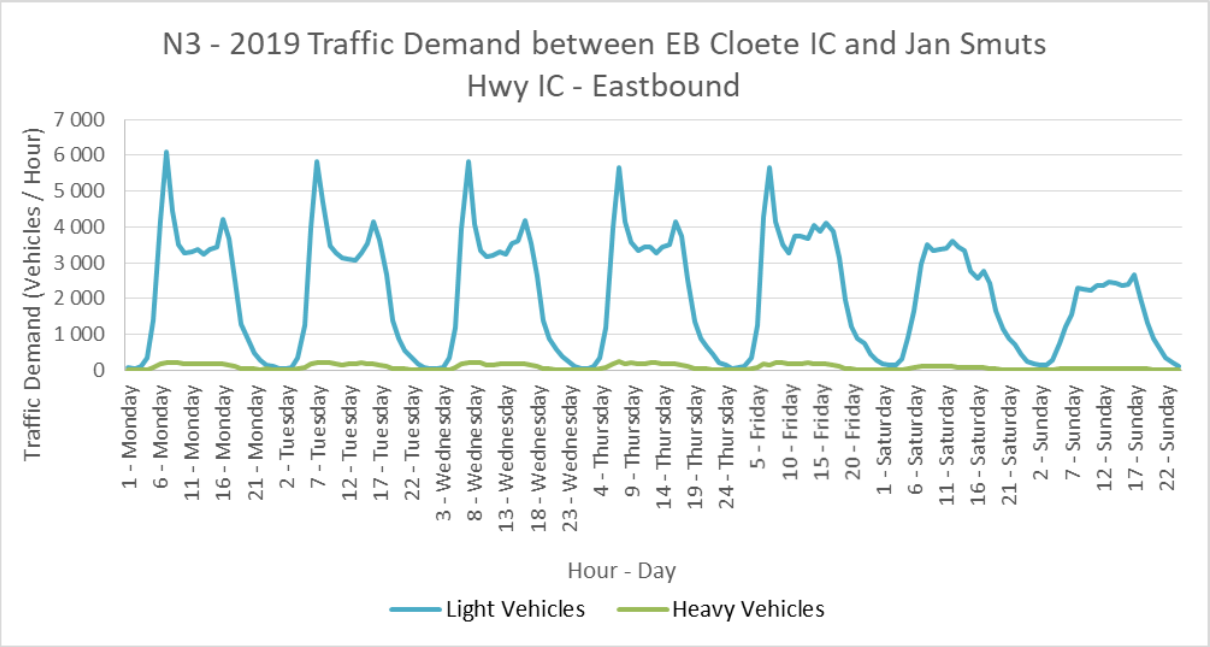
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N3 between EB Cloete Interchange and Jan Smuts Highway Interchange


N3 - 2019 Traffic Demand between EB Cloete IC and Jan Smuts Hwy IC - Eastbound
Traffic Demand (Vehicles / Hour)
7 000
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1 - Monday
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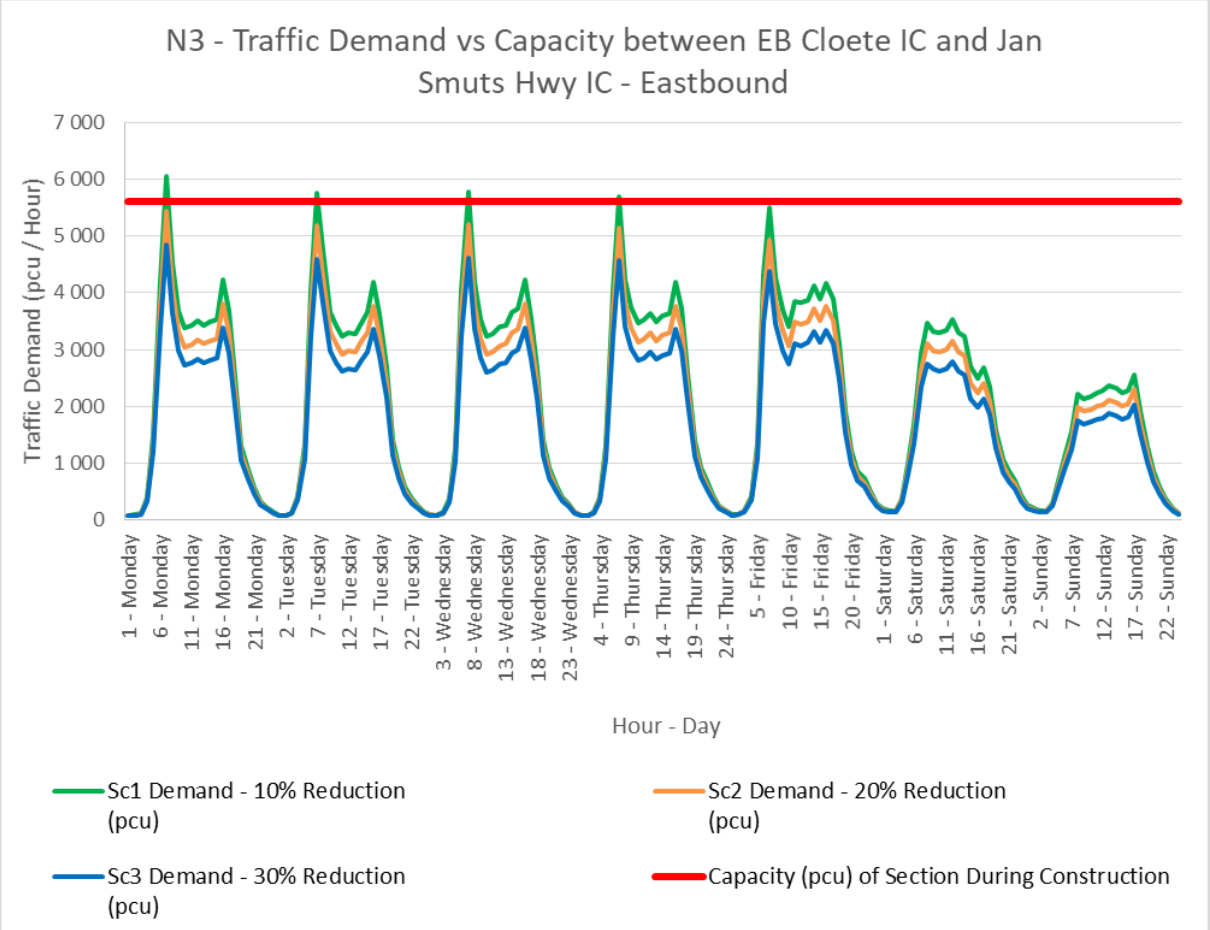
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between EB Cloete IC and Jan Smuts Hwy IC - Eastbound
Traffic Demand (pcu / Hour)
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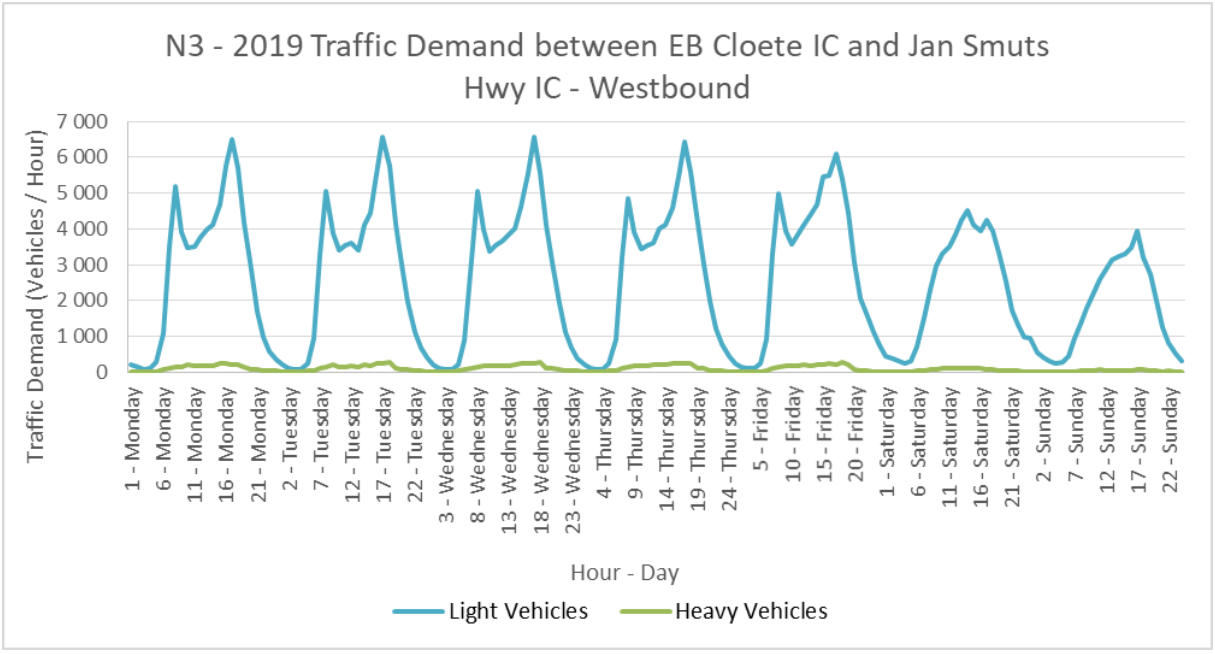
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N3 - 2019 Traffic Demand between EB Cloete IC and Jan Smuts Hwy IC - Westbound
Traffic Demand (Vehicles / Hour)
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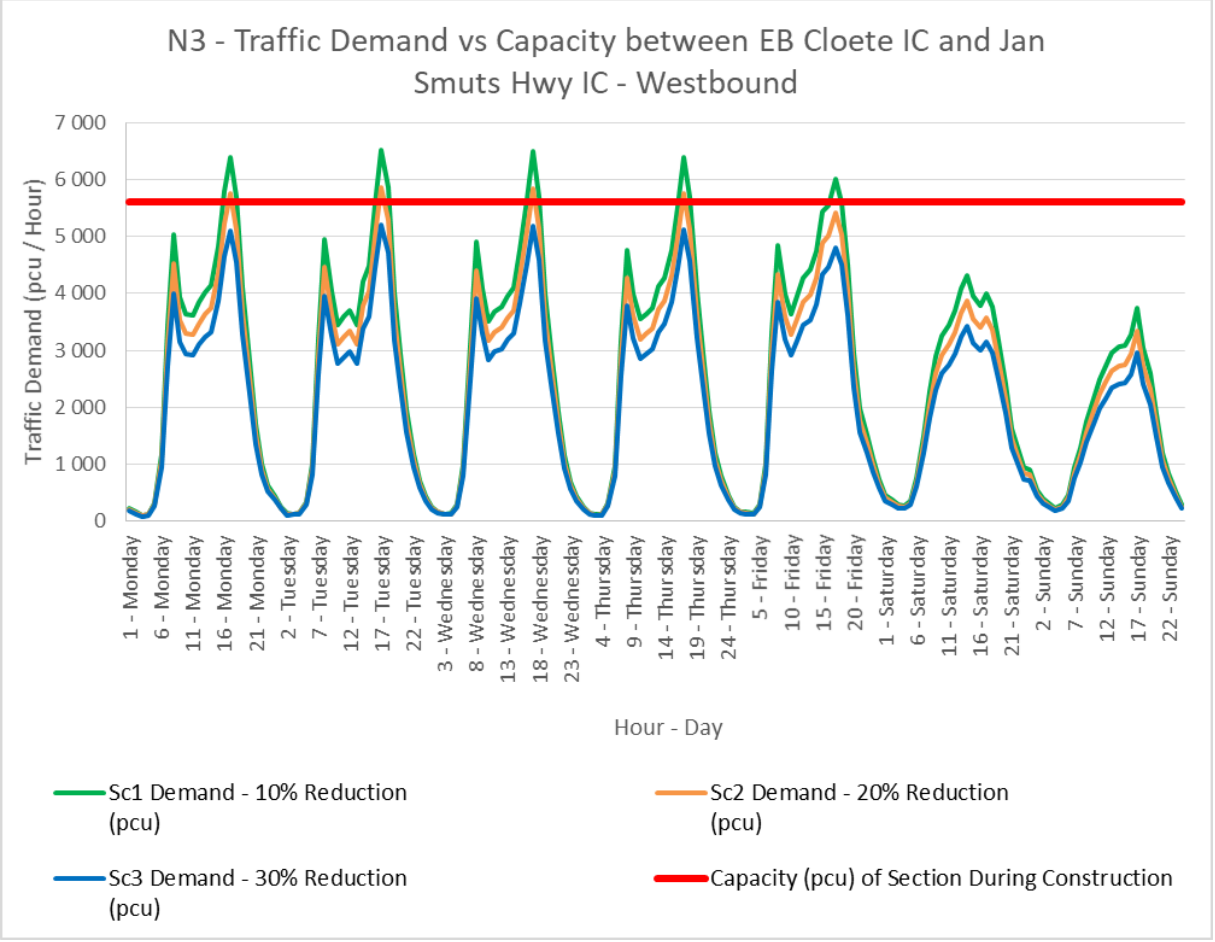
Hour - Day
Light Vehicles
Heavy Vehicles


N3 - Traffic Demand vs Capacity between EB Cloete IC and Jan Smuts Hwy IC - Westbound
Traffic Demand (pcu / Hour)
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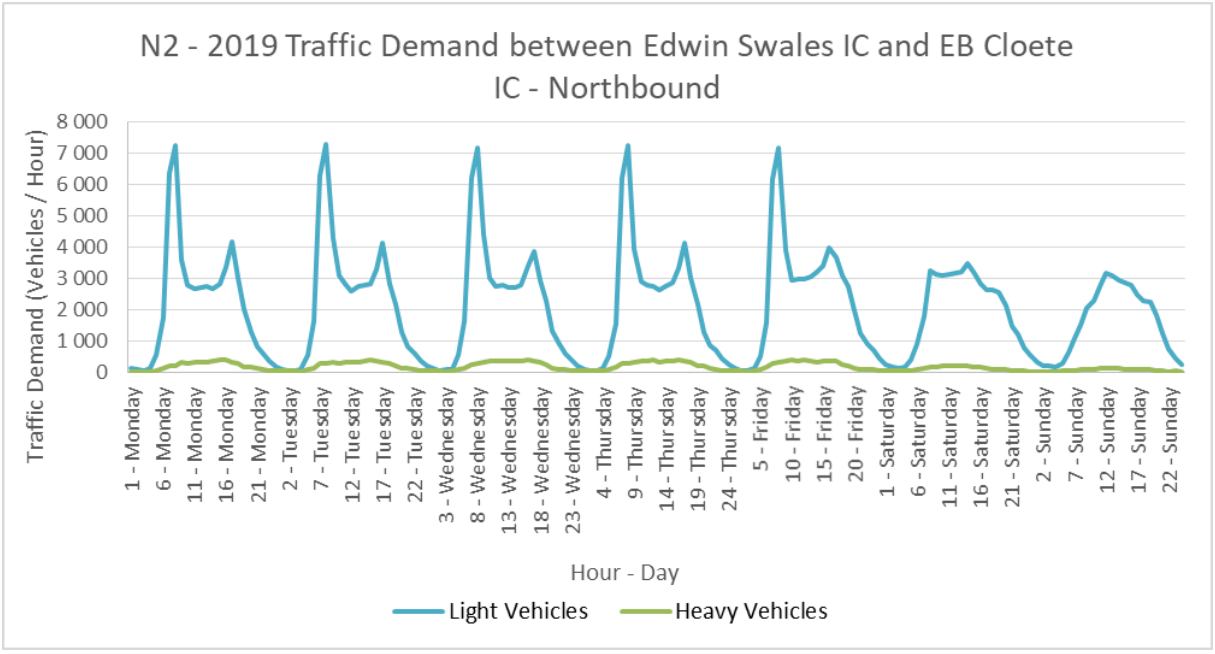
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N2 between Edwin Swales Interchange and EB Cloete Interchange


N2 - 2019 Traffic Demand between Edwin Swales IC and EB Cloete IC - Northbound
Traffic Demand (Vehicles / Hour)
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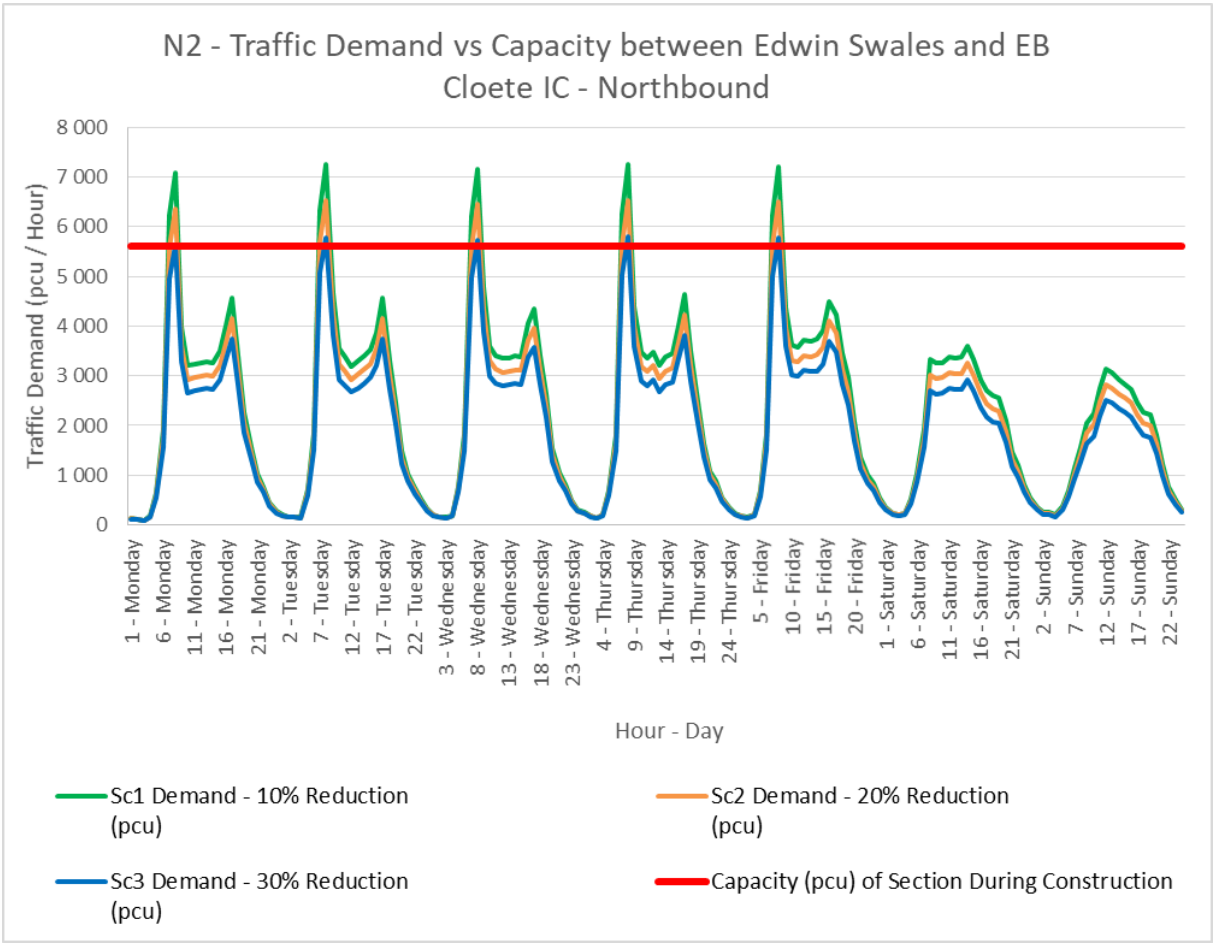
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N2 - Traffic Demand vs Capacity between Edwin Swales and EB Cloete IC - Northbound
Traffic Demand (pcu / Hour)
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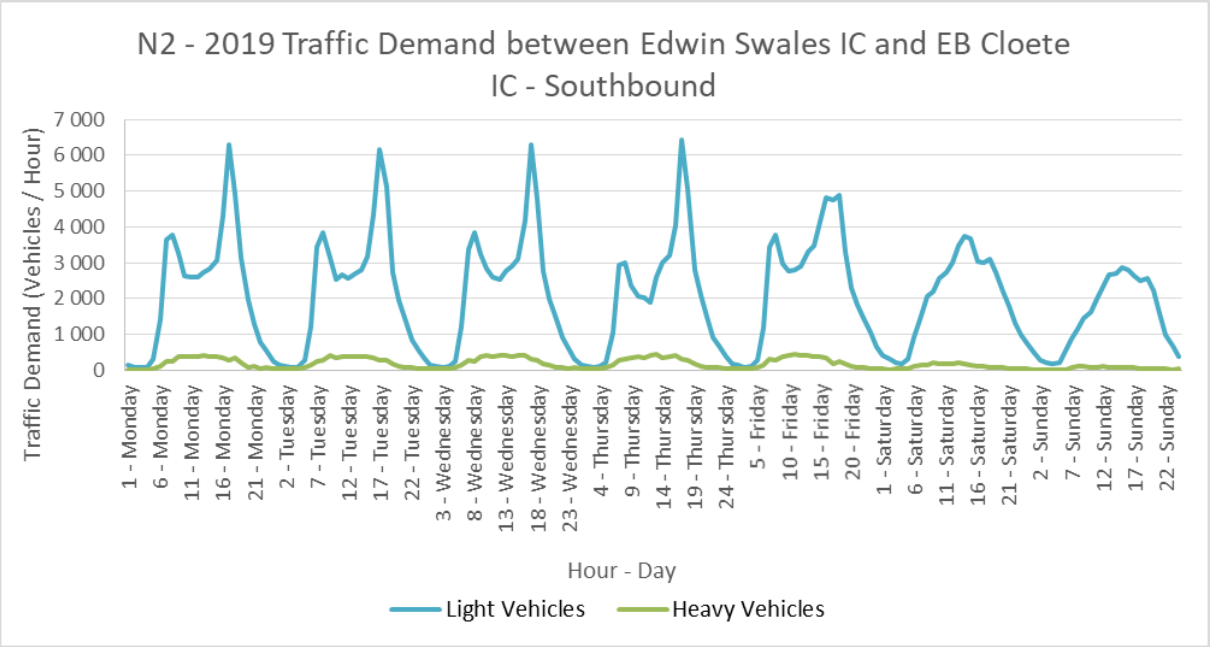
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N2 - 2019 Traffic Demand between Edwin Swales IC and EB Cloete IC - Southbound
Traffic Demand (Vehicles / Hour)
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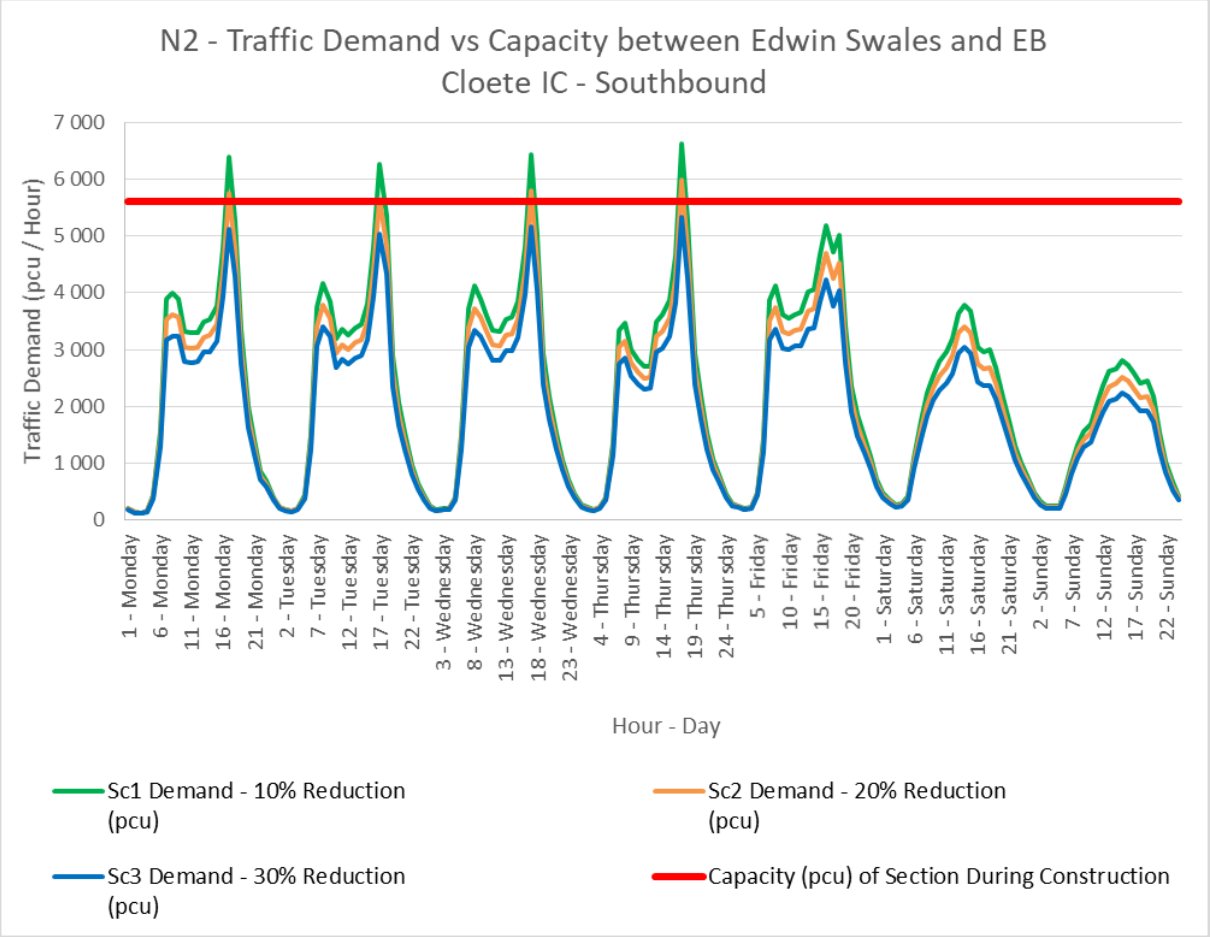
Hour - Day
Light Vehicles
Heavy Vehicles


N2 - Traffic Demand vs Capacity between Edwin Swales and EB Cloete IC - Southbound
Traffic Demand (pcu / Hour)
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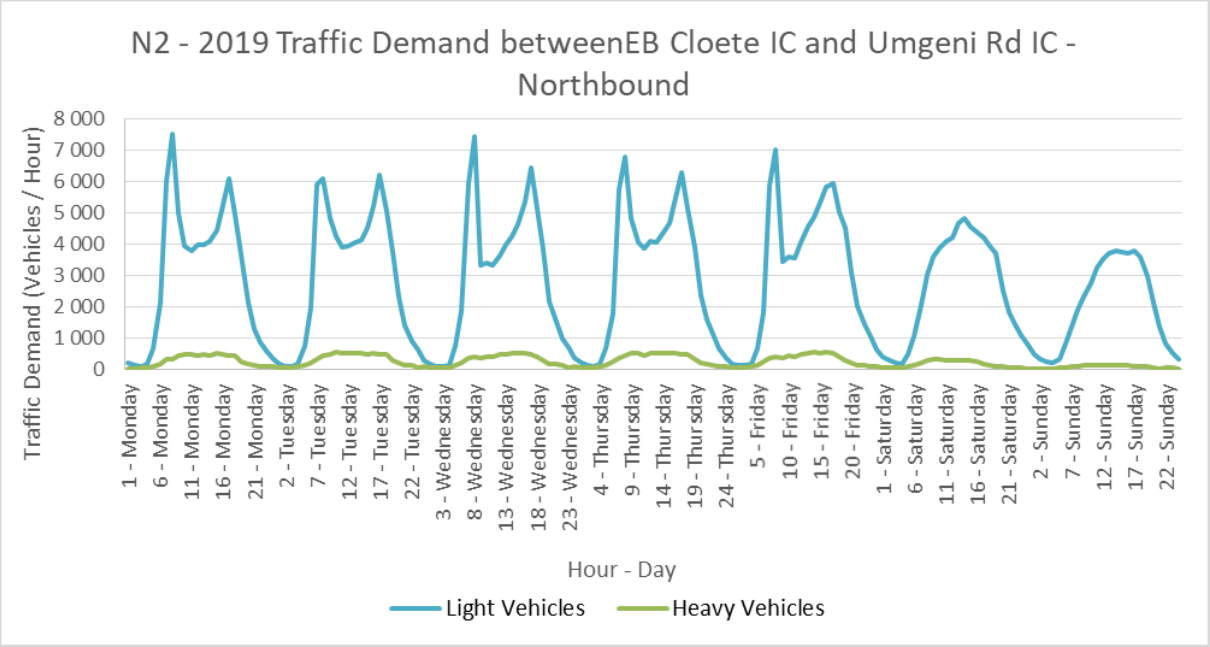
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N2 - 2019 Traffic Demand betweenEB Cloete IC and Umgeni Rd IC - Northbound
Traffic Demand (Vehicles / Hour)
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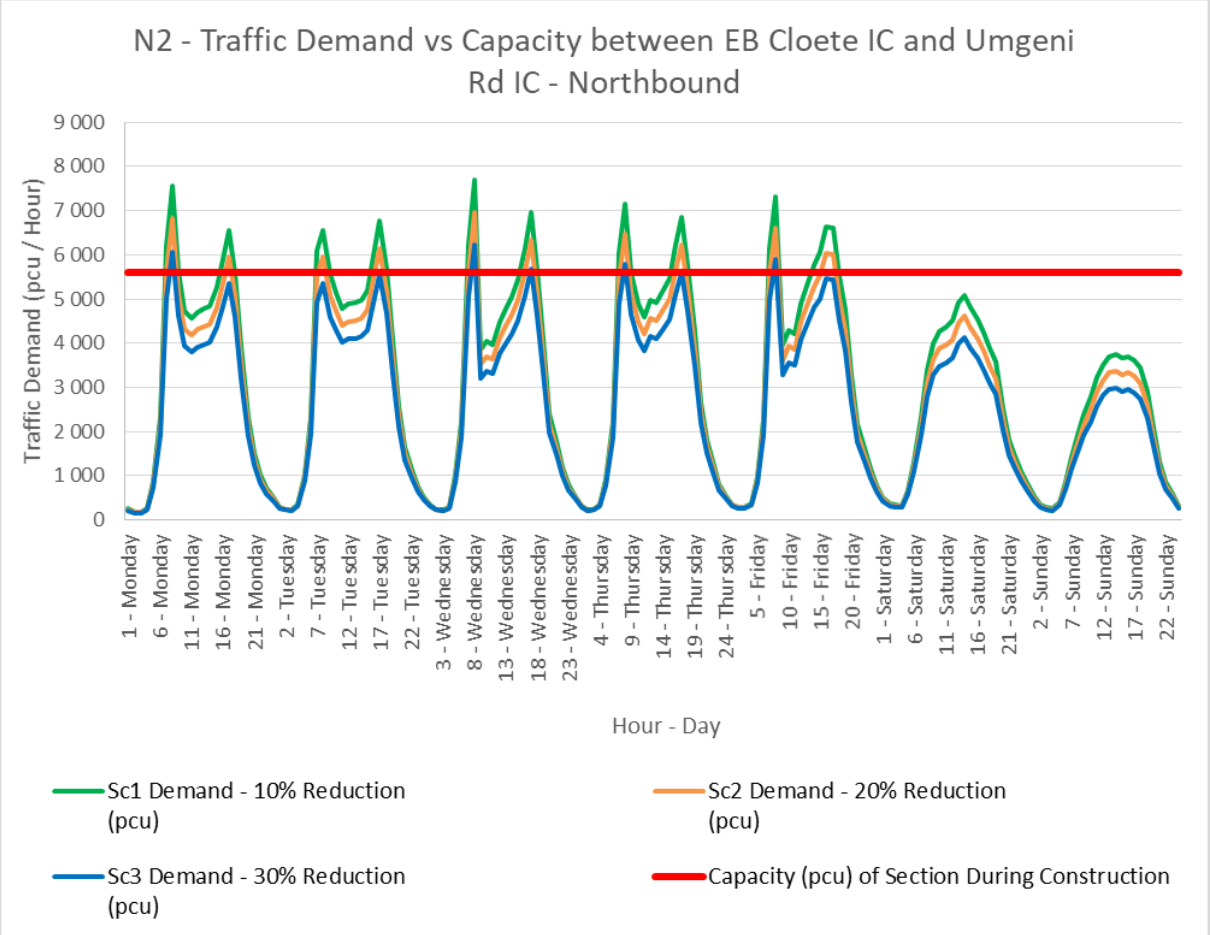
Hour - Day
Light Vehicles
Heavy Vehicles


N2 - Traffic Demand vs Capacity between EB Cloete IC and Umgeni Rd IC - Northbound
Traffic Demand (pcu / Hour)
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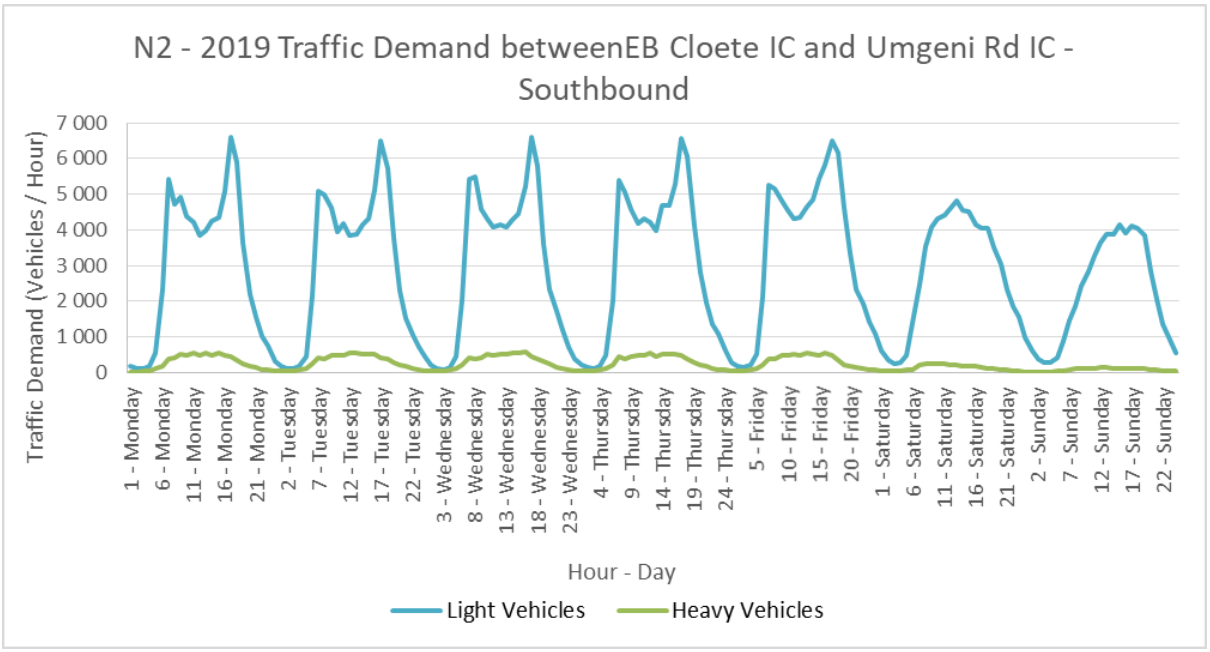
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N2 - 2019 Traffic Demand betweenEB Cloete IC and Umgeni Rd IC - Southbound
Traffic Demand (Vehicles / Hour)
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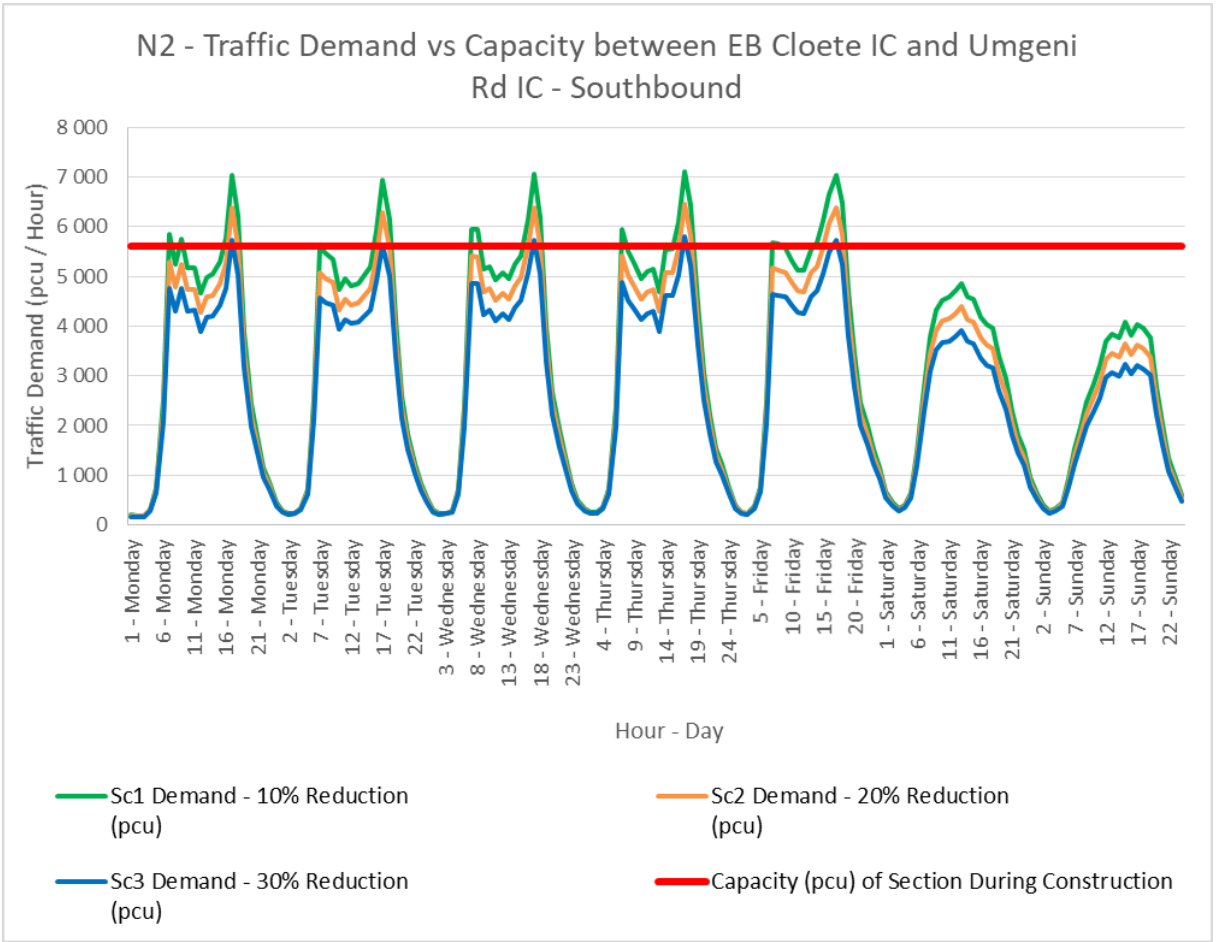
Hour - Day
Light Vehicles
Heavy Vehicles


N2 - Traffic Demand vs Capacity between EB Cloete IC and Umgeni Rd IC - Southbound
Traffic Demand (pcu / Hour)
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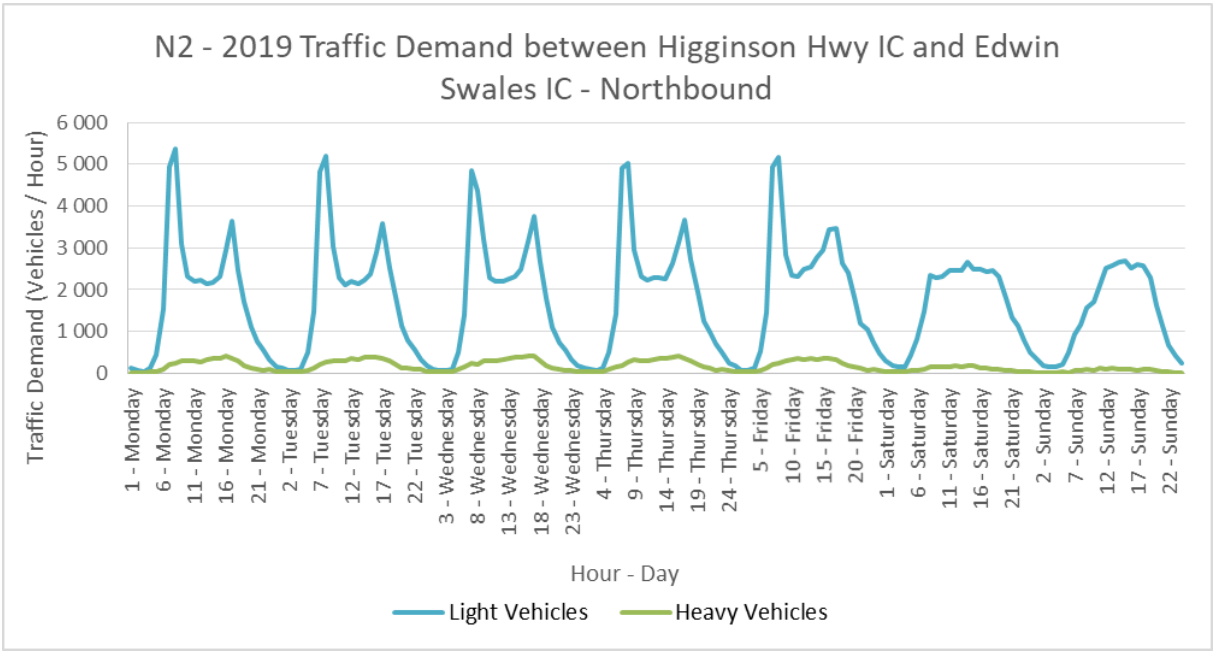
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N2 between Higginson Highway Interchange and Edwin Swales Interchange


N2 - 2019 Traffic Demand between Higginson Hwy IC and Edwin Swales IC - Northbound
Traffic Demand (Vehicles / Hour)
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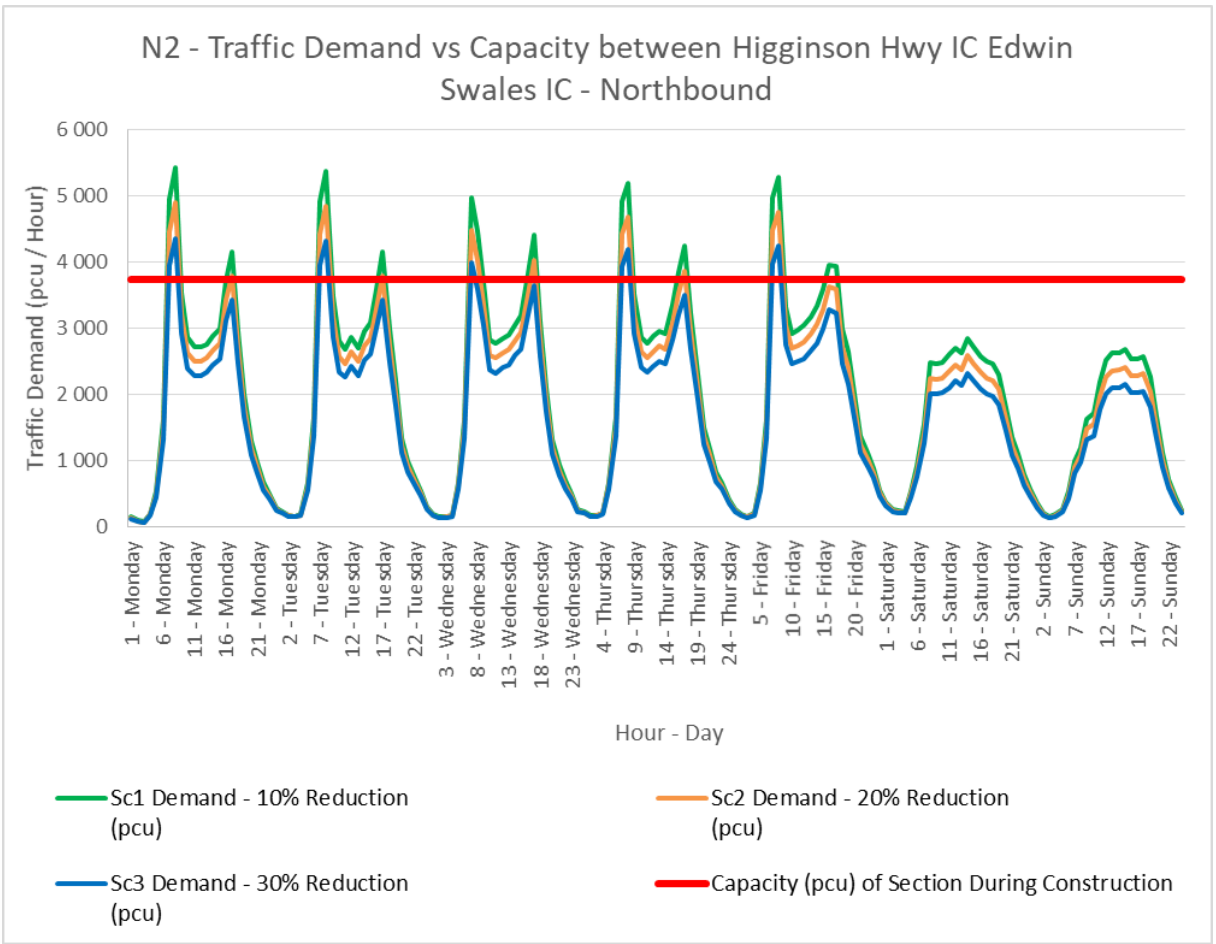
Hour - Day
Light Vehicles
Heavy Vehicles


N2 - Traffic Demand vs Capacity between Higginson Hwy IC Edwin Swales IC - Northbound
Traffic Demand (pcu / Hour)
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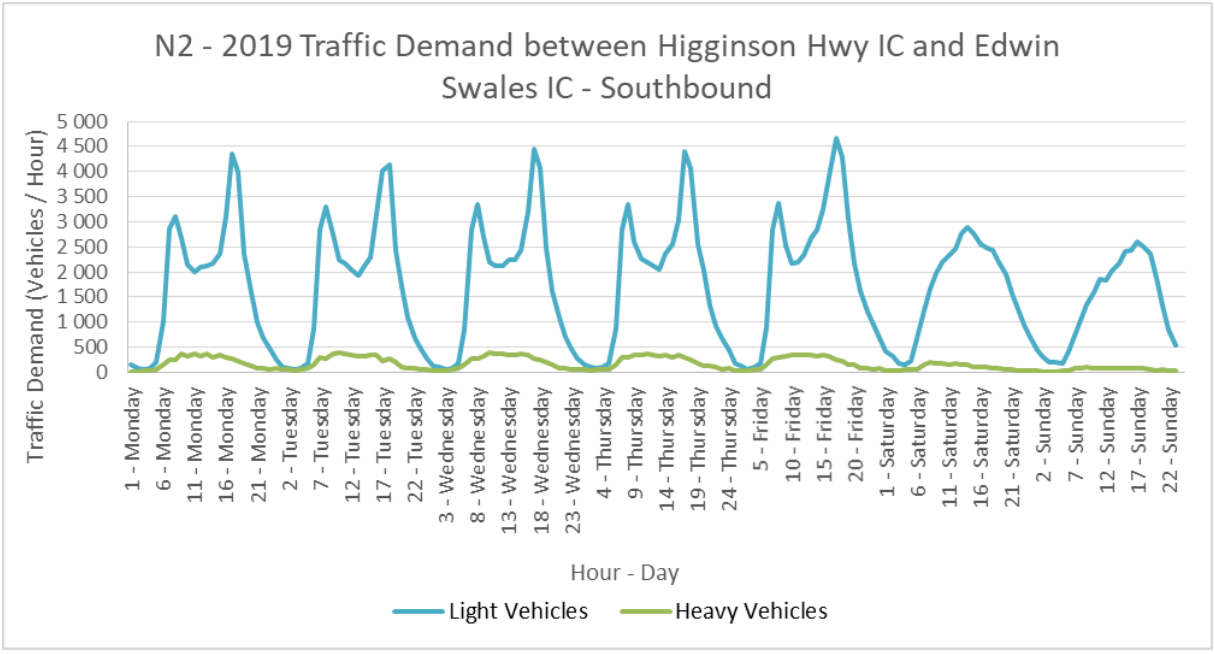
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N2 - 2019 Traffic Demand between Higginson Hwy IC and Edwin Swales IC - Southbound
Traffic Demand (Vehicles / Hour)
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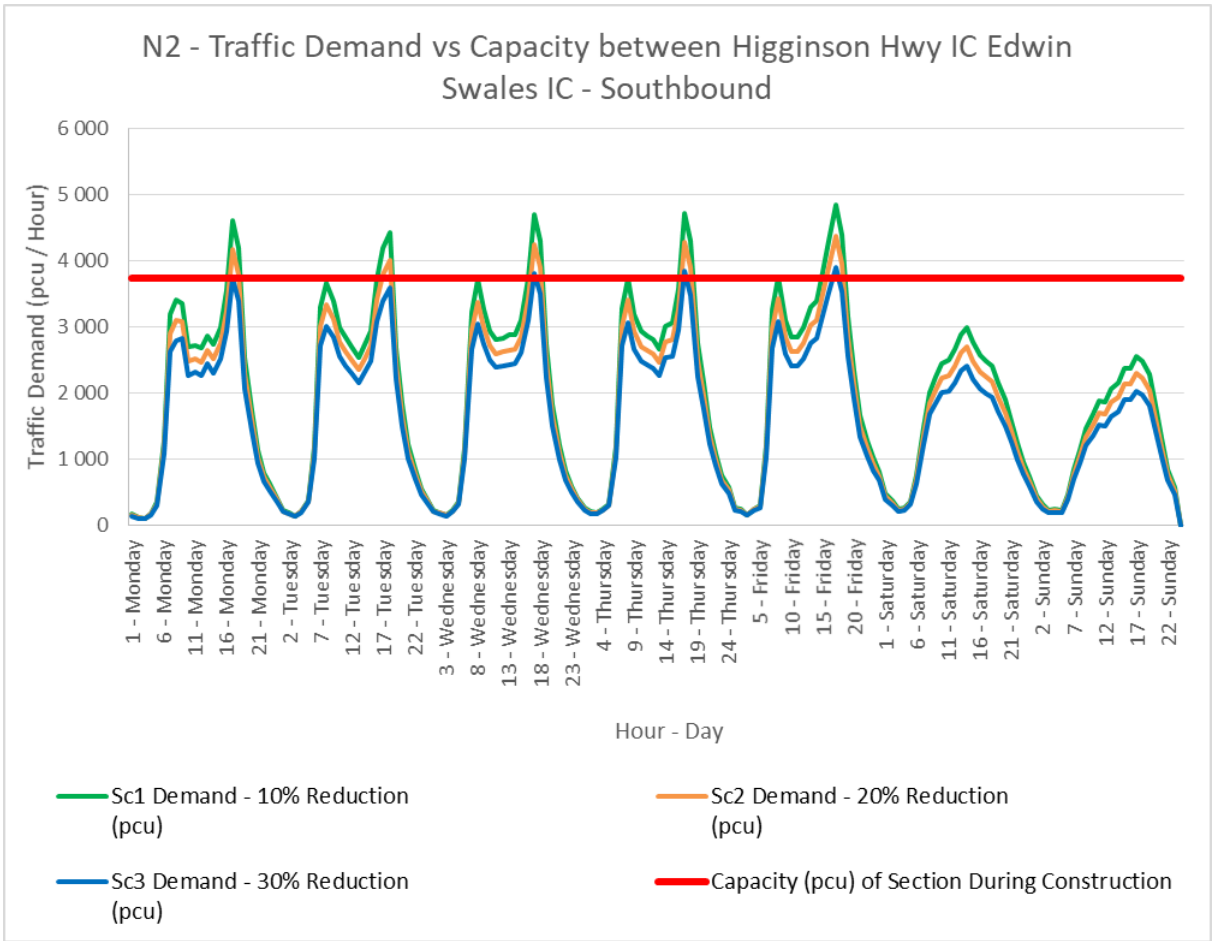
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N2 - Traffic Demand vs Capacity between Higginson Hwy IC Edwin Swales IC - Southbound
Traffic Demand (pcu / Hour)
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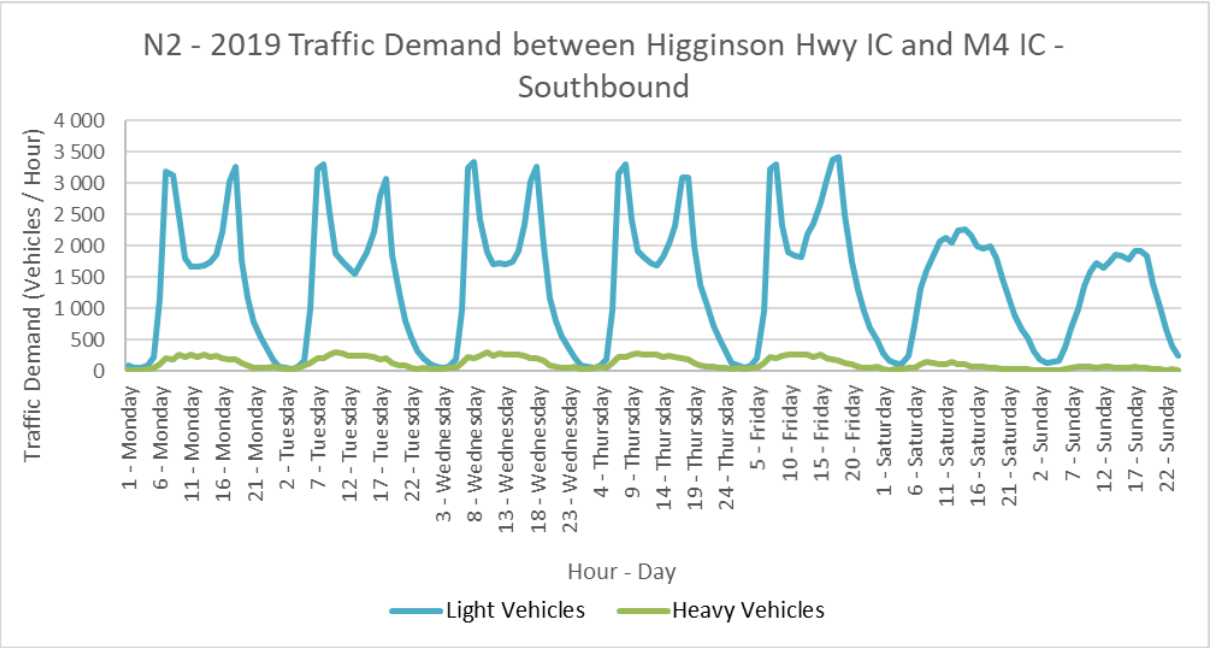
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N2 between Higginson Highway Interchange and M4 Interchange


N2 - 2019 Traffic Demand between Higginson Hwy IC and M4 IC - Southbound
Traffic Demand (Vehicles / Hour)
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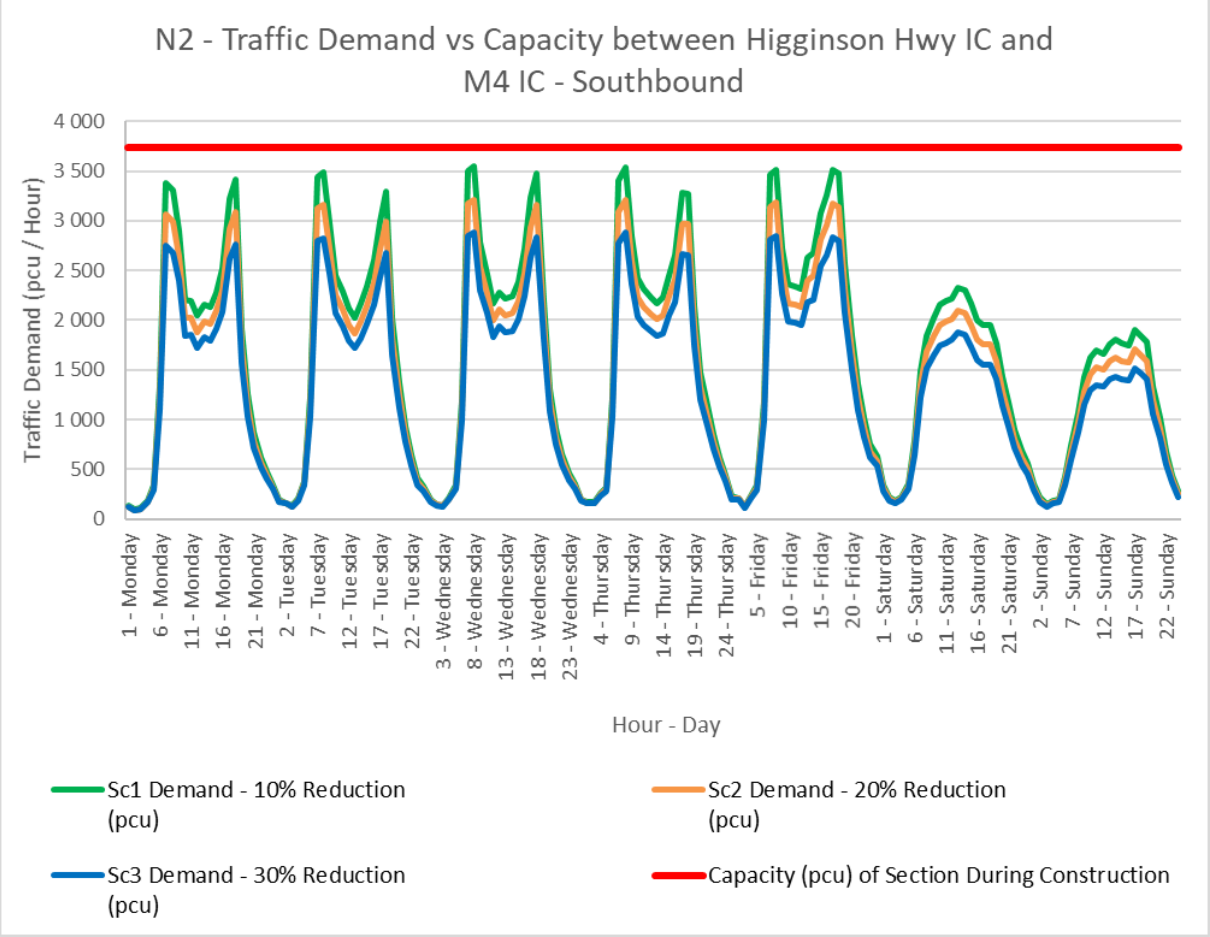
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N2 - Traffic Demand vs Capacity between Higginson Hwy IC and M4 IC - Southbound
Traffic Demand (pcu / Hour)
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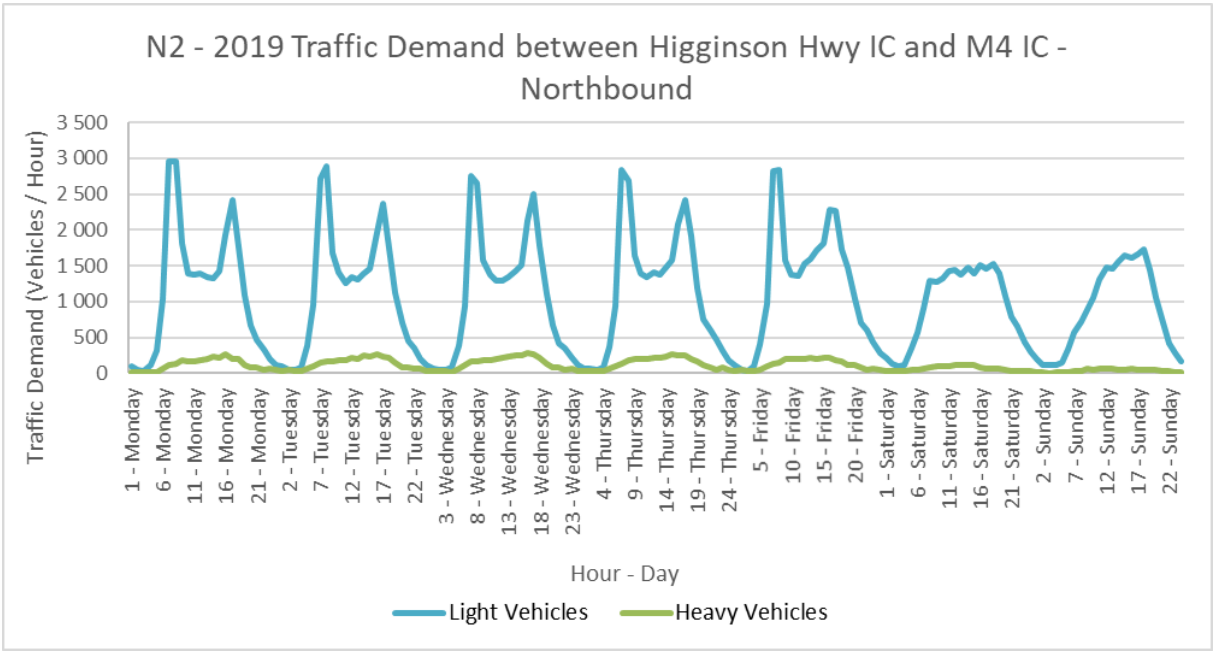
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N2 - 2019 Traffic Demand between Higginson Hwy IC and M4 IC - Northbound
Traffic Demand (Vehicles / Hour)
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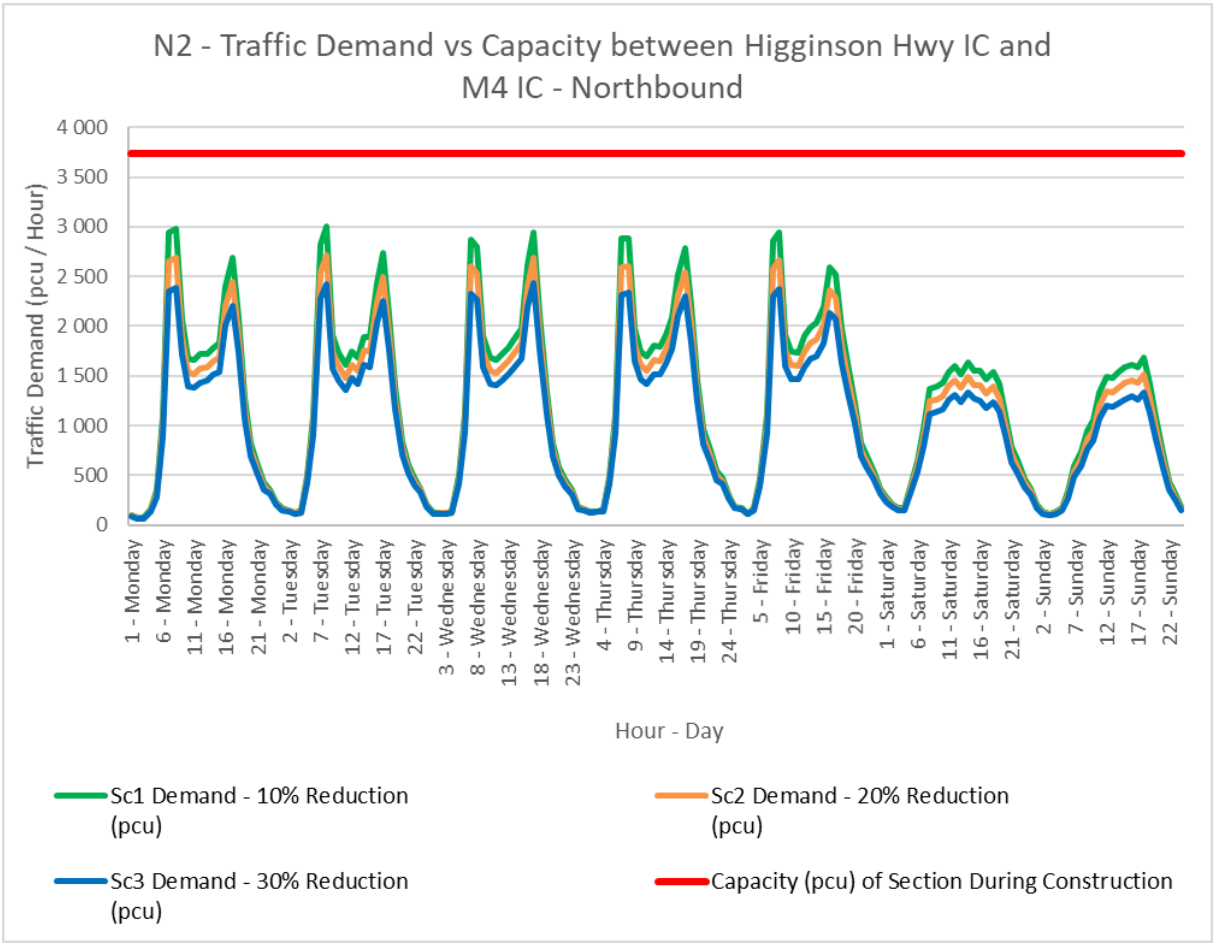
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N2 - Traffic Demand vs Capacity between Higginson Hwy IC and M4 IC - Northbound
Traffic Demand (pcu / Hour)
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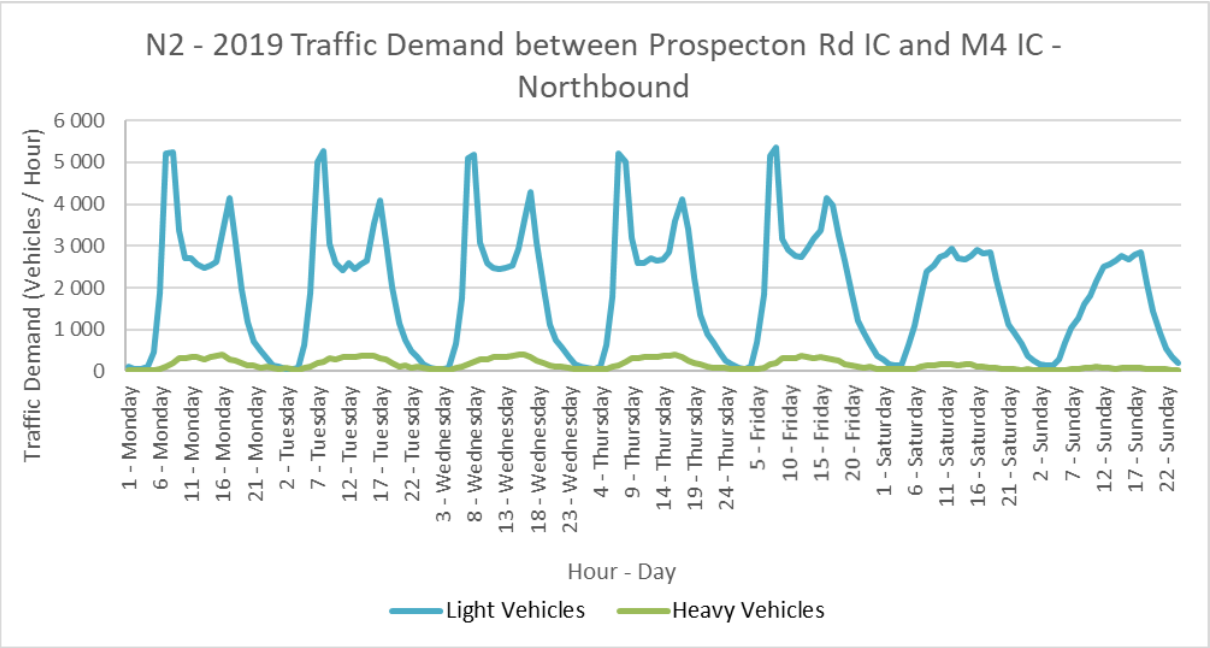
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N2 between Prospecton Road Interchange and M4 Interchange


N2 - 2019 Traffic Demand between Prospecton Rd IC and M4 IC - Northbound
Traffic Demand (Vehicles / Hour)
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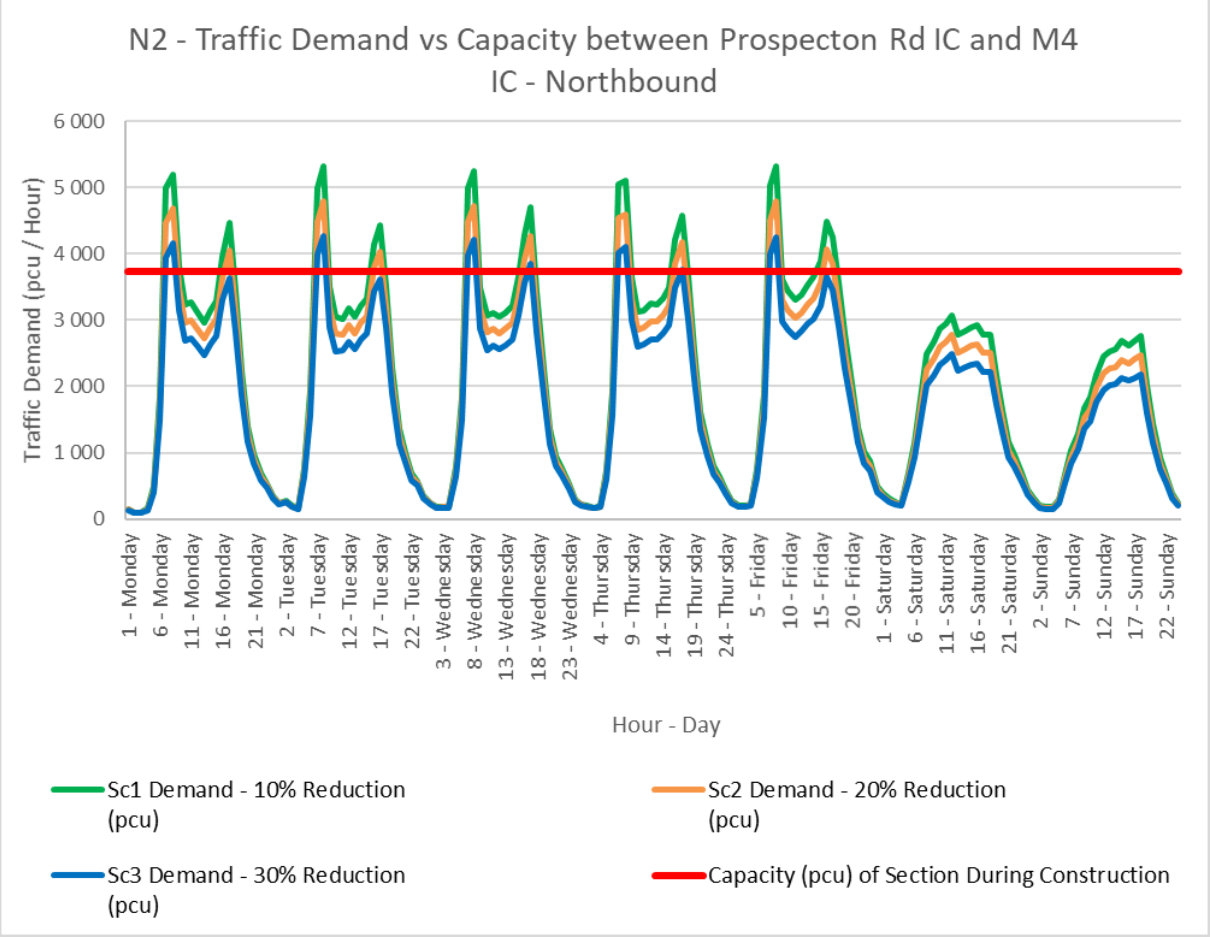
Hour - Day
Light Vehicles
Heavy Vehicles


N2 - Traffic Demand vs Capacity between Prospecton Rd IC and M4 IC - Northbound
Traffic Demand (pcu / Hour)
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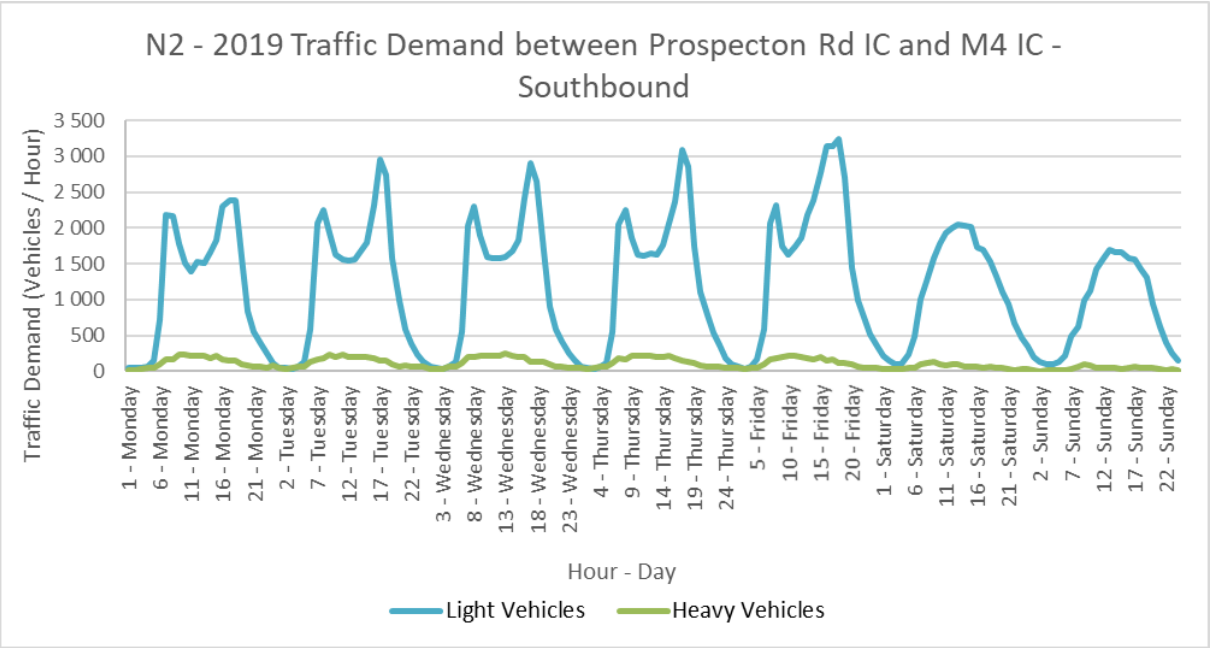
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N2 - 2019 Traffic Demand between Prospecton Rd IC and M4 IC - Southbound
Traffic Demand (Vehicles / Hour)
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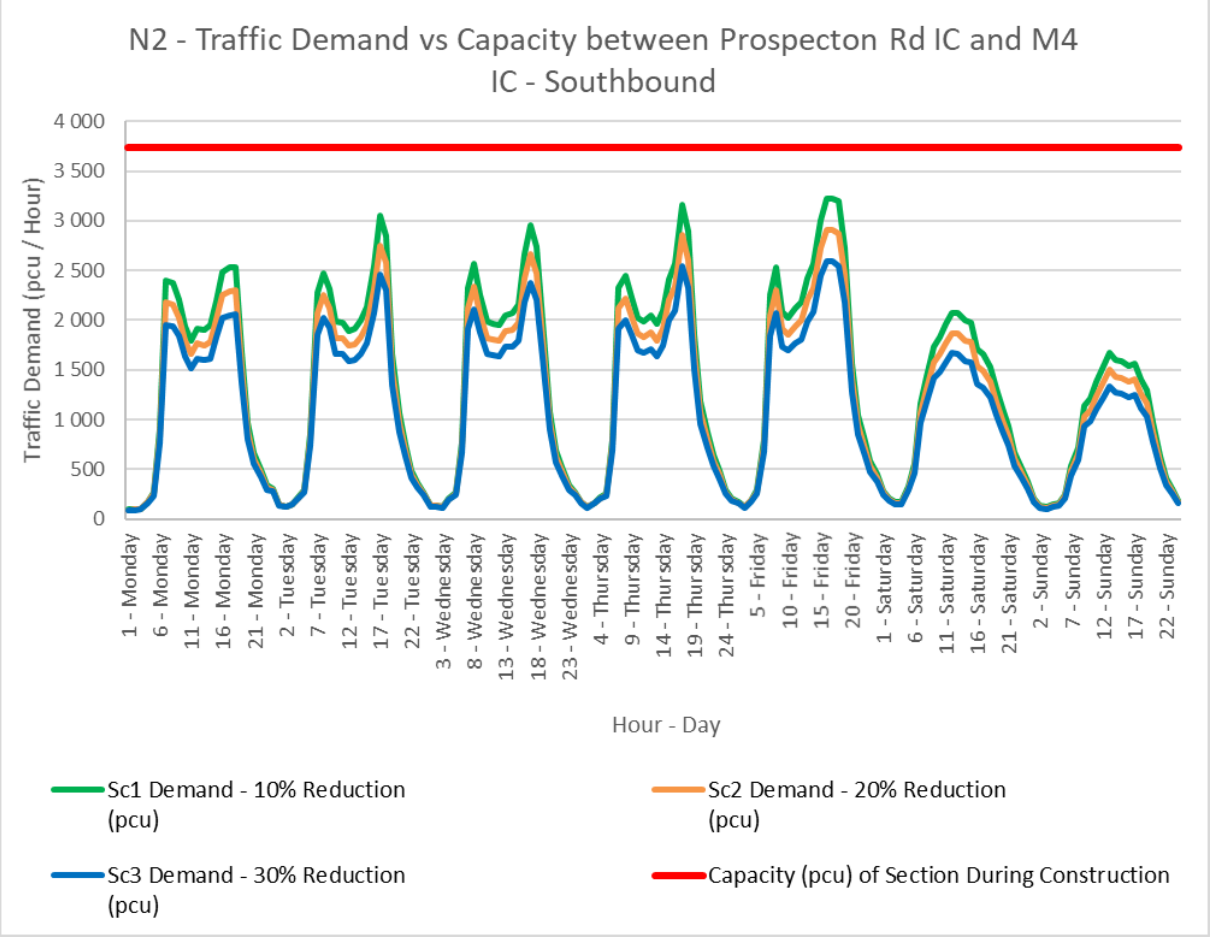
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles


N2 - Traffic Demand vs Capacity between Prospecton Rd IC and M4 IC - Southbound
Traffic Demand (pcu / Hour)
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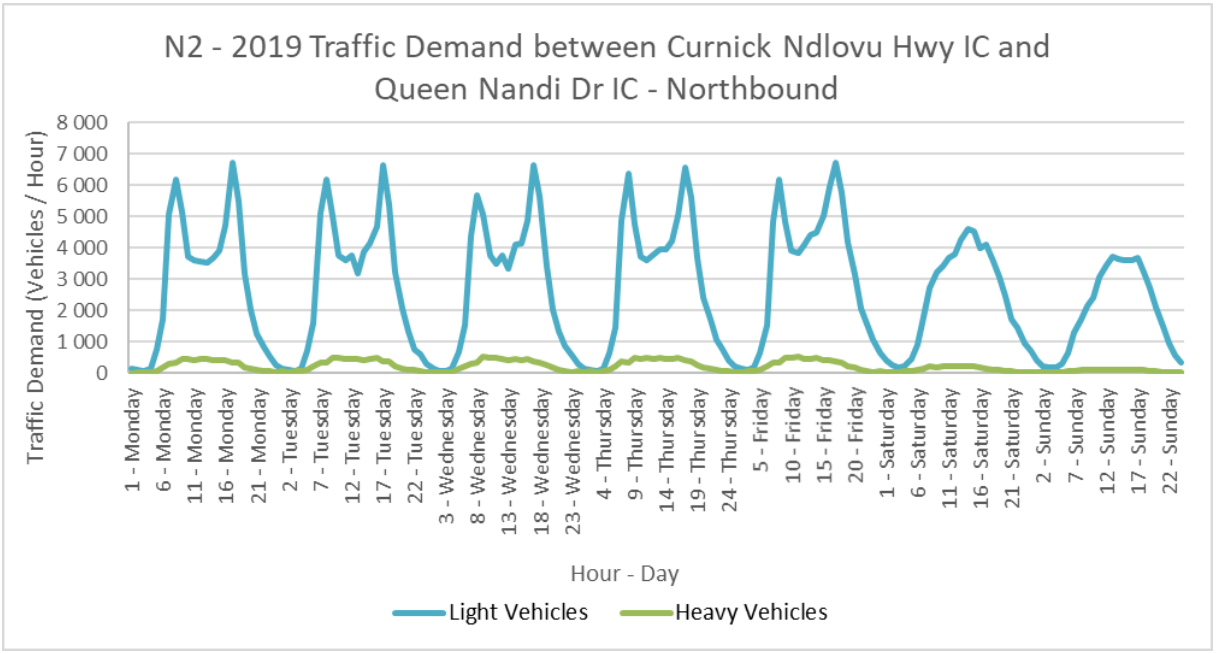
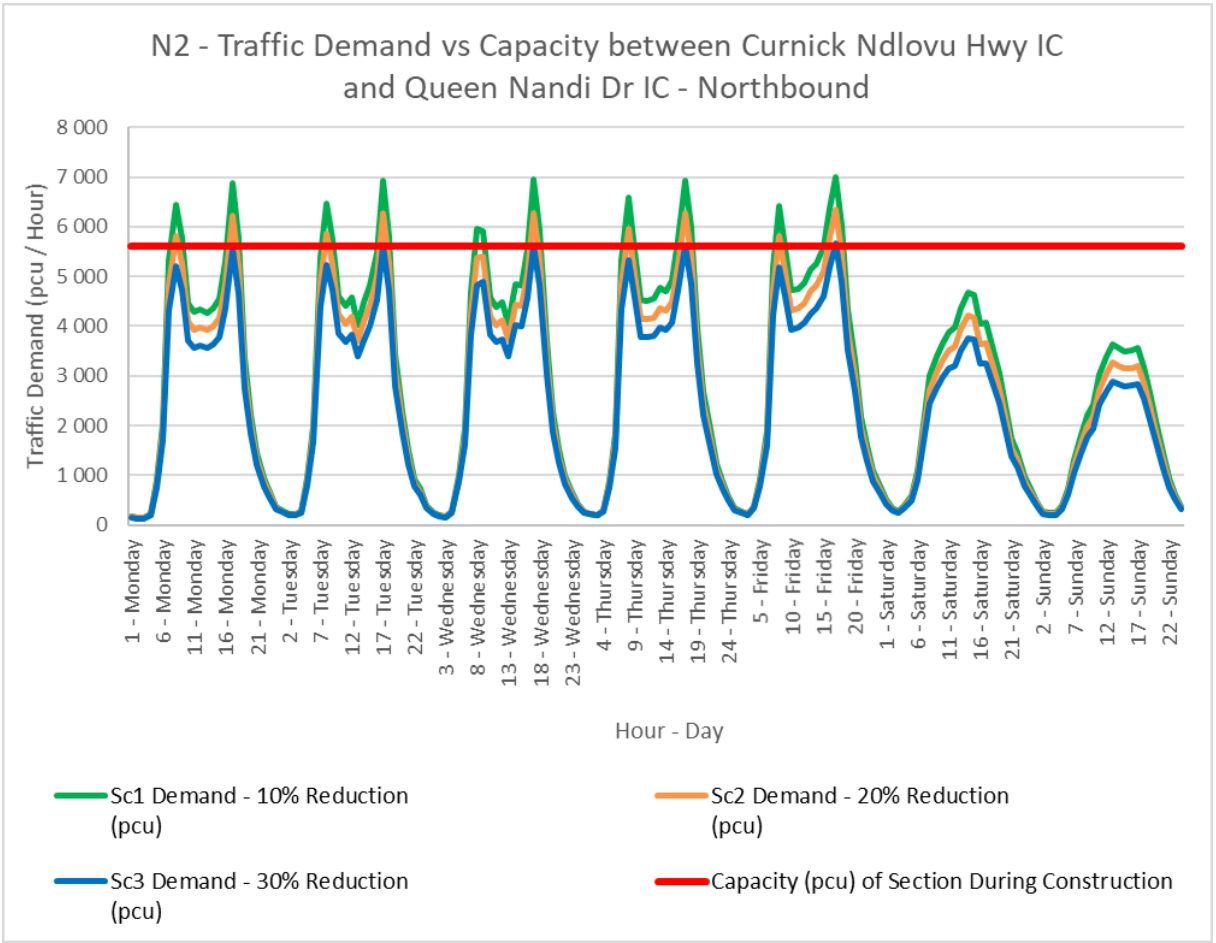
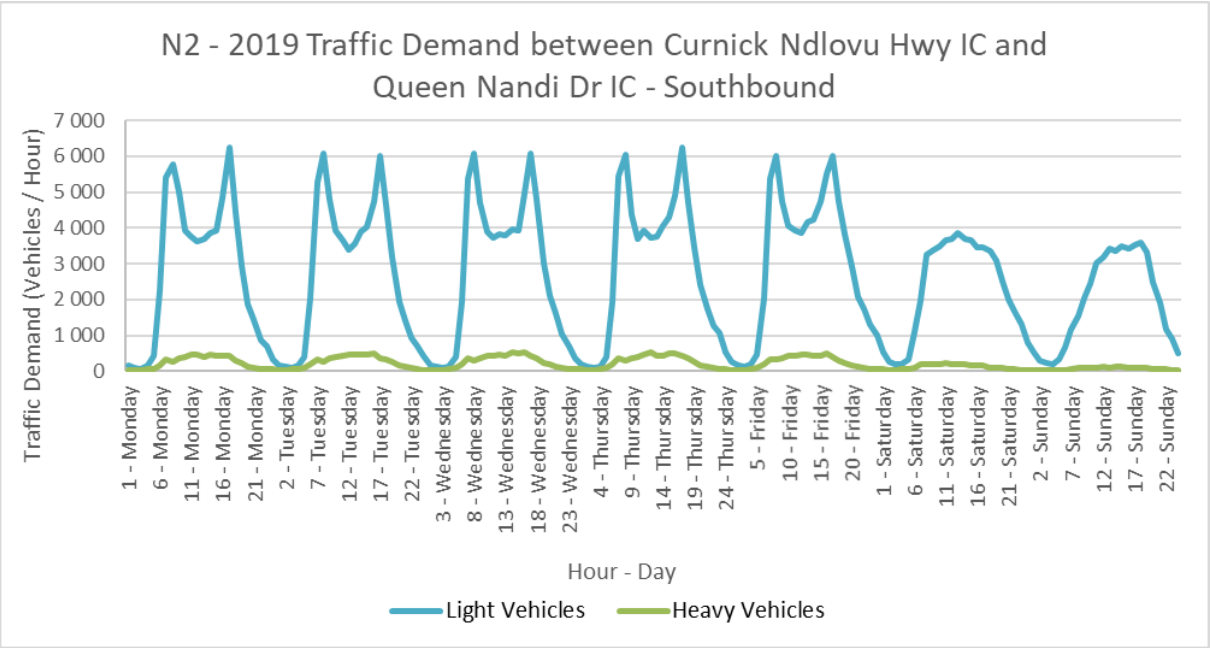
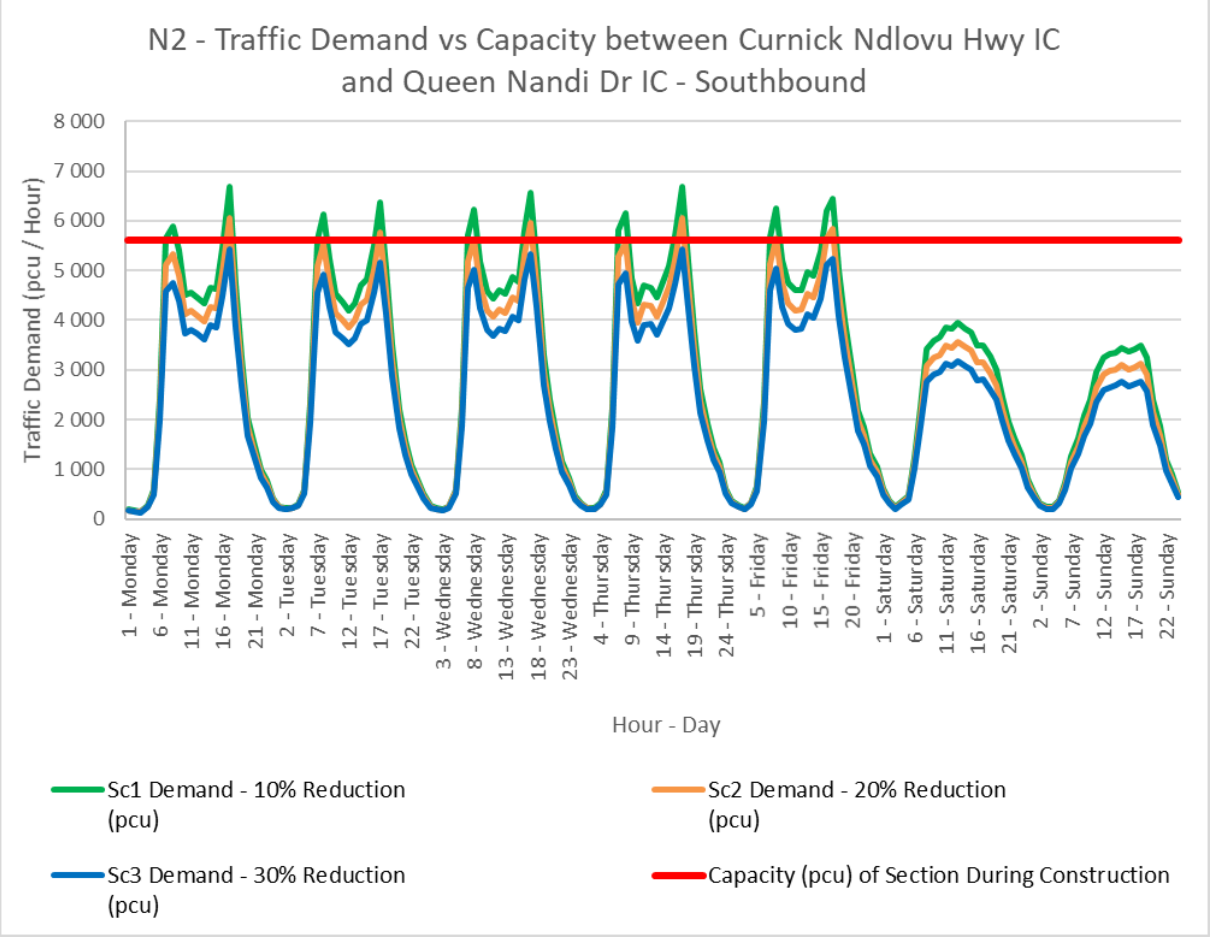
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N2 between Curnick Ndlovu Highway Interchange and Queen Nandi Drive Interchange

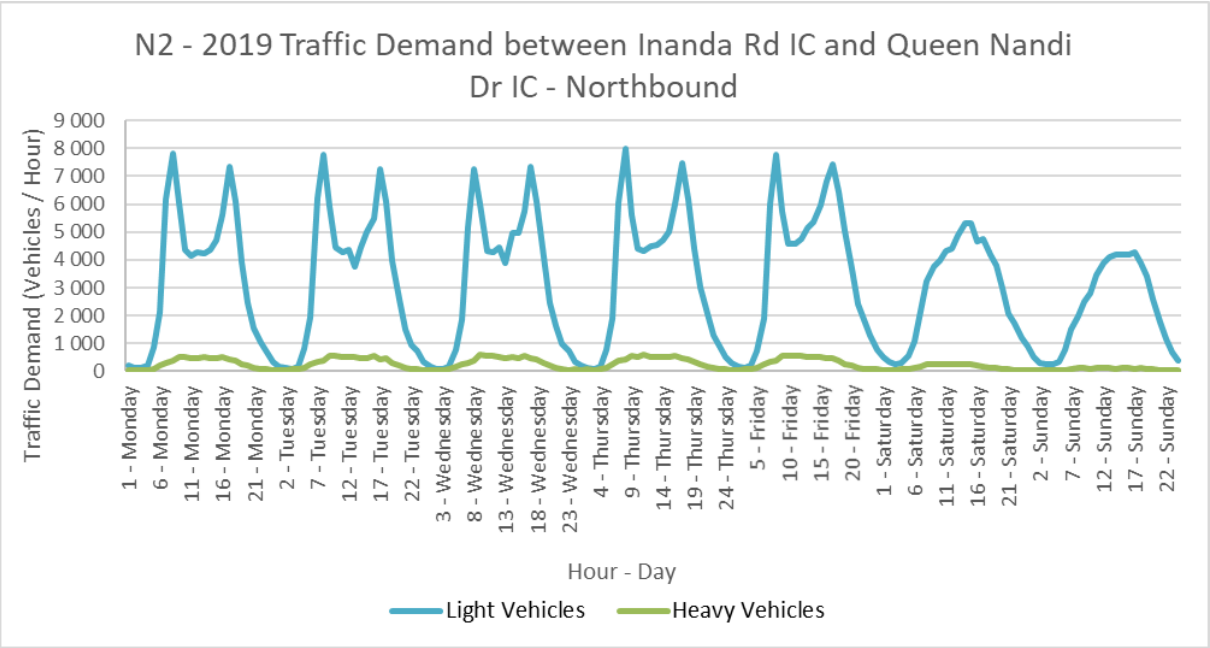

N2 - 2019 Traffic Demand between Curnick Ndlovu Hwy IC and Queen Nandi Dr IC - Northbound
Traffic Demand (Vehicles / Hour)
8 000
7 000
6 000
5 000
4 000
3 000
2 000
1 000
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles

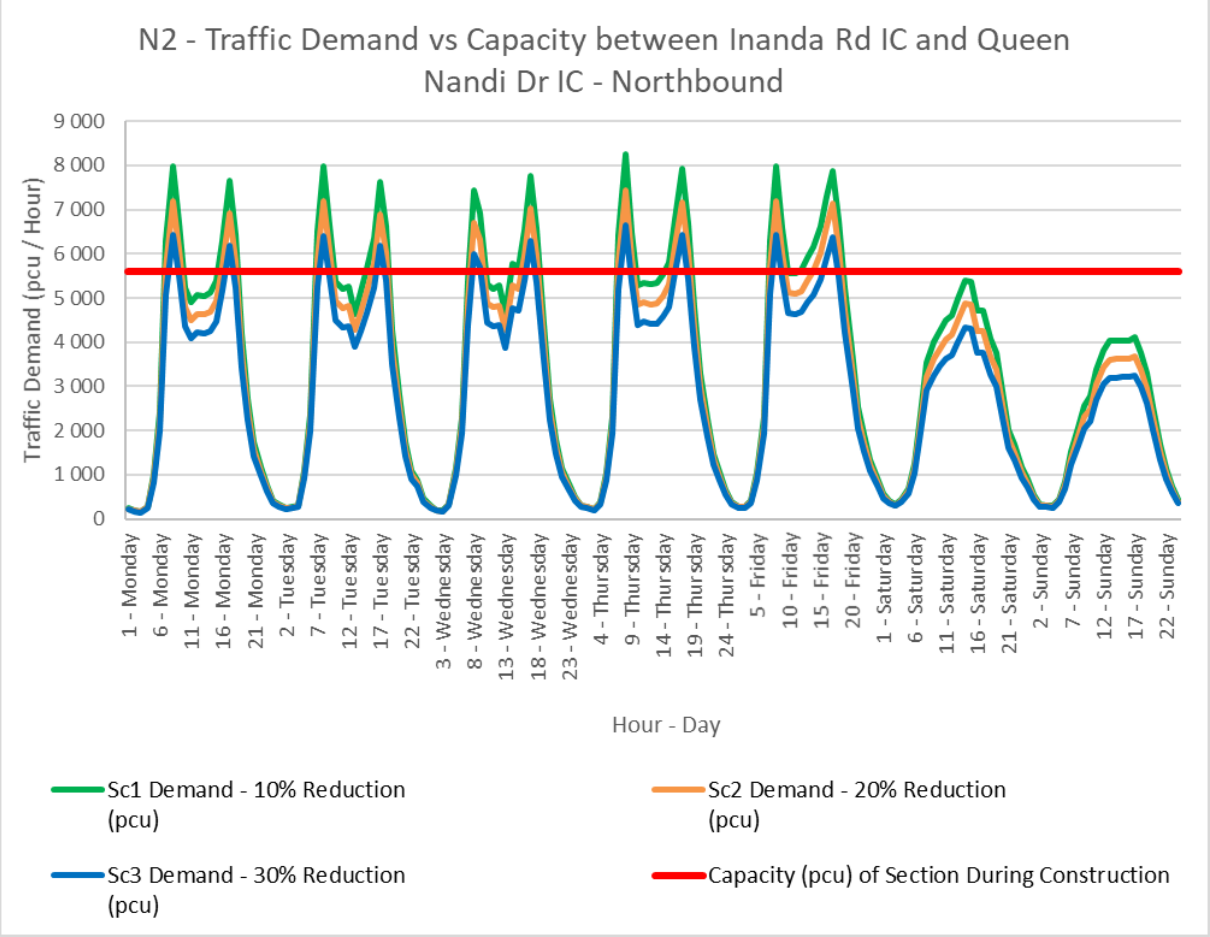

N2 - Traffic Demand vs Capacity between Curnick Ndlovu Hwy IC and Queen Nandi Dr IC - Northbound
Traffic Demand (pcu / Hour)
8 000
7 000
6 000
5 000
4 000
3 000
2 000
1 000
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

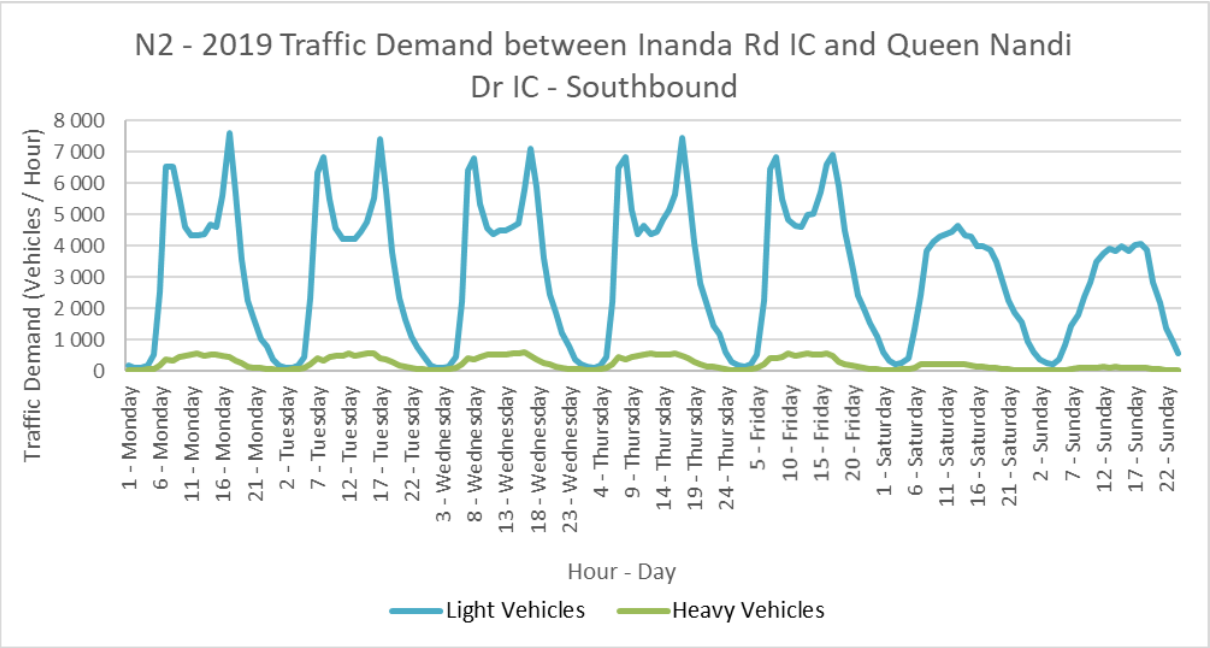

N2 - 2019 Traffic Demand between Curnick Ndlovu Hwy IC and Queen Nandi Dr IC - Southbound
Traffic Demand (Vehicles / Hour)
7 000
6 000
5 000
4 000
3 000
2 000
1 000
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles

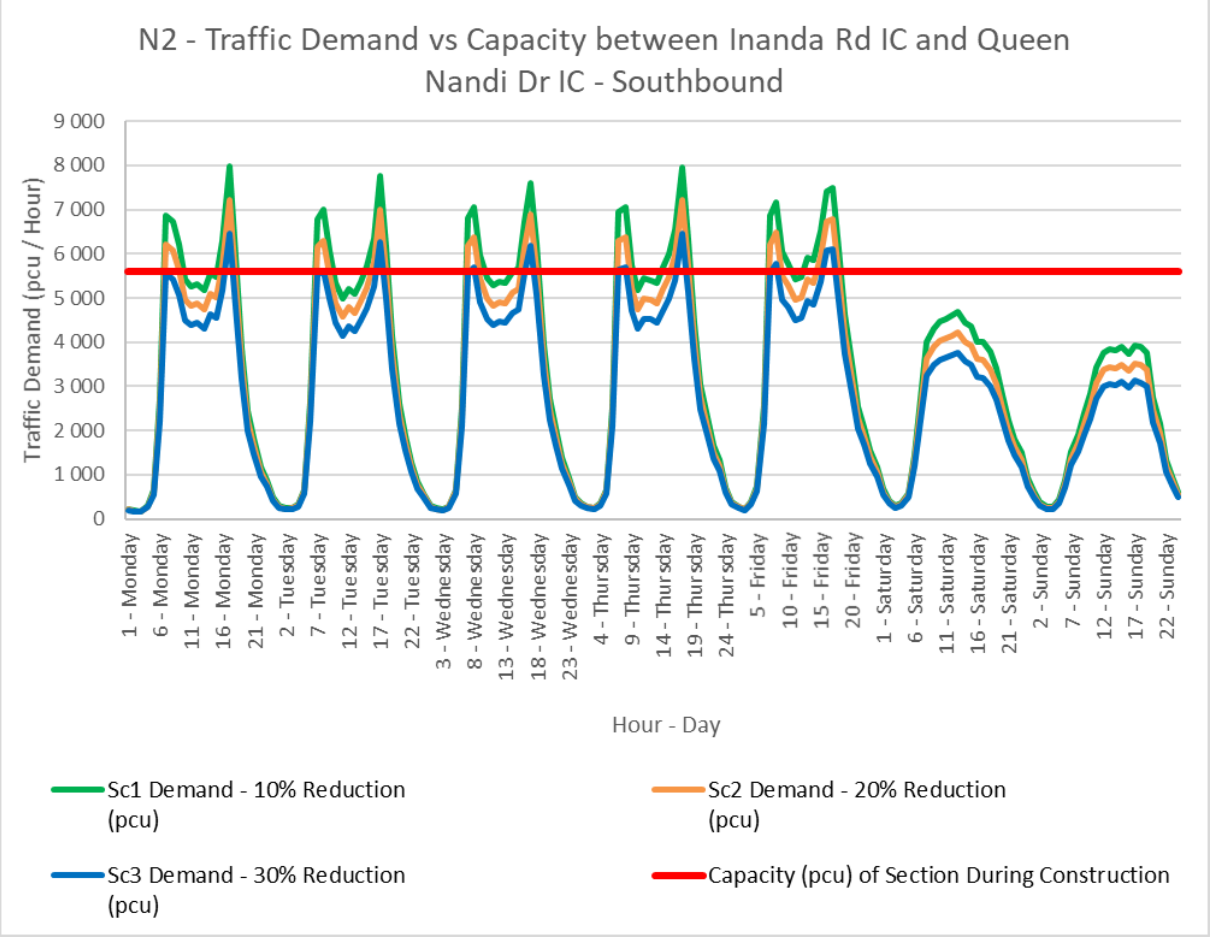

N2 - Traffic Demand vs Capacity between Curnick Ndlovu Hwy IC and Queen Nandi Dr IC - Southbound
Traffic Demand (pcu / Hour)
8 000
7 000
6 000
5 000
4 000
3 000
2 000
1 000
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

N2 between Inanda Road Interchange and Queen Nandi Drive Interchange


N2 - 2019 Traffic Demand between Inanda Rd IC and Queen Nandi Dr IC - Northbound
Traffic Demand (Vehicles / Hour)
9 000
8 000
7 000
6 000
5 000
4 000
3 000
2 000
1 000
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles

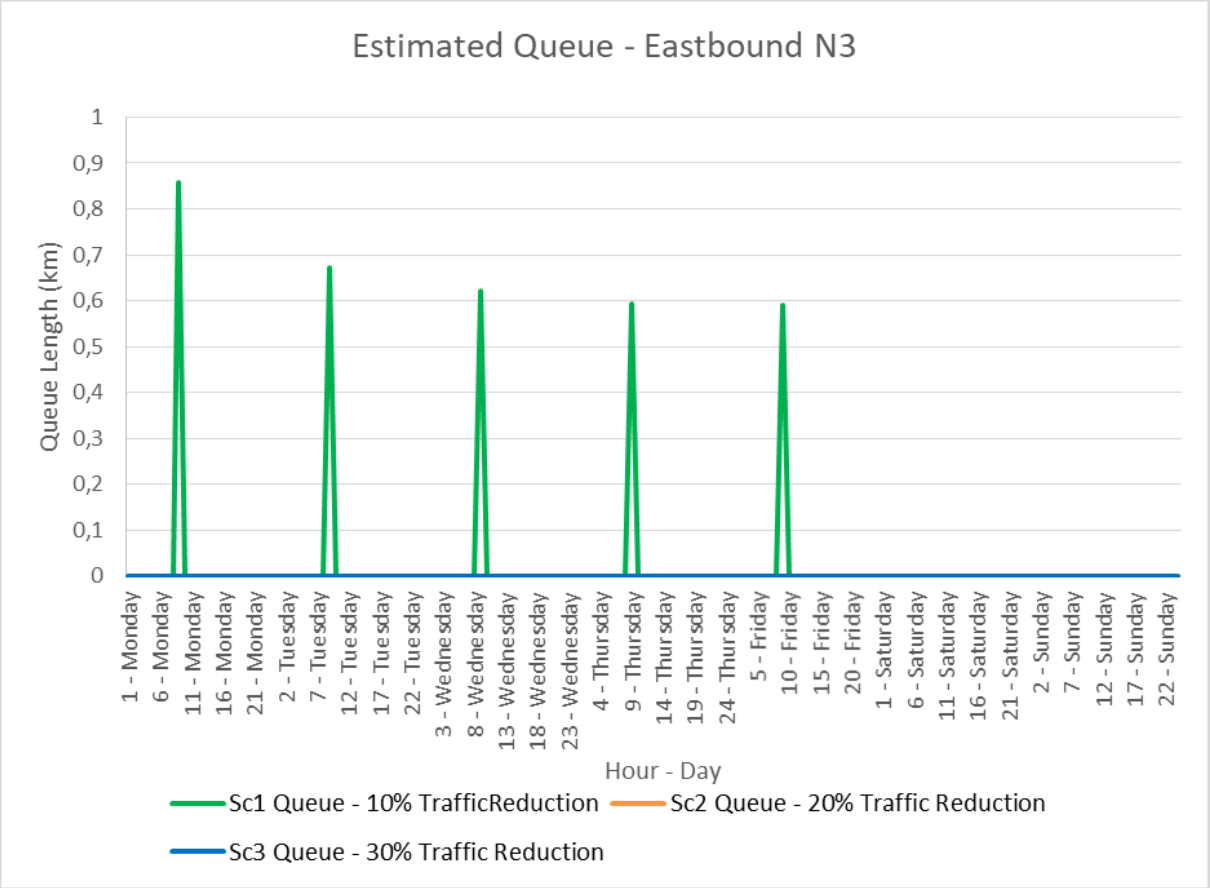

N2 - Traffic Demand vs Capacity between Inanda Rd IC and Queen Nandi Dr IC - Northbound
Traffic Demand (pcu / Hour)
9 000
8 000
7 000
6 000
5 000
4 000
3 000
2 000
1 000
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction


N2 - 2019 Traffic Demand between Inanda Rd IC and Queen Nandi Dr IC - Southbound
Traffic Demand (Vehicles / Hour)
8 000
7 000
6 000
5 000
4 000
3 000
2 000
1 000
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Light Vehicles
Heavy Vehicles

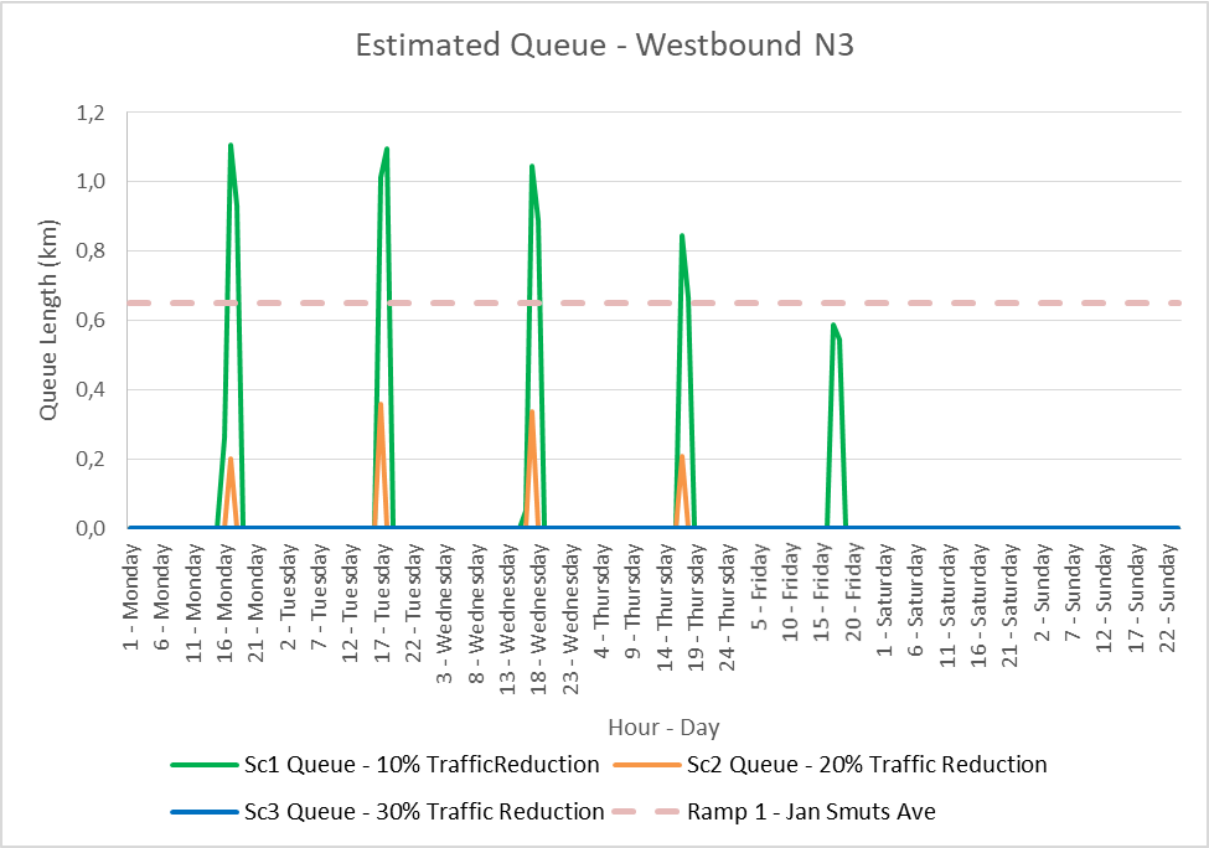

N2 - Traffic Demand vs Capacity between Inanda Rd IC and Queen Nandi Dr IC - Southbound
Traffic Demand (pcu / Hour)
9 000
8 000
7 000
6 000
5 000
4 000
3 000
2 000
1 000
0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Demand - 10% Reduction (pcu)
Sc2 Demand - 20% Reduction (pcu)
Sc3 Demand - 30% Reduction (pcu)
Capacity (pcu) of Section During Construction

Annexure C – Queue Length Estimates on Mainline N2 and N3

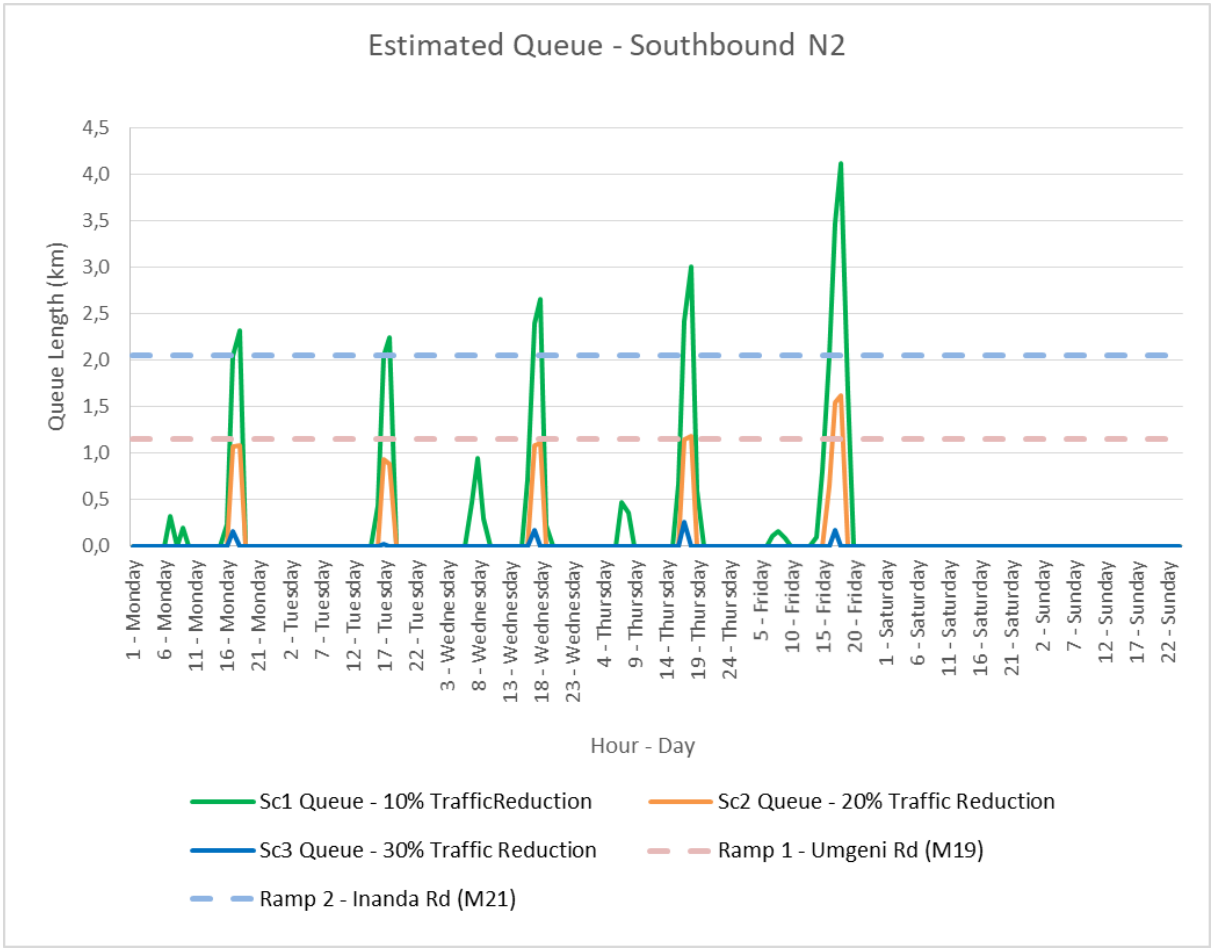
Western Approach – Traveling Eastbound on N3– Estimated Queue from M13 Ramp Merge with N3



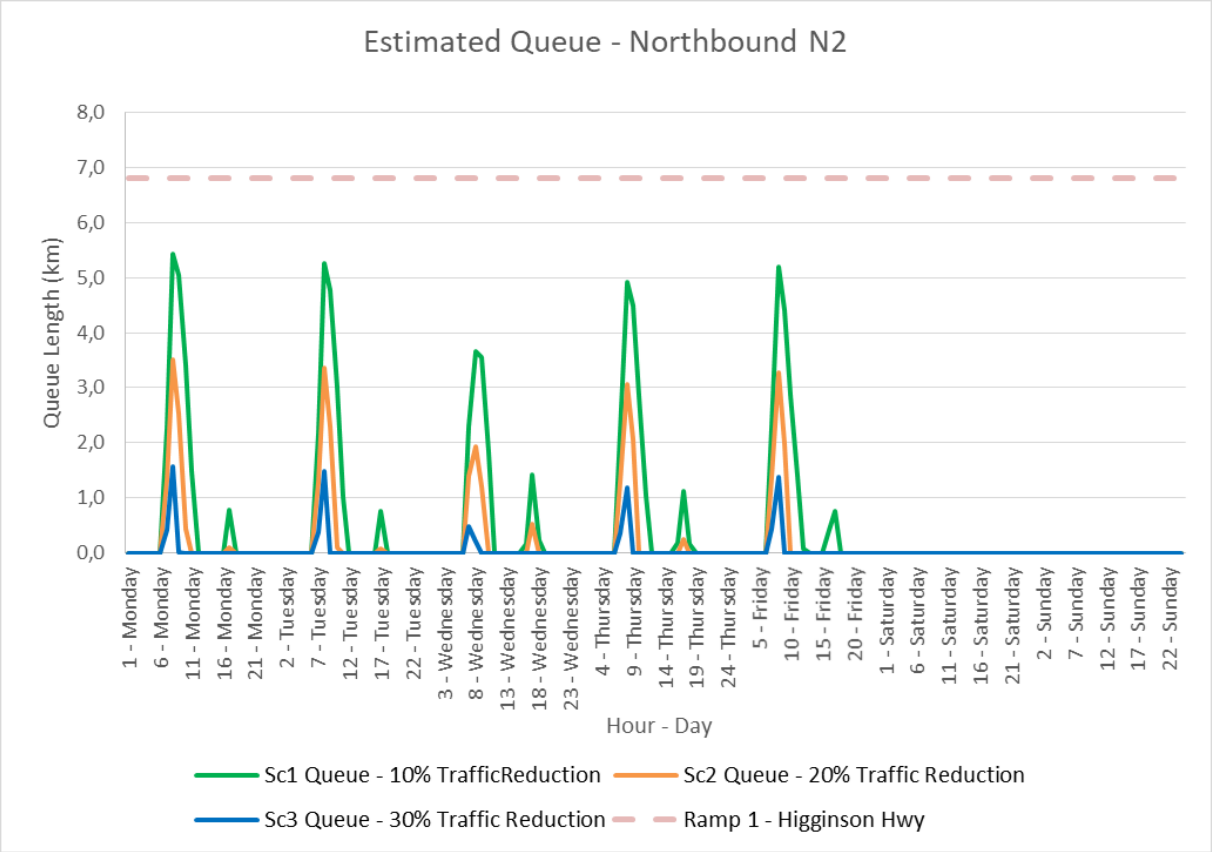
Eastern Approach – Traveling Westbound on N3– Estimated Queue from Jan Smuts Ave Ramp Merge with N3



Northern Approach – Traveling Southbound on N2– Estimated Queue from Umgeni Rd Ramp Merge with N2

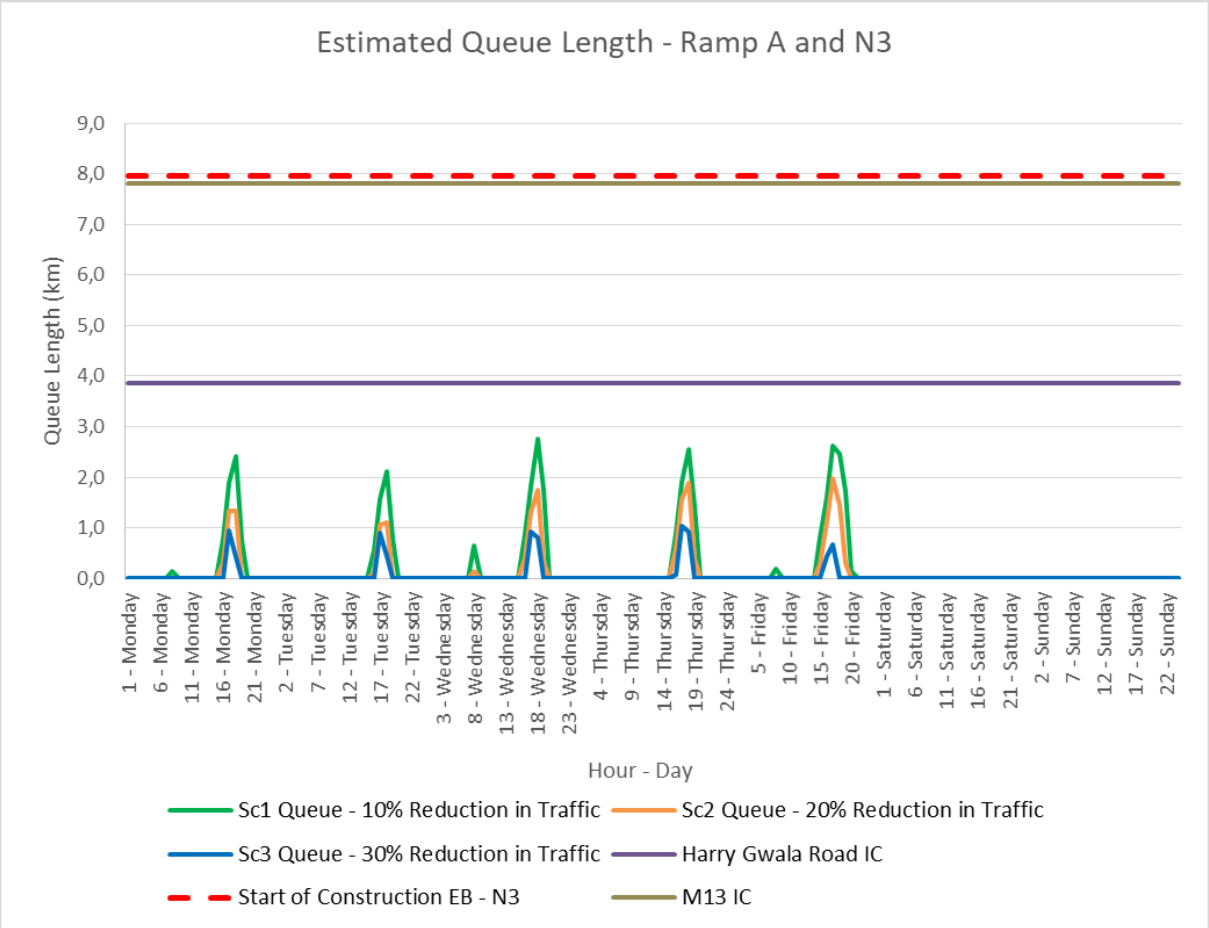


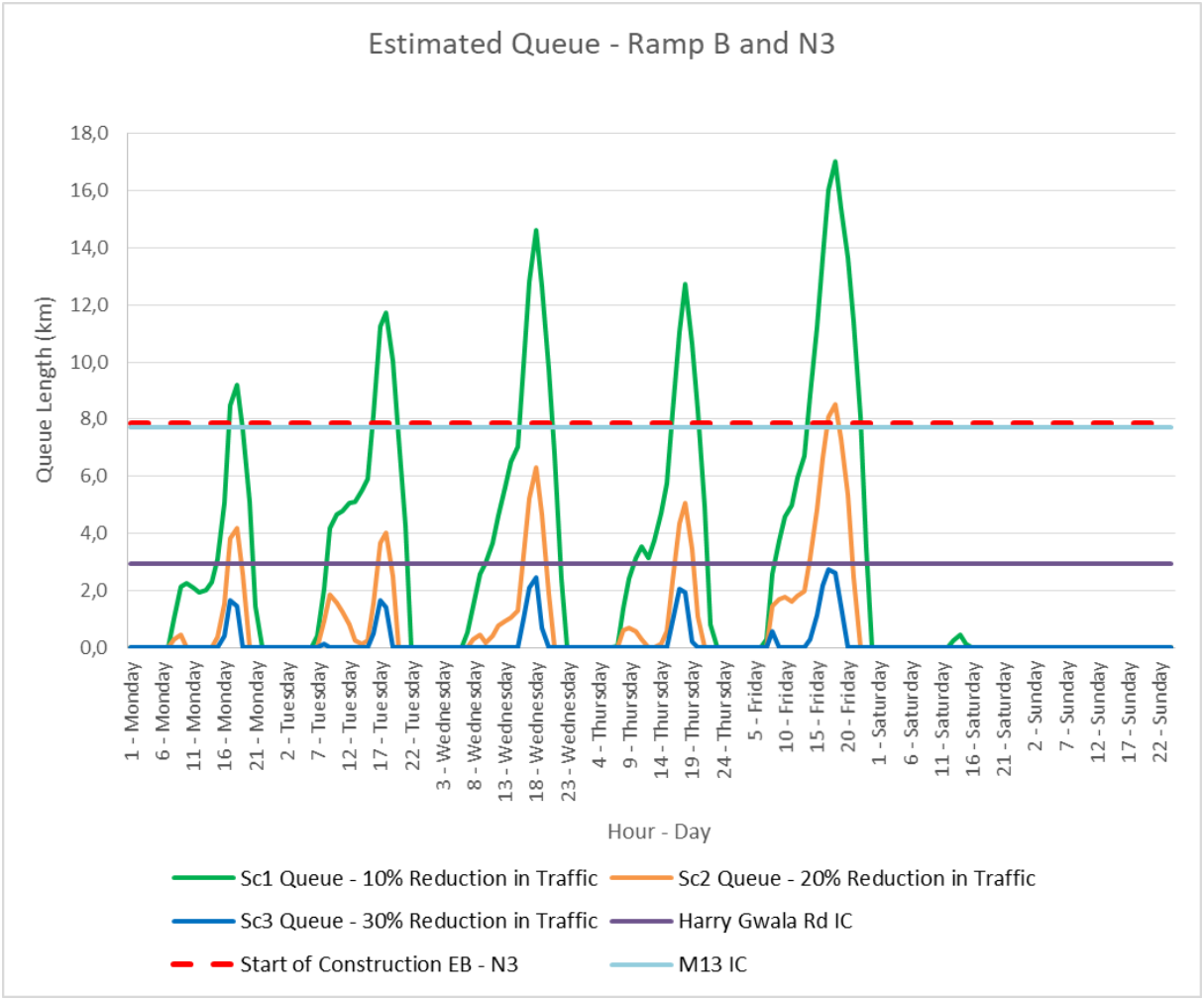
Southern Approach – Traveling Northbound on N2– Estimated Queue from 150 m before Edwin Swales IC Off- Ramp on N2

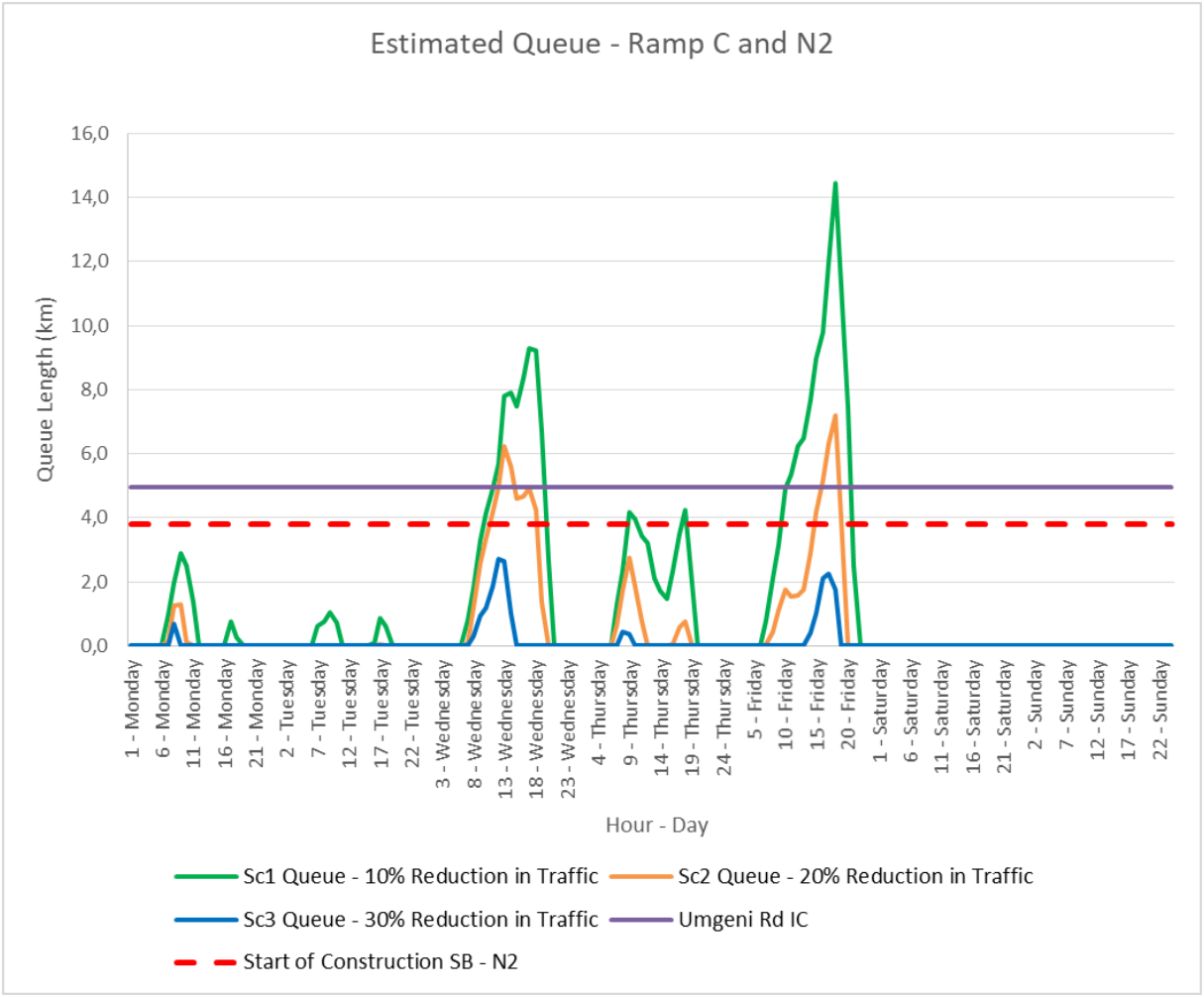


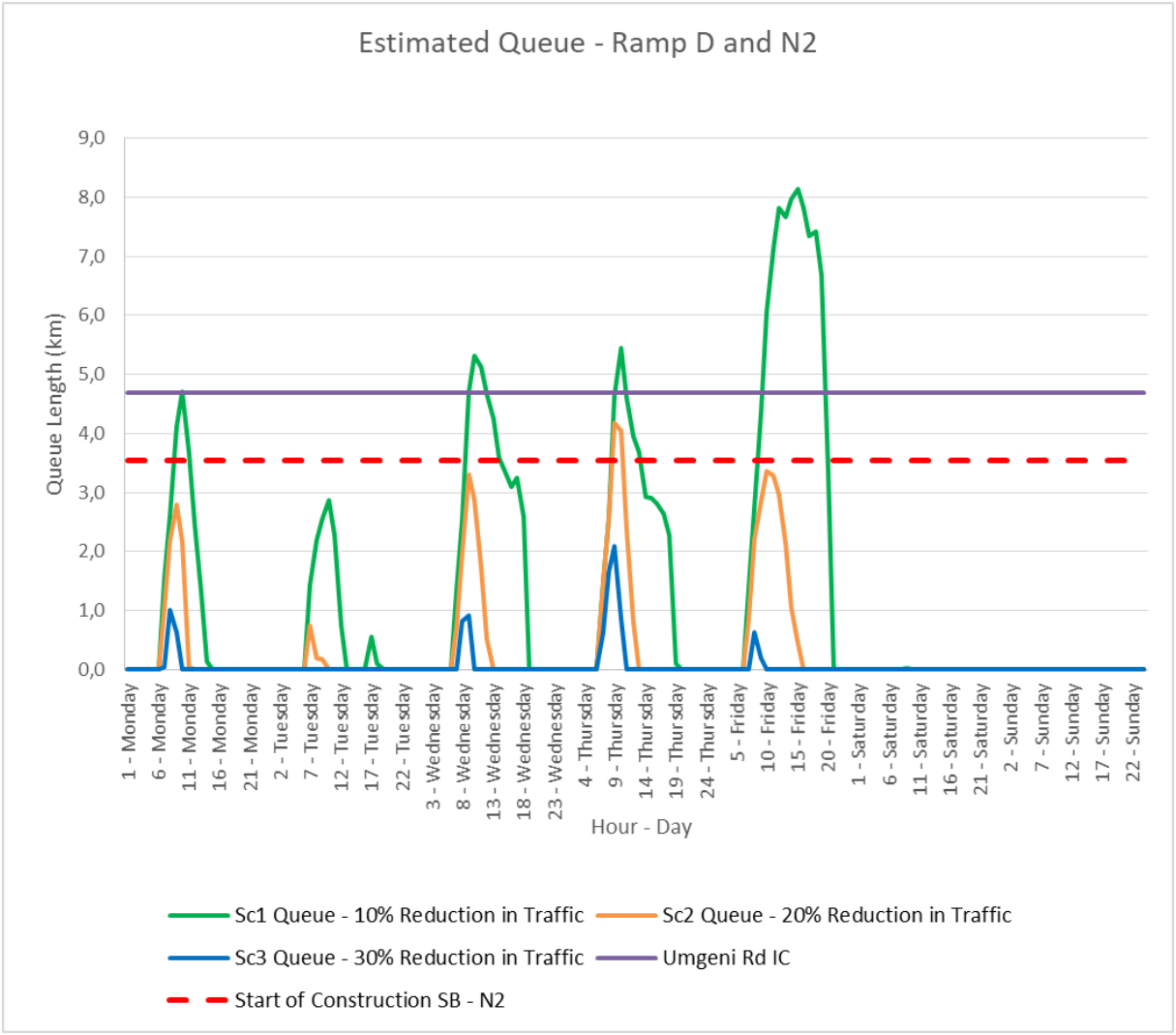
Expected Queue Lengths – EB

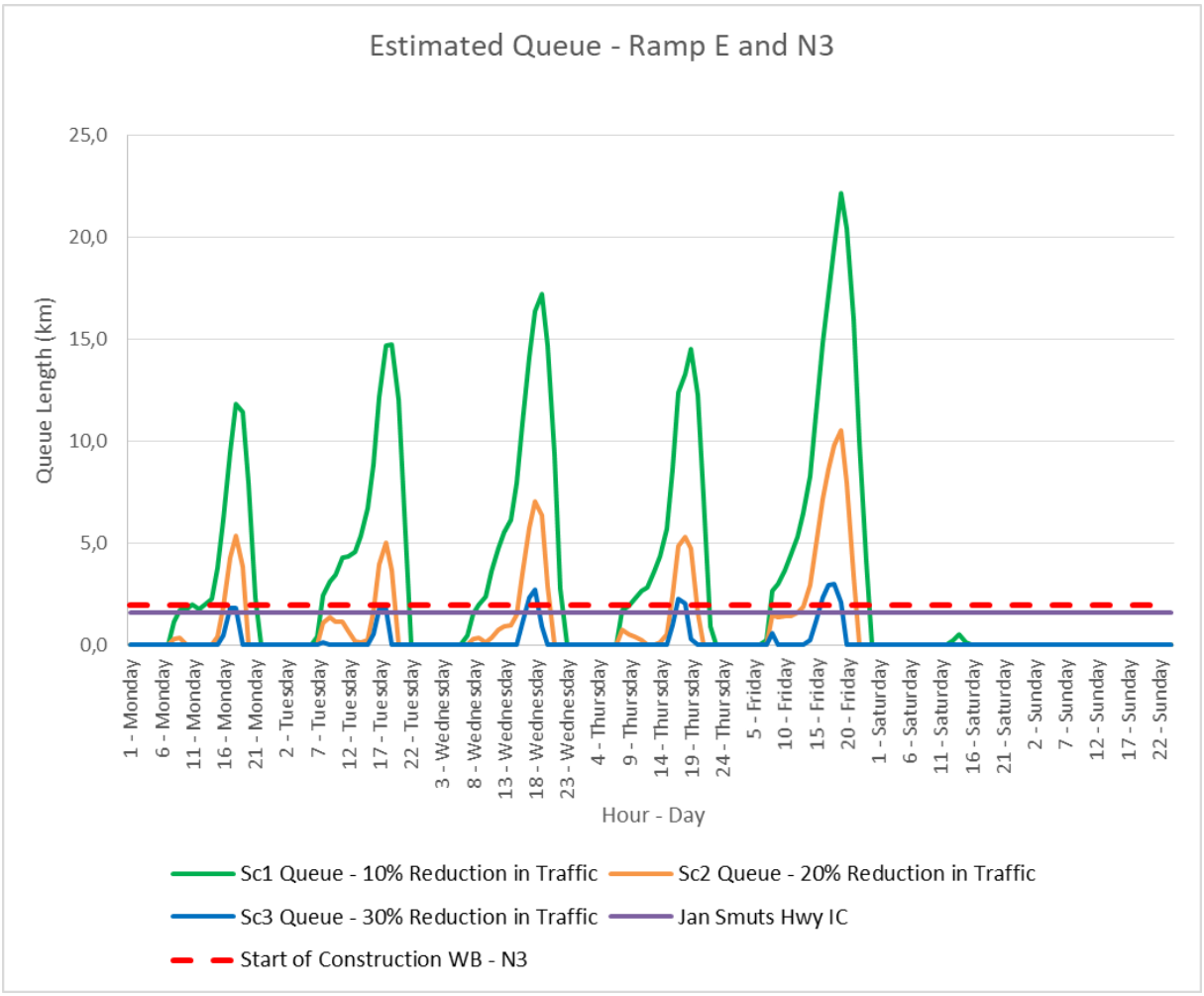
Cloete Interchange Merge Points

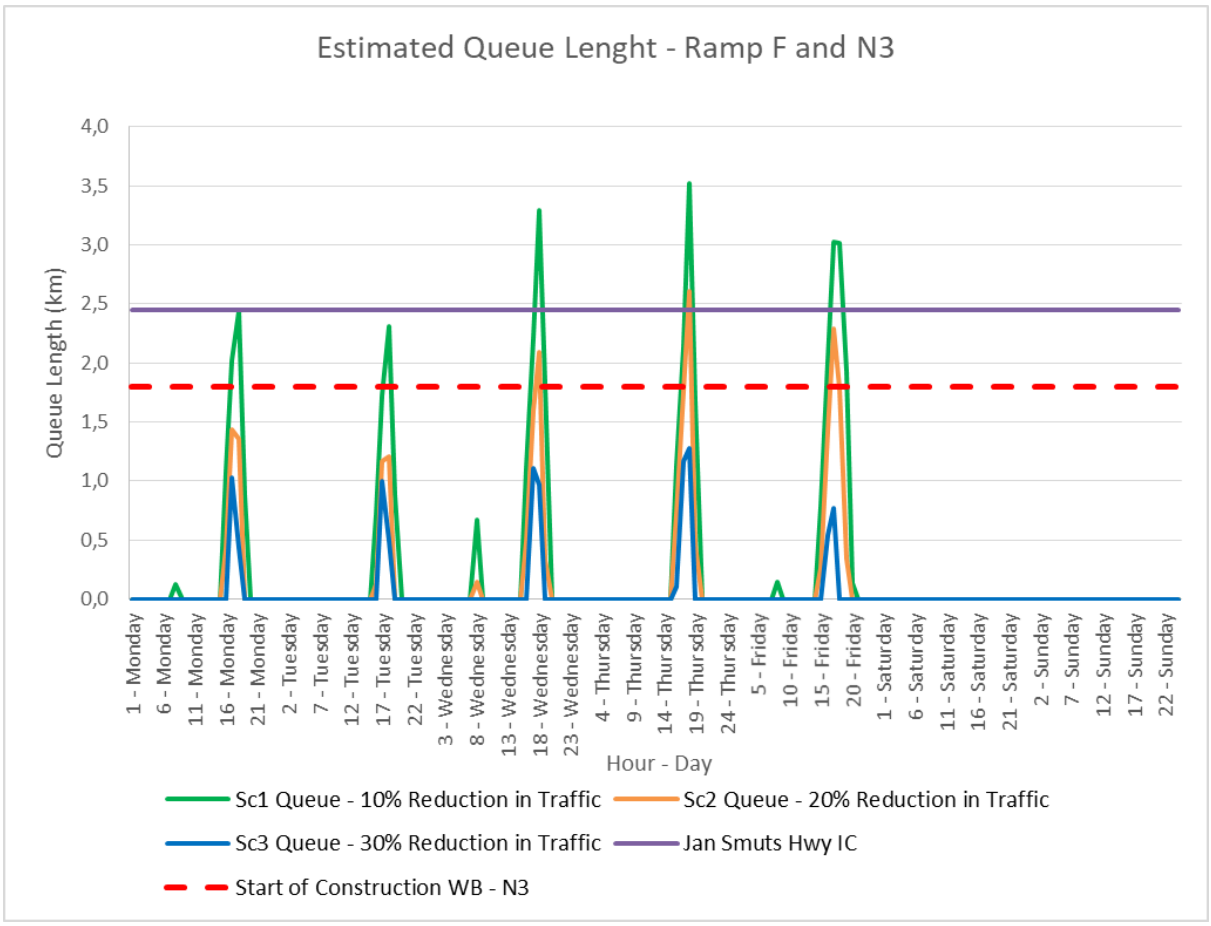

Estimated Queue Length - Ramp A and N3
Queue Length (km)
9,0
8,0
7,0
6,0
5,0
4,0
3,0
2,0
1,0
0,0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Queue - 10% Reduction in Traffic
Sc2 Queue - 20% Reduction in Traffic
Sc3 Queue - 30% Reduction in Traffic
Harry Gwala Road IC
Start of Construction EB - N3
M13 IC

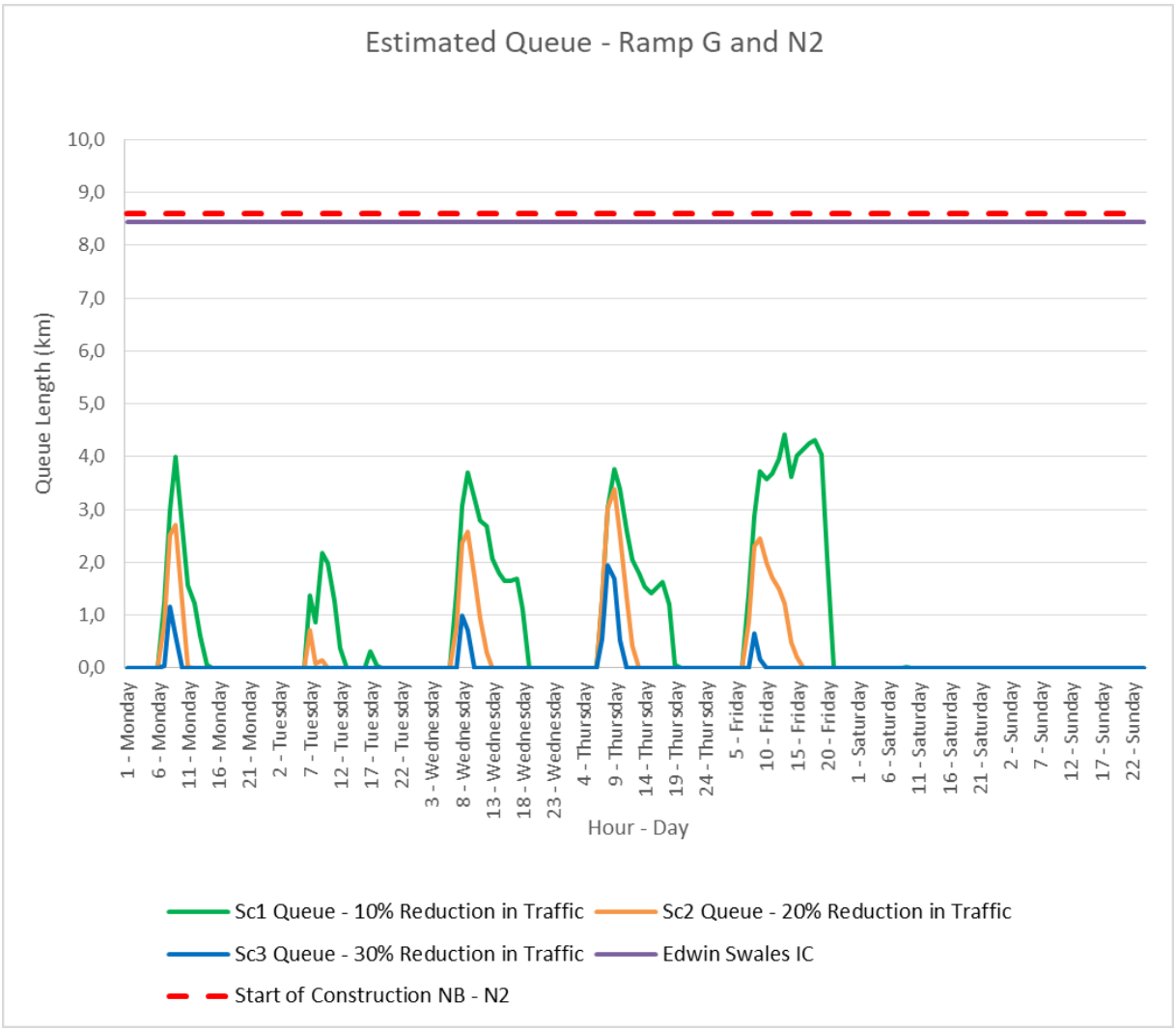

Estimated Queue - Ramp B and N3
Queue Length (km)
18,0
16,0
14,0
12,0
10,0
8,0
6,0
4,0
2,0
0,0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Queue - 10% Reduction in Traffic
Sc2 Queue - 20% Reduction in Traffic
Sc3 Queue - 30% Reduction in Traffic
Harry Gwala Rd IC
Start of Construction EB - N3
M13 IC

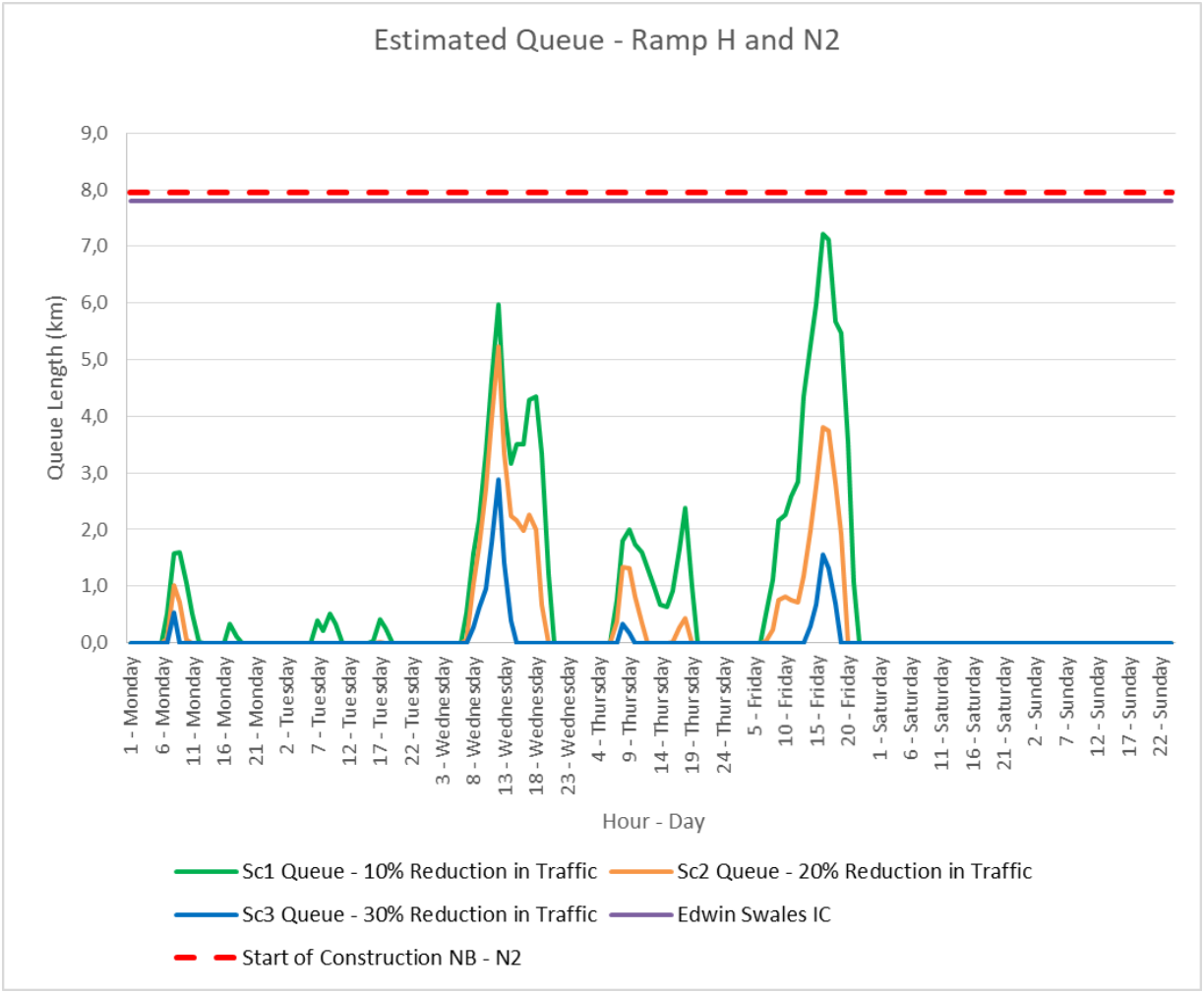

Estimated Queue - Ramp C and N2
Queue Length (km)
16,0
14,0
12,0
10,0
8,0
6,0
4,0
2,0
0,0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Queue - 10% Reduction in Traffic
Sc2 Queue - 20% Reduction in Traffic
Sc3 Queue - 30% Reduction in Traffic
Umgeni Rd IC
Start of Construction SB - N2


Estimated Queue - Ramp D and N2
Queue Length (km)
9,0
8,0
7,0
6,0
5,0
4,0
3,0
2,0
1,0
0,0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Queue - 10% Reduction in Traffic
Sc2 Queue - 20% Reduction in Traffic
Sc3 Queue - 30% Reduction in Traffic
Umgeni Rd IC
Start of Construction SB - N2


Estimated Queue - Ramp E and N3
Queue Length (km)
25,0
20,0
15,0
10,0
5,0
0,0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Queue - 10% Reduction in Traffic
Sc2 Queue - 20% Reduction in Traffic
Sc3 Queue - 30% Reduction in Traffic
Jan Smuts Hwy IC
Start of Construction WB - N3

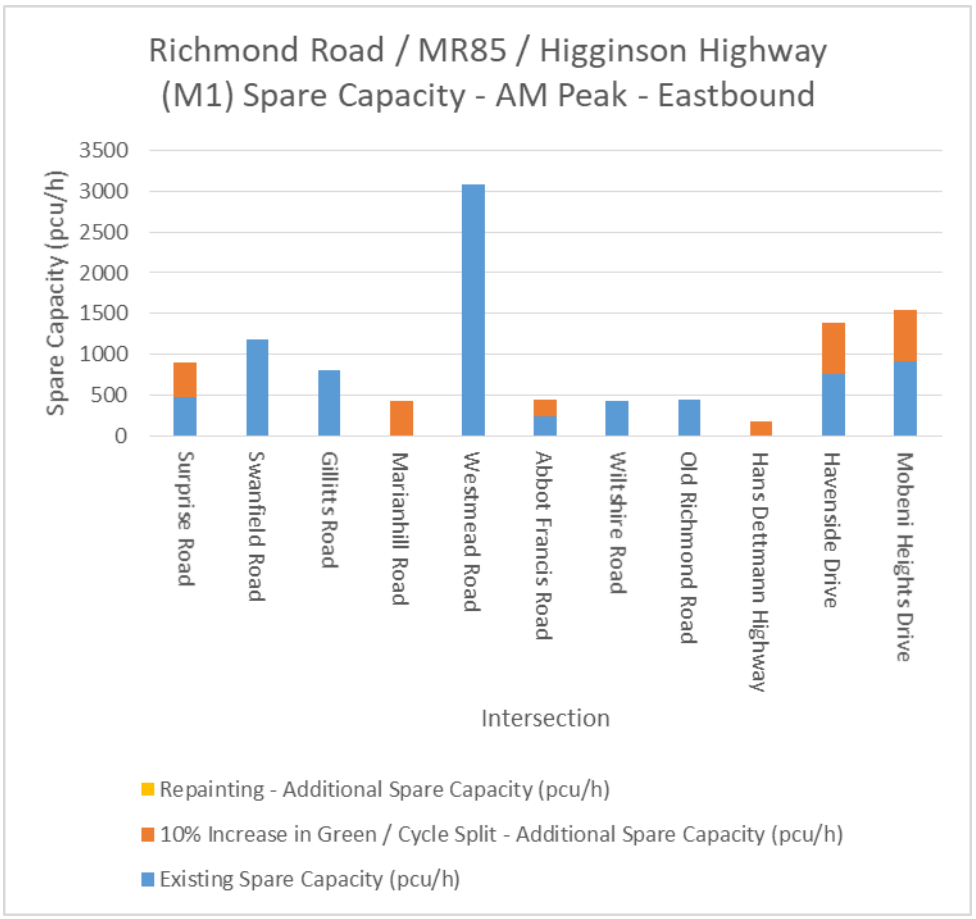

Estimated Queue Lenght - Ramp F and N3
Queue Length (km)
4,0
3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Queue - 10% Reduction in Traffic
Sc2 Queue - 20% Reduction in Traffic
Sc3 Queue - 30% Reduction in Traffic
Jan Smuts Hwy IC
Start of Construction WB - N3

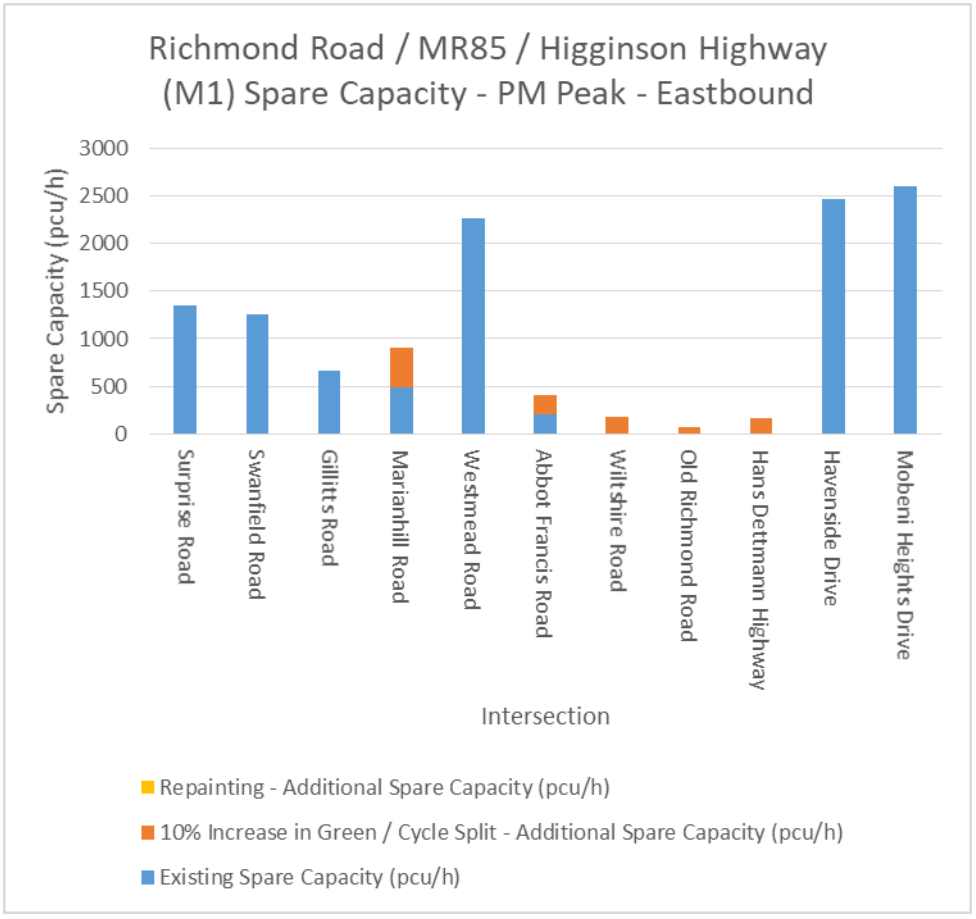

Estimated Queue - Ramp G and N2
Queue Length (km)
10,0
9,0
8,0
7,0
6,0
5,0
4,0
3,0
2,0
1,0
0,0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Queue - 10% Reduction in Traffic
Sc2 Queue - 20% Reduction in Traffic
Sc3 Queue - 30% Reduction in Traffic
Edwin Swales IC
Start of Construction NB - N2

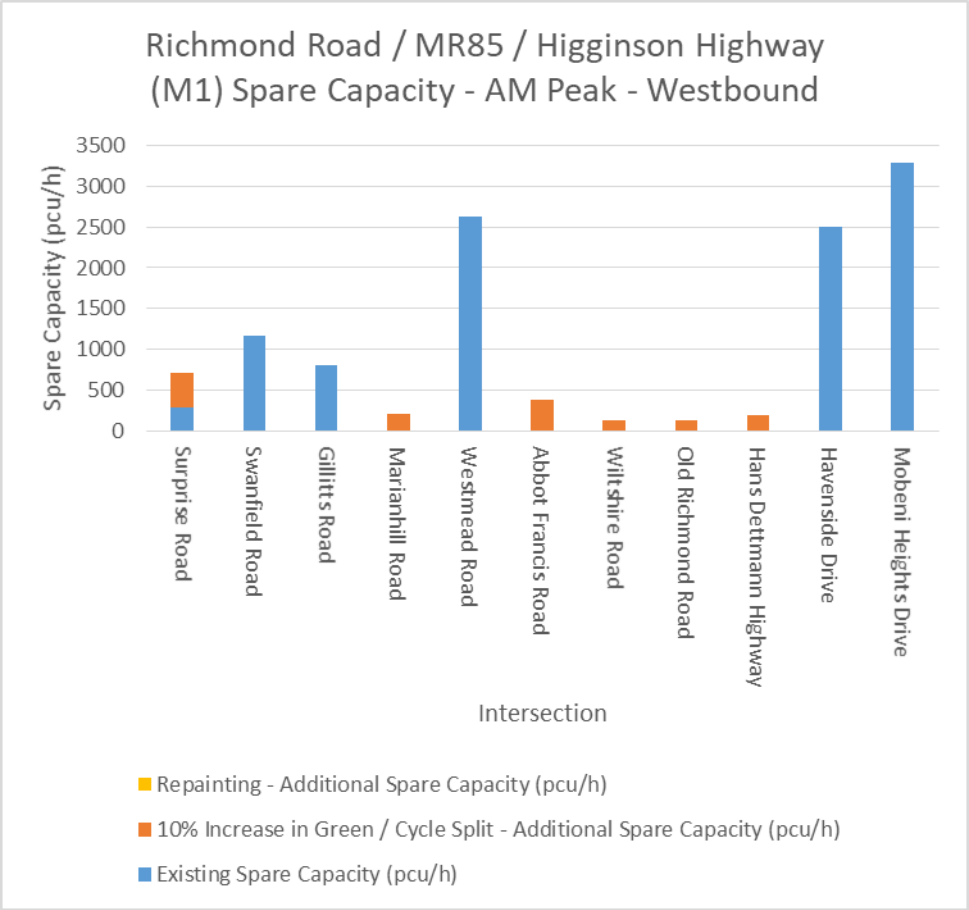

Estimated Queue - Ramp H and N2
Queue Length (km)
9,0
8,0
7,0
6,0
5,0
4,0
3,0
2,0
1,0
0,0
1 - Monday
6 - Monday
11 - Monday
16 - Monday
21 - Monday
2 - Tuesday
7 - Tuesday
12 - Tuesday
17 - Tuesday
22 - Tuesday
3 - Wednesday
8 - Wednesday
13 - Wednesday
18 - Wednesday
23 - Wednesday
4 - Thursday
9 - Thursday
14 - Thursday
19 - Thursday
24 - Thursday
5 - Friday
10 - Friday
15 - Friday
20 - Friday
1 - Saturday
6 - Saturday
11 - Saturday
16 - Saturday
21 - Saturday
2 - Sunday
7 - Sunday
12 - Sunday
17 - Sunday
22 - Sunday
Hour - Day
Sc1 Queue - 10% Reduction in Traffic
Sc2 Queue - 20% Reduction in Traffic
Sc3 Queue - 30% Reduction in Traffic
Edwin Swales IC
Start of Construction NB - N2

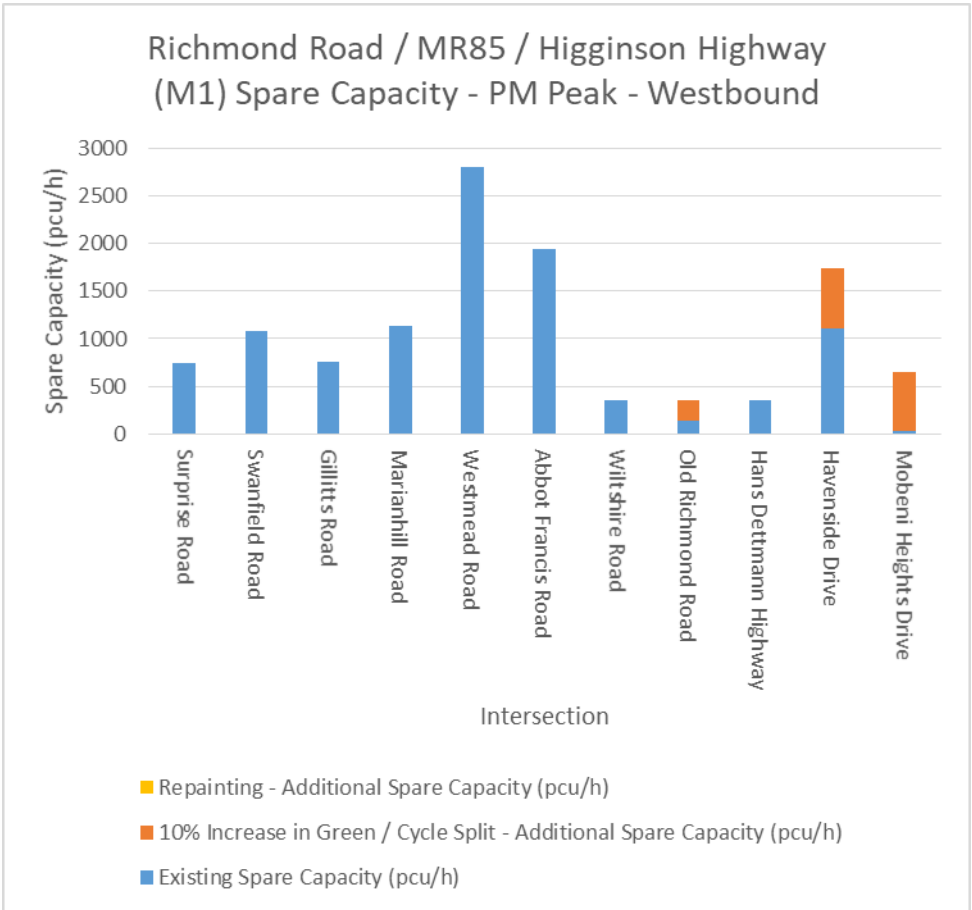
Annexure D – Through Movement Spare Capacity for Alternative Routes

Richmond Road / MR85 / Higginson Highway - M1

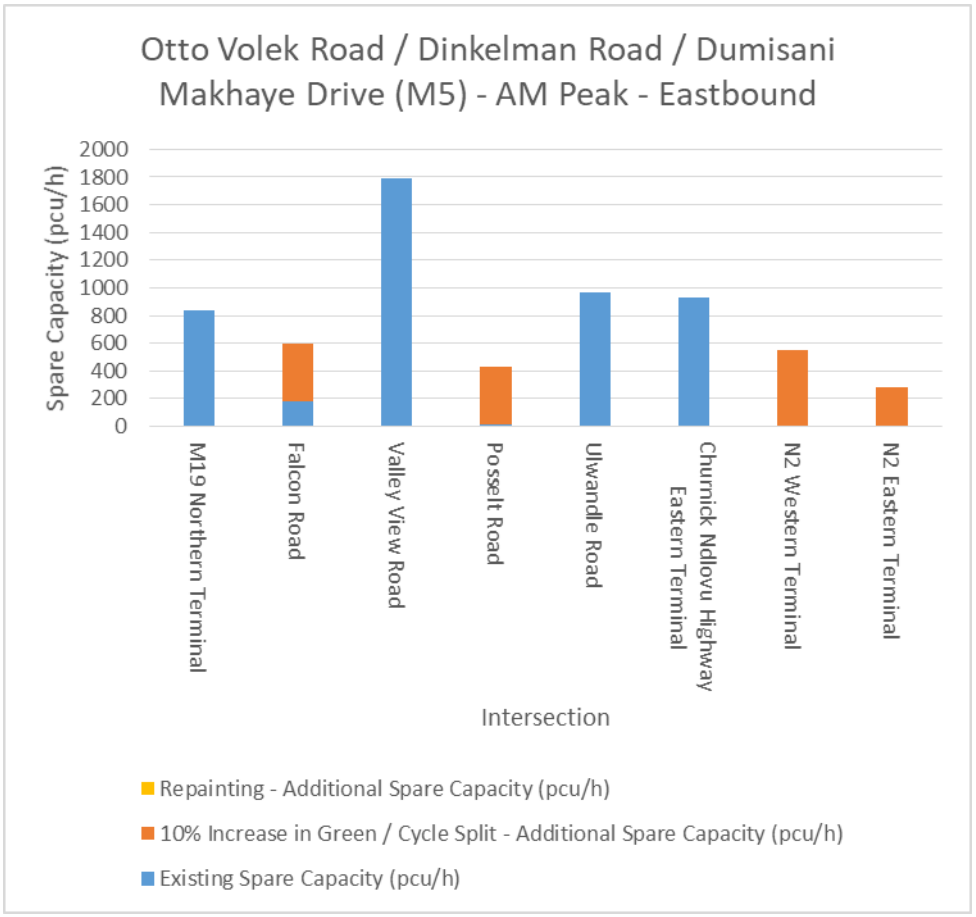

Richmond Road / MR85 / Higginson Highway (M1) Spare Capacity - AM Peak - Eastbound
Spare Capacity (pcu/h)
3500
3000
2500
2000
1500
1000
500
0
Surprise Road
Swanfield Road
Gillitts Road
Marianhill Road
Westmead Road
Abbot Francis Road
Wiltshire Road
Old Richmond Road
Hans Dettmann Highway
Havenside Drive
Mobeni Heights Drive
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

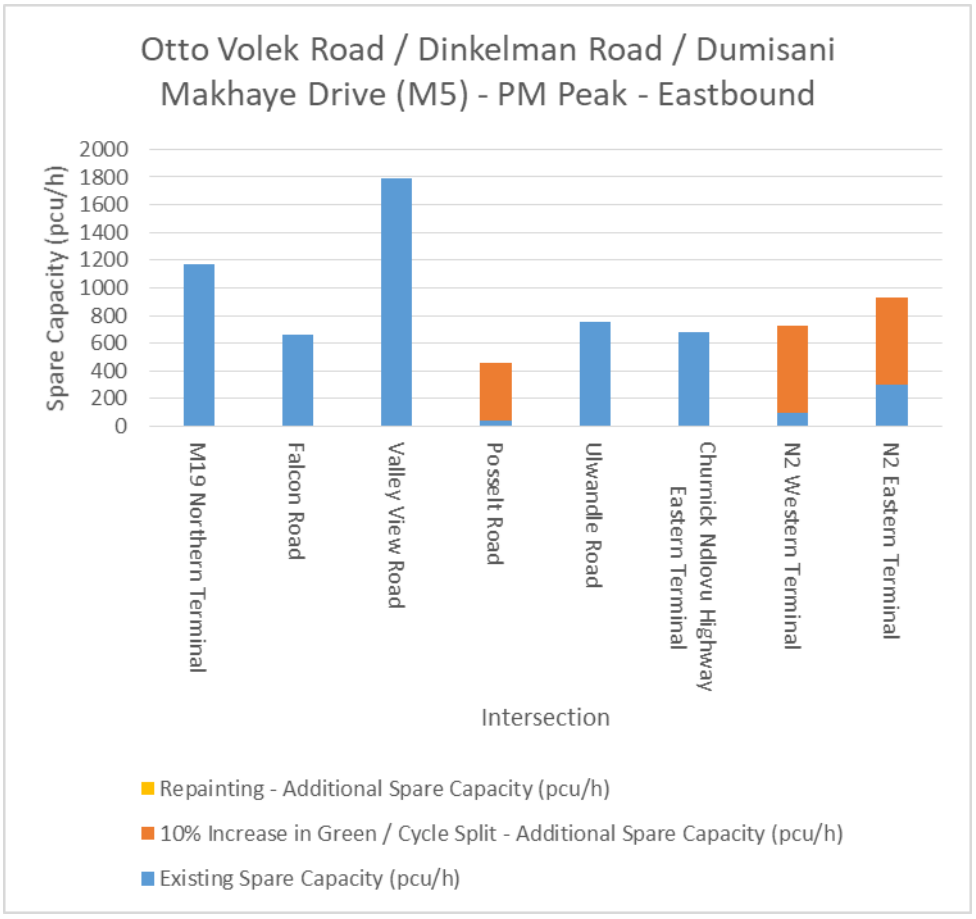

Richmond Road / MR85 / Higginson Highway (M1) Spare Capacity - PM Peak - Eastbound
Spare Capacity (pcu/h)
3000
2500
2000
1500
1000
500
0
Surprise Road
Swanfield Road
Gillitts Road
Marianhill Road
Westmead Road
Abbot Francis Road
Wiltshire Road
Old Richmond Road
Hans Dettmann Highway
Havenside Drive
Mobeni Heights Drive
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

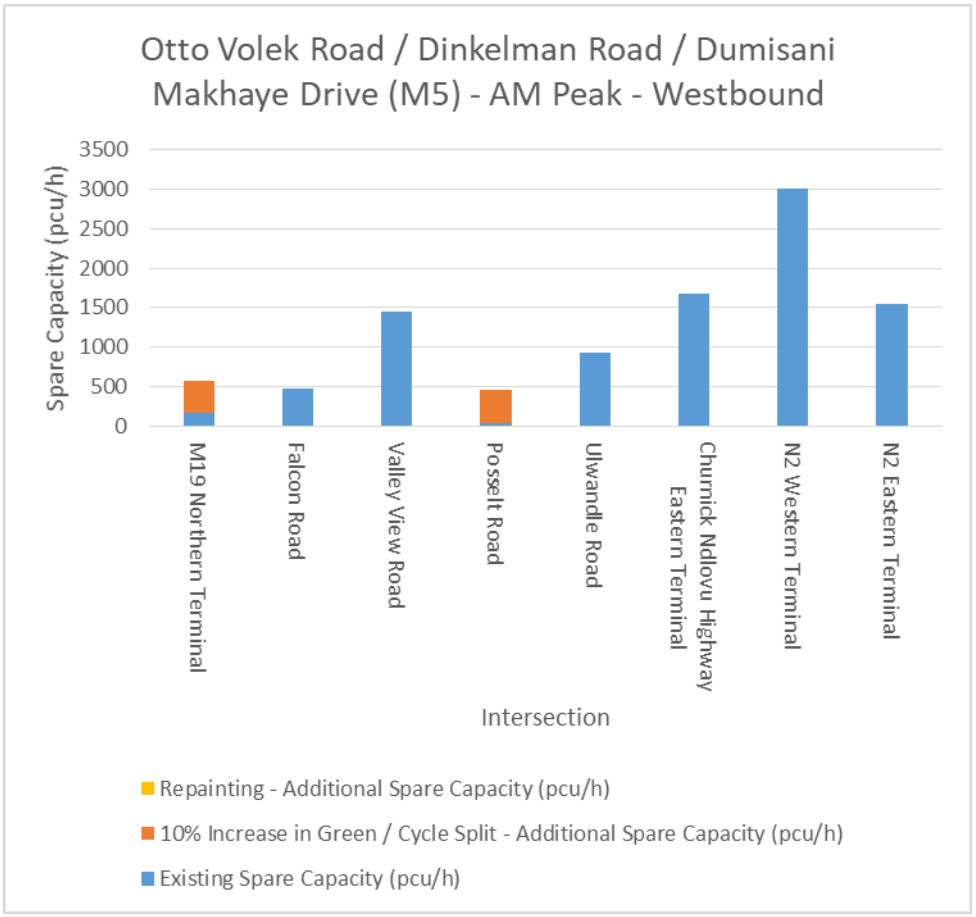

Richmond Road / MR85 / Higginson Highway (M1) Spare Capacity - AM Peak - Westbound
Spare Capacity (pcu/h)
3500
3000
2500
2000
1500
1000
500
0
Surprise Road
Swanfield Road
Gillitts Road
Marianhill Road
Westmead Road
Abbot Francis Road
Wiltshire Road
Old Richmond Road
Hans Dettmann Highway
Havenside Drive
Mobeni Heights Drive
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

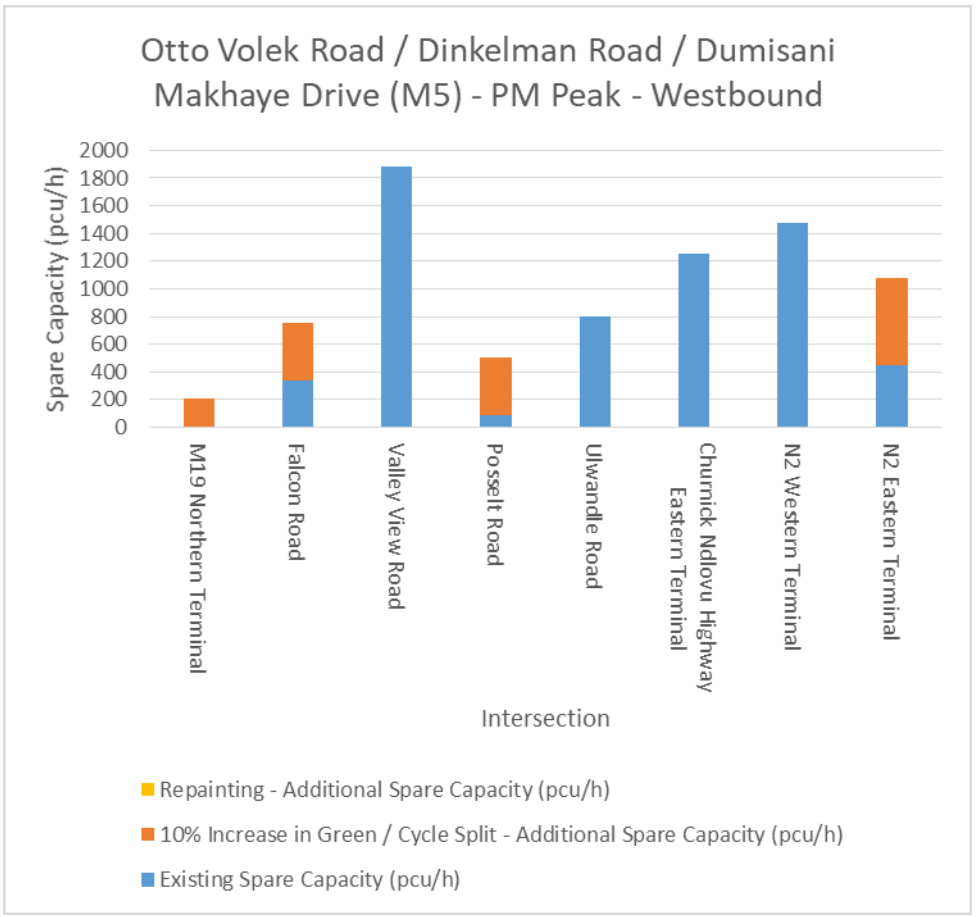

Richmond Road / MR85 / Higginson Highway (M1) Spare Capacity - PM Peak - Westbound
Spare Capacity (pcu/h)
3000
2500
2000
1500
1000
500
0
Surprise Road
Swanfield Road
Gillitts Road
Marianhill Road
Westmead Road
Abbot Francis Road
Wiltshire Road
Old Richmond Road
Hans Dettmann Highway
Havenside Drive
Mobeni Heights Drive
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

Otto Volek Road / Dinkelman Road / Dumisani Makhaye Drive - M5

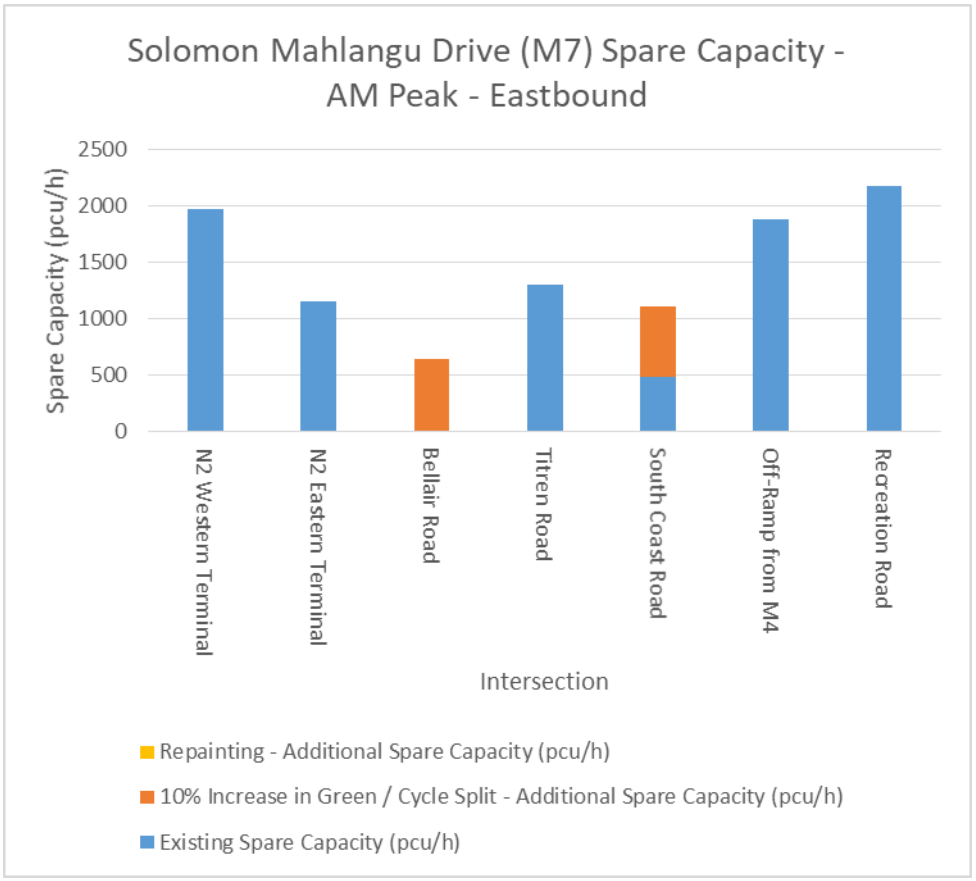

Otto Volek Road / Dinkelman Road / Dumisani Makhaye Drive (M5) - AM Peak - Eastbound
Spare Capacity (pcu/h)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
M19 Northern Terminal
Falcon Road
Valley View Road
Posselt Road
Ulwandle Road
Churnick Ndlovu Highway Eastern Terminal
N2 Western Terminal
N2 Eastern Terminal
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

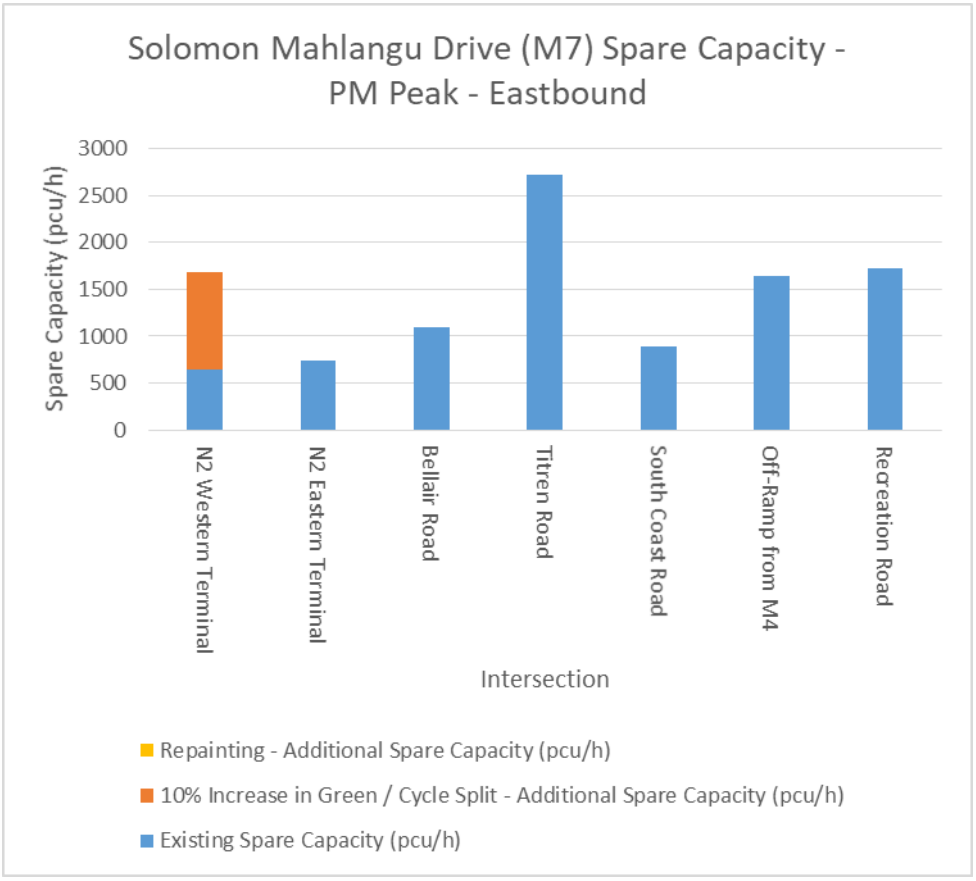

Otto Volek Road / Dinkelman Road / Dumisani Makhaye Drive (M5) - PM Peak - Eastbound
Spare Capacity (pcu/h)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
M19 Northern Terminal
Falcon Road
Valley View Road
Posselt Road
Ulwandle Road
Churnick Ndlovu Highway Eastern Terminal
N2 Western Terminal
N2 Eastern Terminal
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

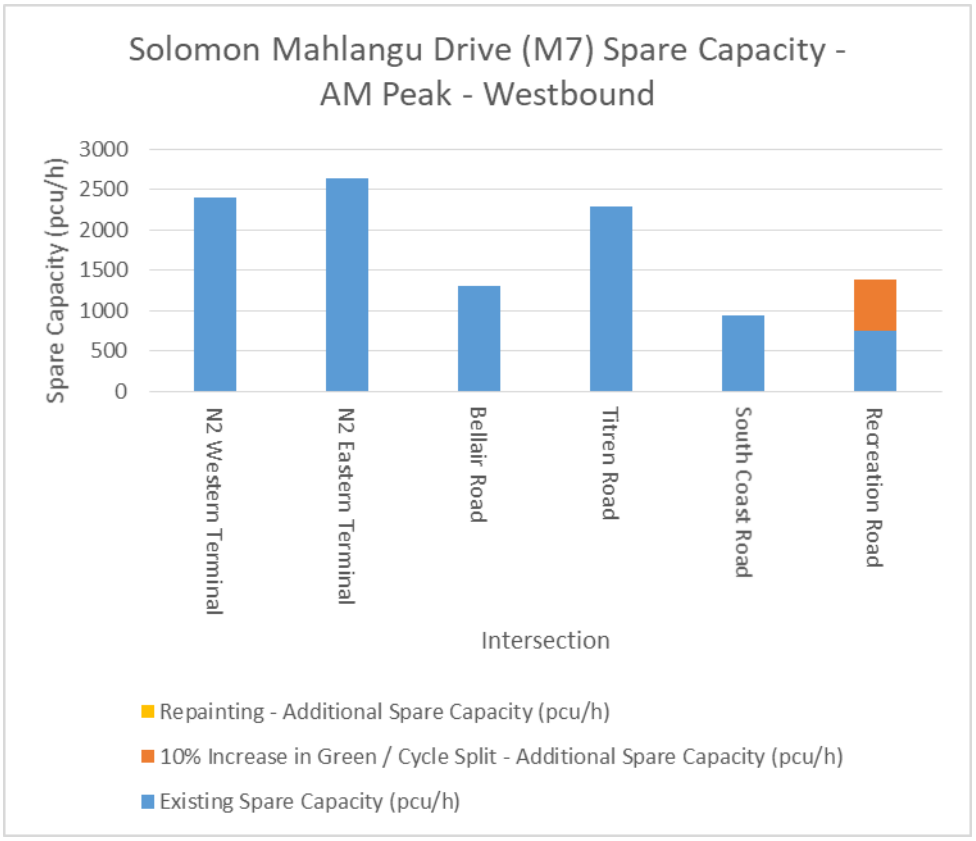

Otto Volek Road / Dinkelman Road / Dumisani Makhaye Drive (M5) - AM Peak - Westbound
Spare Capacity (pcu/h)
3500
3000
2500
2000
1500
1000
500
0
M19 Northern Terminal
Falcon Road
Valley View Road
Posselt Road
Ulwandle Road
Churnick Ndlovu Highway Eastern Terminal
N2 Western Terminal
N2 Eastern Terminal
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

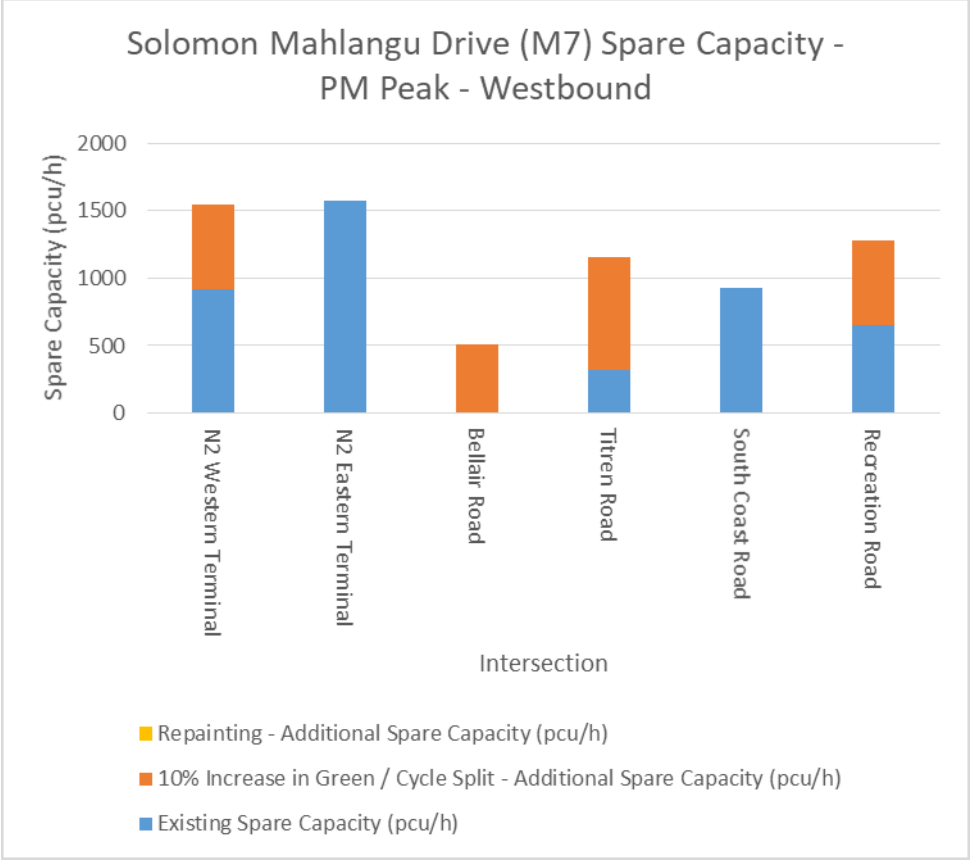

Otto Volek Road / Dinkelman Road / Dumisani Makhaye Drive (M5) - PM Peak - Westbound
Spare Capacity (pcu/h)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
M19 Northern Terminal
Falcon Road
Valley View Road
Posselt Road
Ulwandle Road
Churnick Ndlovu Highway Eastern Terminal
N2 Western Terminal
N2 Eastern Terminal
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

Solomon Mahlangu Drive - M7

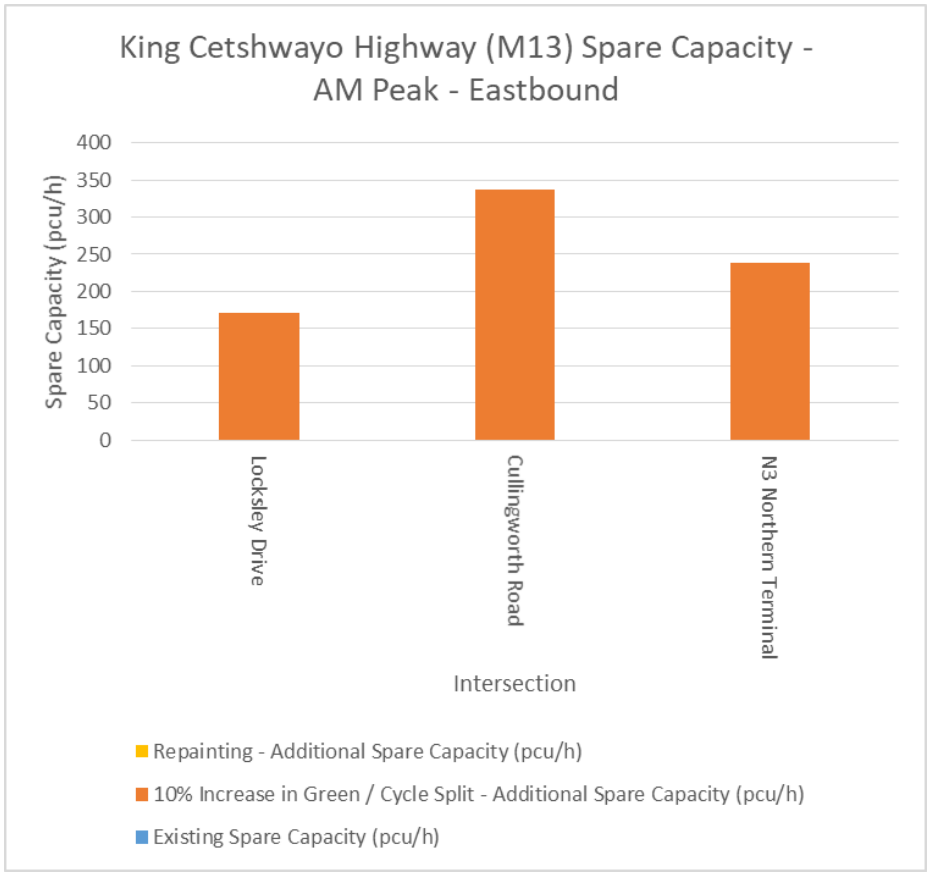

Solomon Mahlangu Drive (M7) Spare Capacity - AM Peak - Eastbound
Spare Capacity (pcu/h)
2500
2000
1500
1000
500
0
N2 Western Terminal
N2 Eastern Terminal
Bellair Road
Titren Road
South Coast Road
Off-Ramp from M4
Recreation Road
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

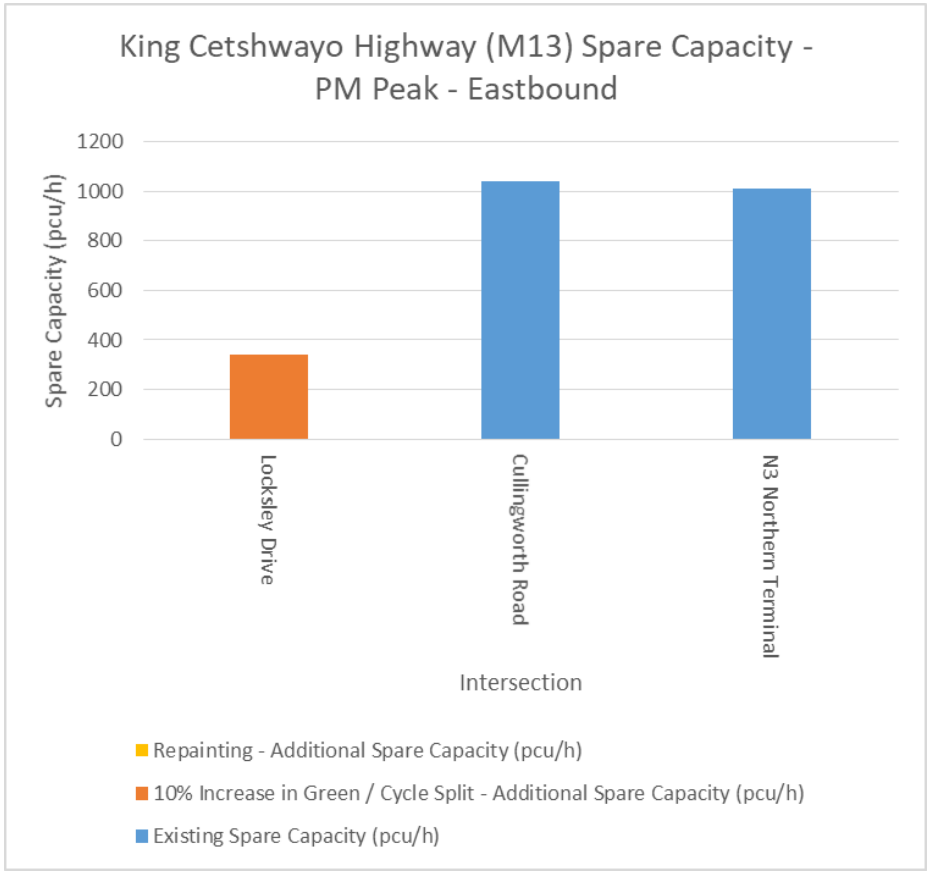

Solomon Mahlangu Drive (M7) Spare Capacity - PM Peak - Eastbound
Spare Capacity (pcu/h)
3000
2500
2000
1500
1000
500
0
N2 Western Terminal
N2 Eastern Terminal
Bellair Road
Titren Road
South Coast Road
Off-Ramp from M4
Recreation Road
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

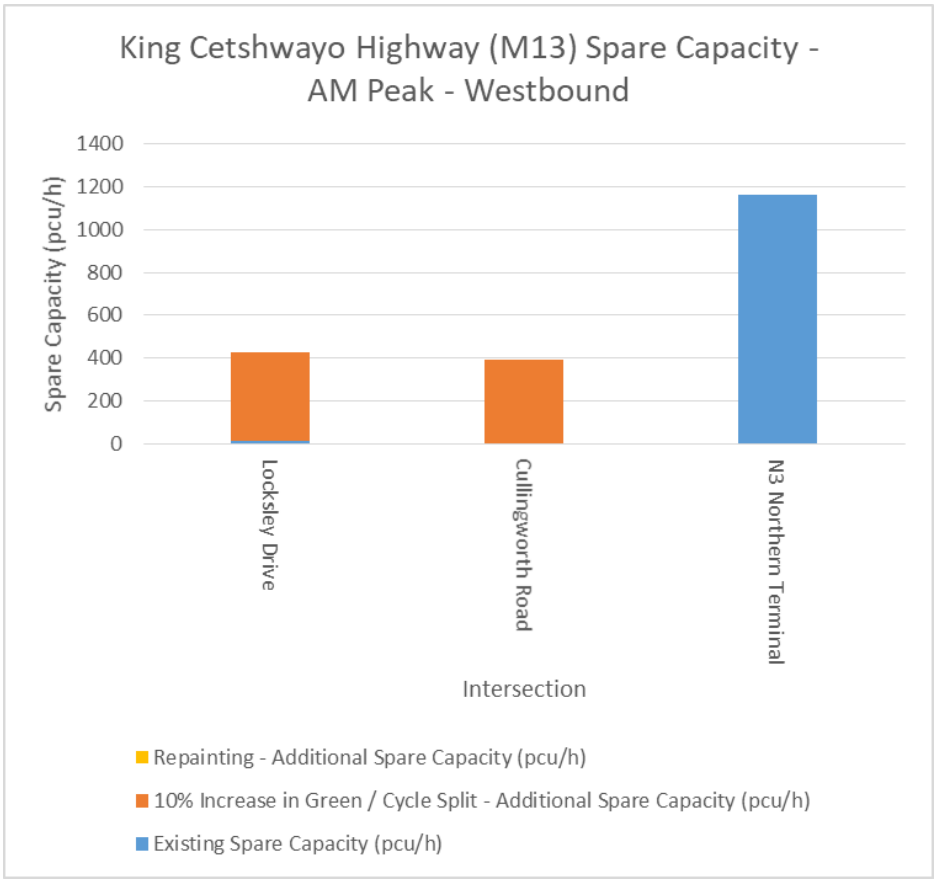

Solomon Mahlangu Drive (M7) Spare Capacity - AM Peak - Westbound
Spare Capacity (pcu/h)
3000
2500
2000
1500
1000
500
0
N2 Western Terminal
N2 Eastern Terminal
Bellair Road
Titren Road
South Coast Road
Recreation Road
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

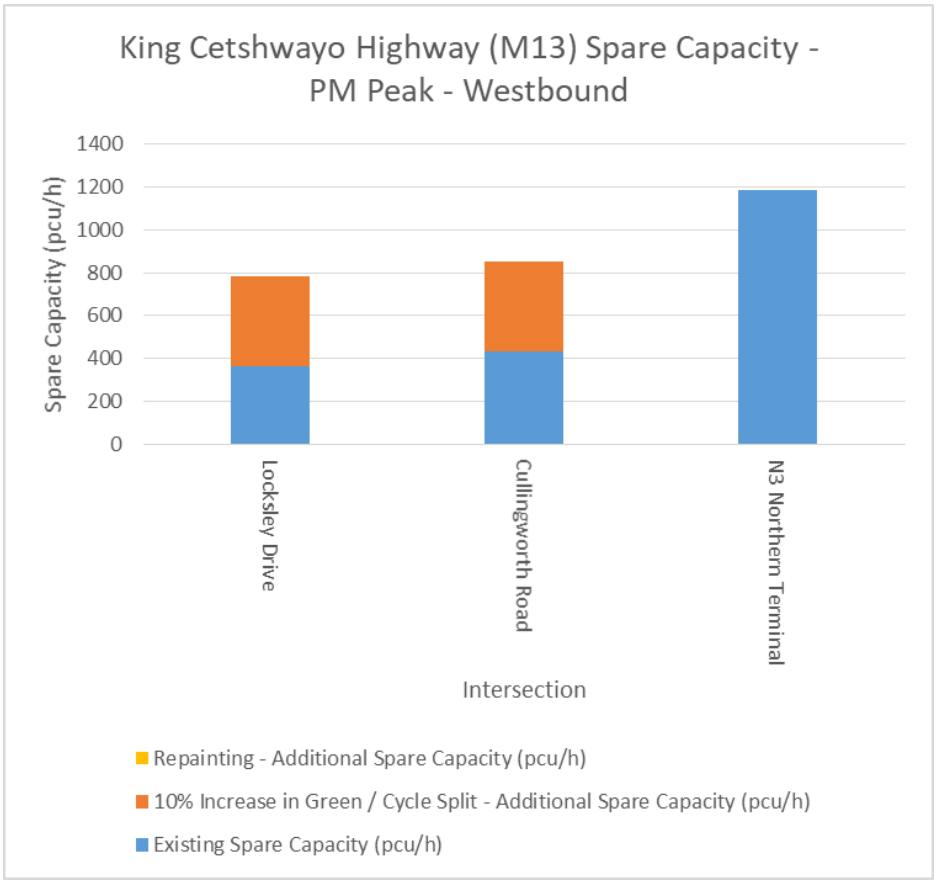

Solomon Mahlangu Drive (M7) Spare Capacity - PM Peak - Westbound
Spare Capacity (pcu/h)
2000
1500
1000
500
0
N2 Western Terminal
N2 Eastern Terminal
Bellair Road
Titren Road
South Coast Road
Recreation Road
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

King Cetshwayo Highway - M13

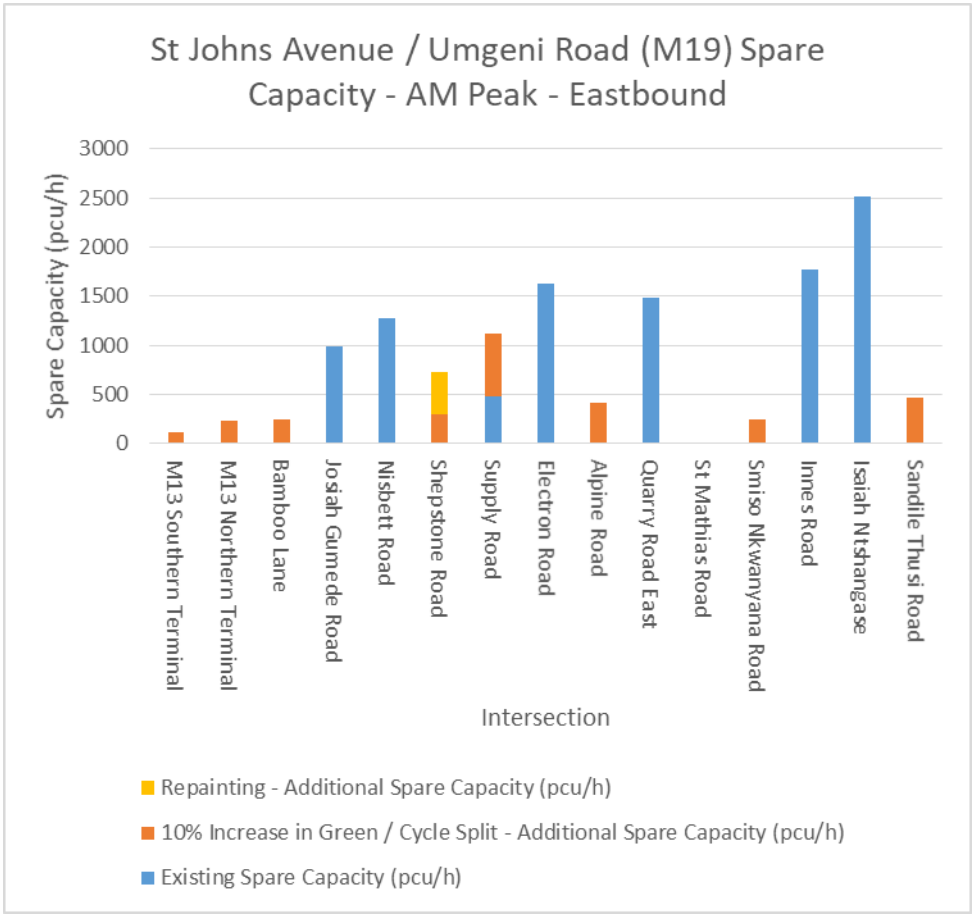

King Cetshwayo Highway (M13) Spare Capacity - AM Peak - Eastbound
Spare Capacity (pcu/h)
400
350
300
250
200
150
100
50
0
Locksley Drive
Cullingworth Road
N3 Northern Terminal
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

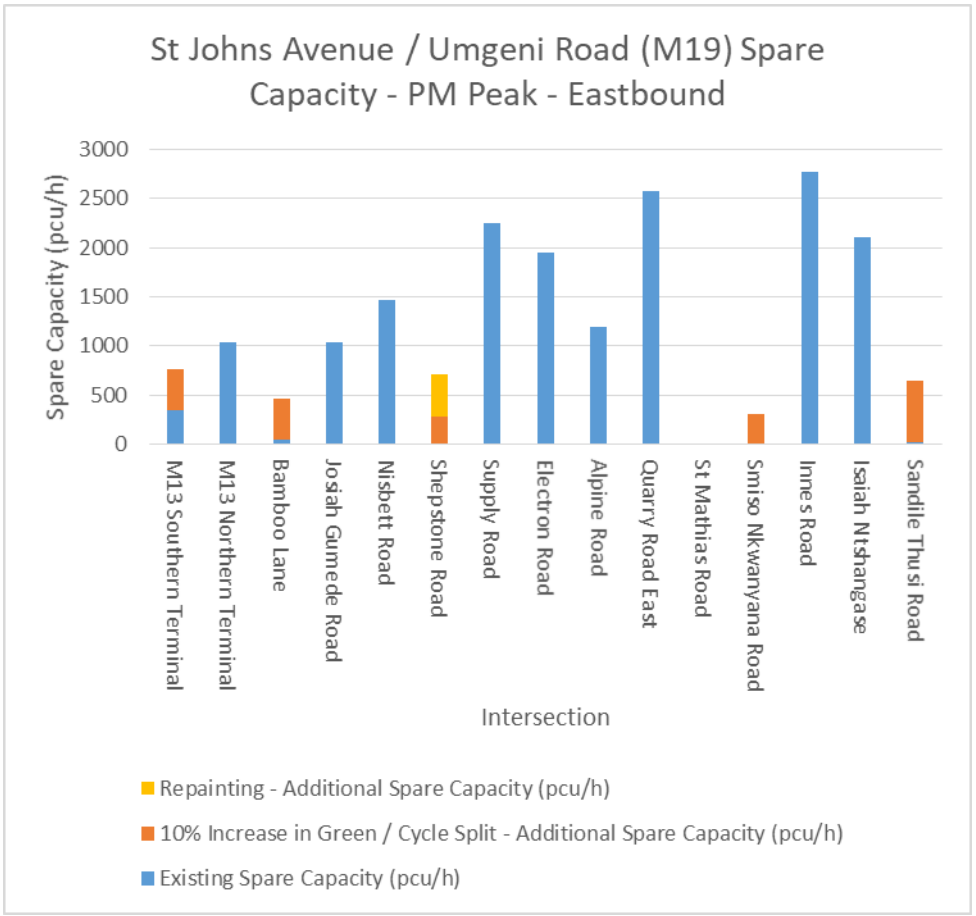

King Cetshwayo Highway (M13) Spare Capacity - PM Peak - Eastbound
Spare Capacity (pcu/h)
1200
1000
800
600
400
200
0
Locksley Drive
Cullingworth Road
N3 Northern Terminal
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

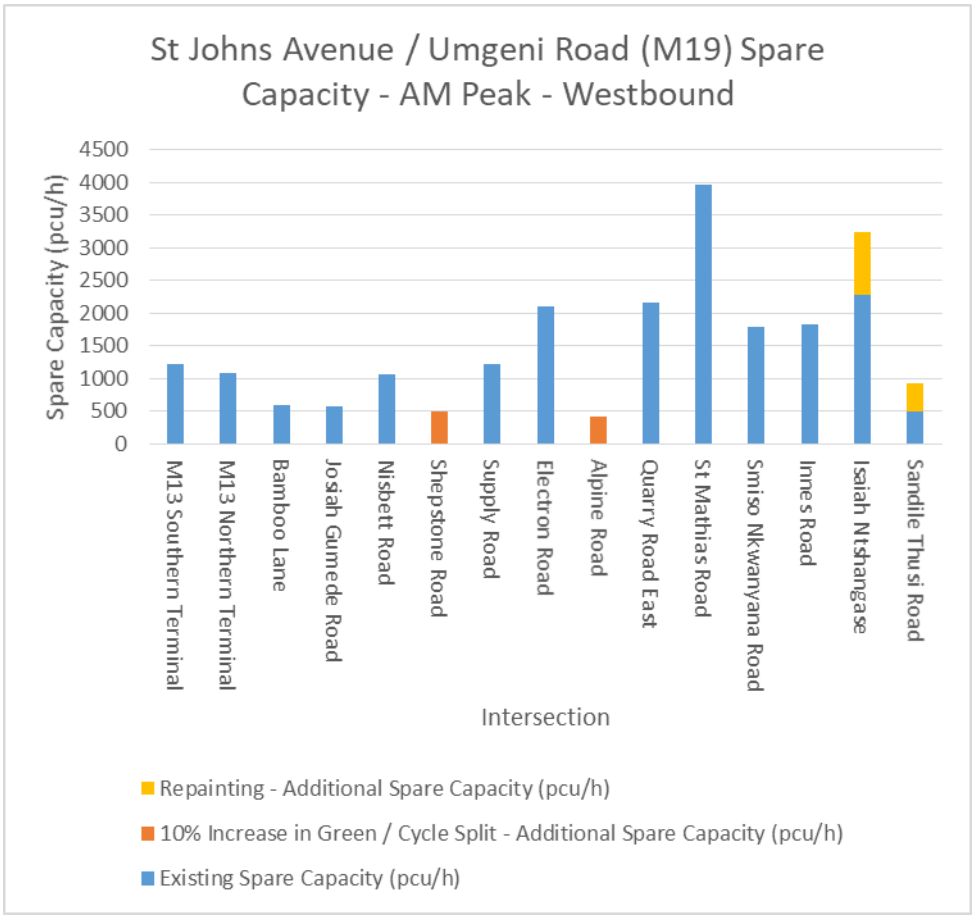

King Cetshwayo Highway (M13) Spare Capacity - AM Peak - Westbound
Spare Capacity (pcu/h)
1400
1200
1000
800
600
400
200
0
Locksley Drive
Cullingworth Road
N3 Northern Terminal
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

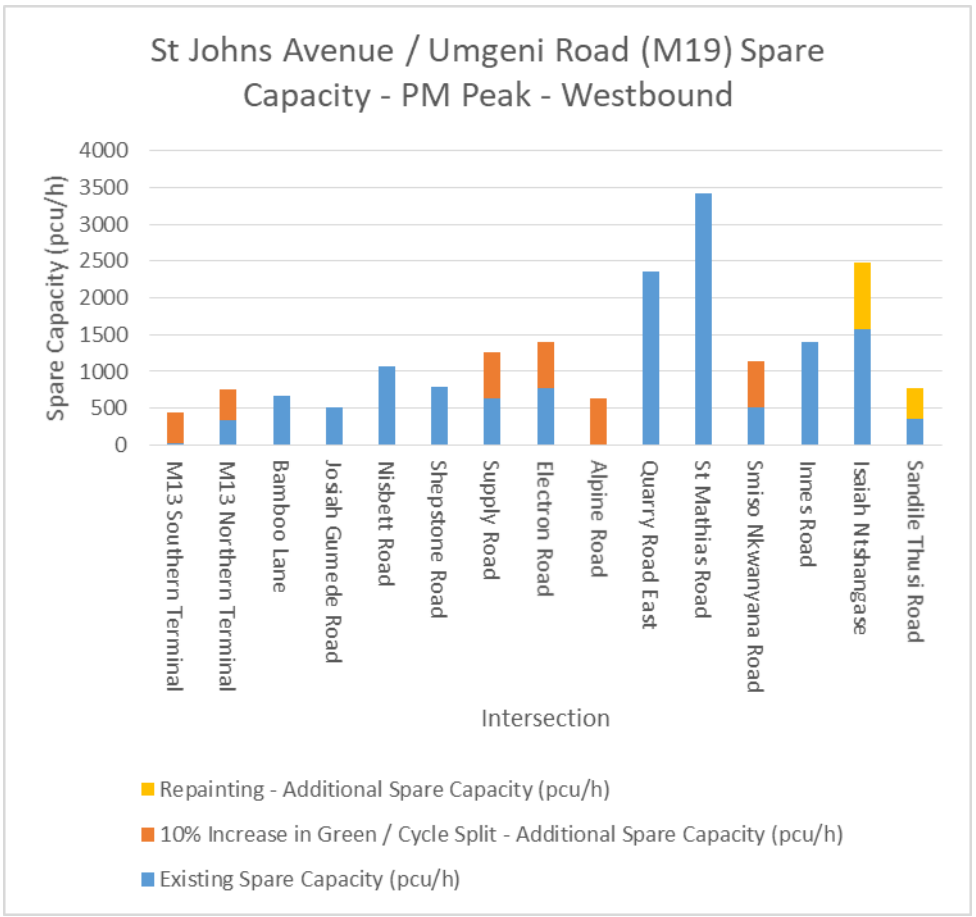

King Cetshwayo Highway (M13) Spare Capacity - PM Peak - Westbound
Spare Capacity (pcu/h)
1400
1200
1000
800
600
400
200
0
Locksley Drive
Cullingworth Road
N3 Northern Terminal
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

St Johns Avenue / Umgeni Road - M19

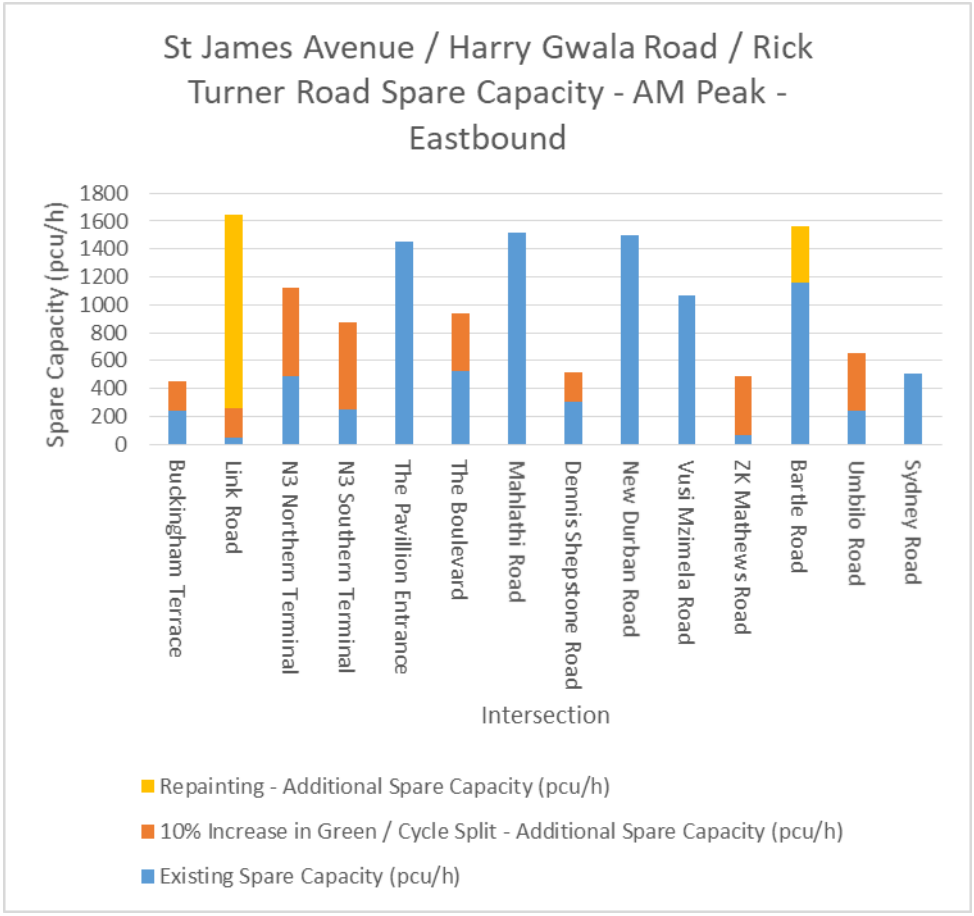

St Johns Avenue / Umgeni Road (M19) Spare Capacity - AM Peak - Eastbound
Spare Capacity (pcu/h)
3000
2500
2000
1500
1000
500
0
M13 Southern Terminal
M13 Northern Terminal
Bamboo Lane
Josiah Gumede Road
Nisbett Road
Shepstone Road
Supply Road
Electron Road
Alpine Road
Quarry Road East
St Mathias Road
Smiso Nkwanyana Road
Inne s Road
Isaiah Ntshangase
Sandile Thusi Road
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

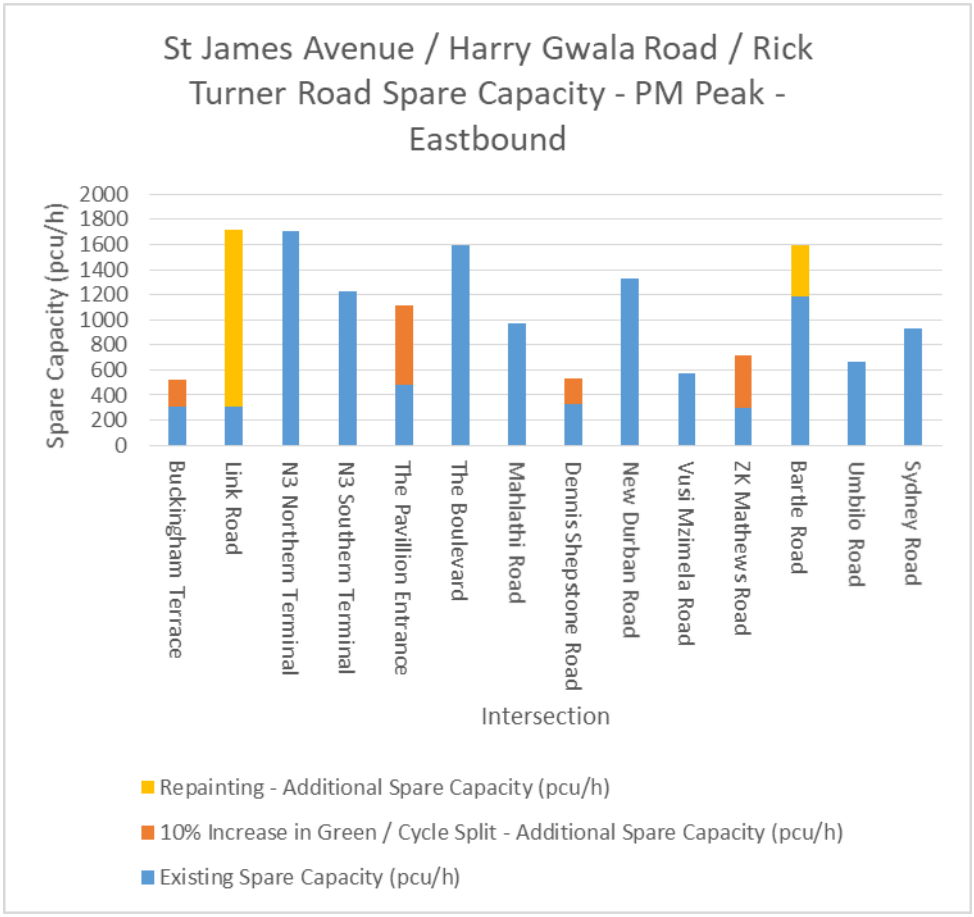

St Johns Avenue / Umgeni Road (M19) Spare Capacity - PM Peak - Eastbound
Spare Capacity (pcu/h)
3000
2500
2000
1500
1000
500
0
M13 Southern Terminal
M13 Northern Terminal
Bamboo Lane
Josiah Gumede Road
Nisbett Road
Shepstone Road
Supply Road
Electron Road
Alpine Road
Quarry Road East
St Mathias Road
Smiso Nkwanyana Road
Inne s Road
Isaiah Ntshangase
Sandile Thusi Road
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

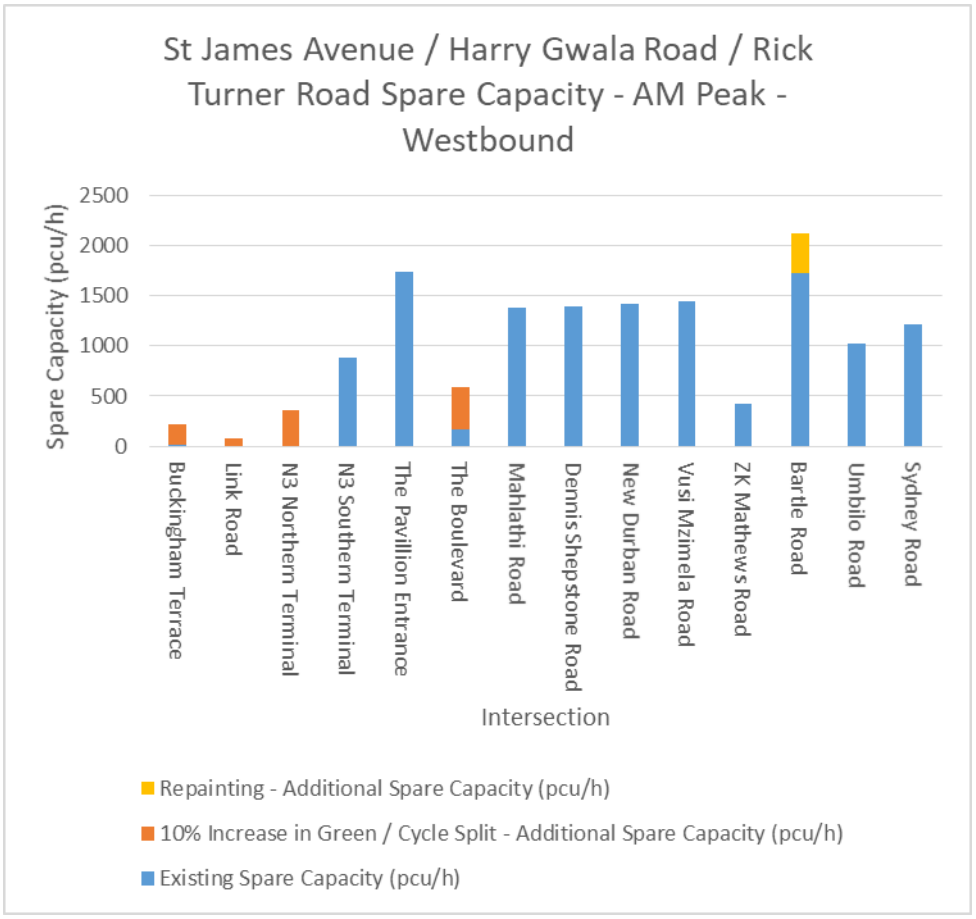

St Johns Avenue / Umgeni Road (M19) Spare Capacity - AM Peak - Westbound
Spare Capacity (pcu/h)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
M13 Southern Terminal
M13 Northern Terminal
Bamboo Lane
Josiah Gumede Road
Nisbett Road
Shepstone Road
Supply Road
Electron Road
Alpine Road
Quarry Road East
St Mathias Road
Smiso Nkwanyana Road
Innes Road
Isaiah Ntshangase
Sandile Thusi Road
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

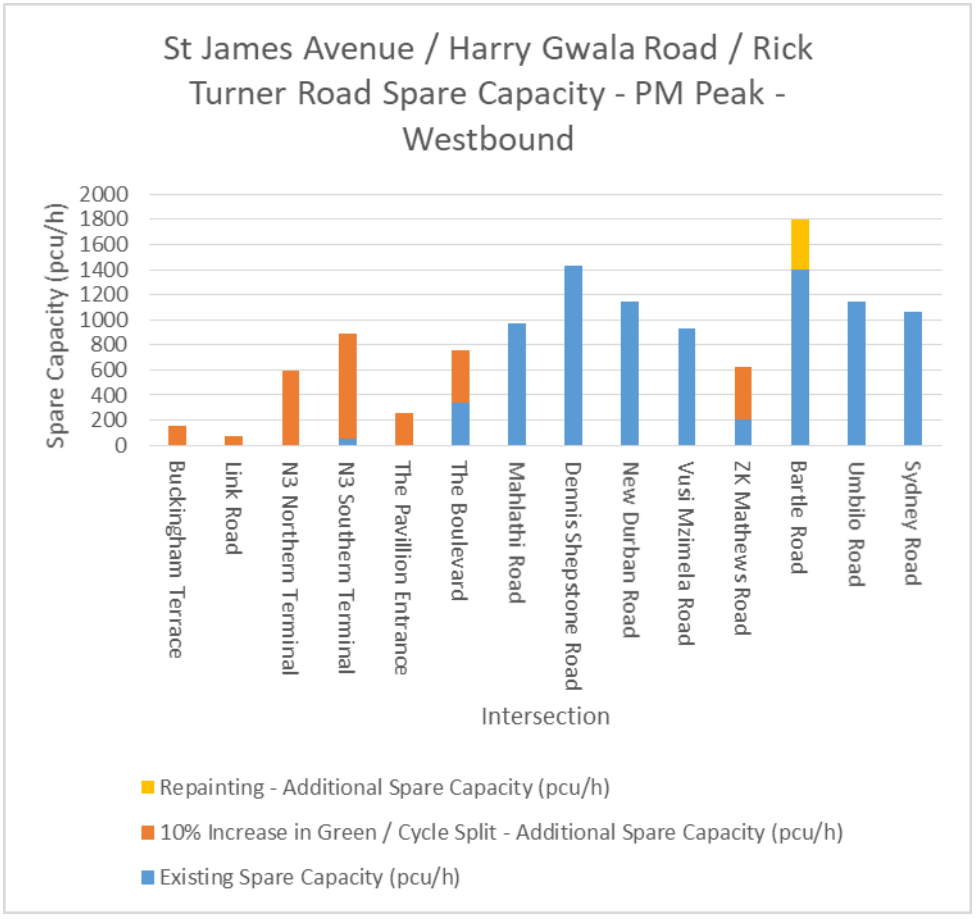

St Johns Avenue / Umgeni Road (M19) Spare Capacity - PM Peak - Westbound
Spare Capacity (pcu/h)
4000
3500
3000
2500
2000
1500
1000
500
0
M13 Southern Terminal
M13 Northern Terminal
Bamboo Lane
Josiah Gumede Road
Nisbett Road
Shepstone Road
Supply Road
Electron Road
Alpine Road
Quarry Road East
St Mathias Road
Smiso Nkwanyana Road
Innes Road
Isaiah Ntshangase
Sandile Thusi Road
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

St James Avenue / Harry Gwala Road / Rick Turner Road


St James Avenue / Harry Gwala Road / Rick Turner Road Spare Capacity - AM Peak - Eastbound
Spare Capacity (pcu/h)
1800
1600
1400
1200
1000
800
600
400
200
0
Buckingham Terrace
Link Road
N3 Northern Terminal
N3 Southern Terminal
The Pavillion Entrance
The Boulevard
Mahlathi Road
Dennis Shepstone Road
New Durban Road
Vusi Mzimela Road
ZK Mathews Road
Bartle Road
Umbilo Road
Sydney Road
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)


St James Avenue / Harry Gwala Road / Rick Turner Road Spare Capacity - PM Peak - Eastbound
Spare Capacity (pcu/h)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Buckingham Terrace
Link Road
N3 Northern Terminal
N3 Southern Terminal
The Pavillion Entrance
The Boulevard
Mahlathi Road
Dennis Shepstone Road
New Durban Road
Vusi Mzimela Road
ZK Mathews Road
Bartle Road
Umbilo Road
Sydney Road
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)


St James Avenue / Harry Gwala Road / Rick Turner Road Spare Capacity - AM Peak - Westbound
Spare Capacity (pcu/h)
2500
2000
1500
1000
500
0
Buckingham Terrace
Link Road
N3 Northern Terminal
N3 Southern Terminal
The Pavillion Entrance
The Boulevard
Mahlathi Road
Dennis Shepstone Road
New Durban Road
Vusi Mzimela Road
ZK Mathews Road
Bartle Road
Umbilo Road
Sydney Road
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)


St James Avenue / Harry Gwala Road / Rick Turner Road Spare Capacity - PM Peak - Westbound
Spare Capacity (pcu/h)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Buckingham Terrace
Link Road
N3 Northern Terminal
N3 Southern Terminal
The Pavillion Entrance
The Boulevard
Mahlathi Road
Dennis Shepstone Road
New Durban Road
Vusi Mzimela Road
ZK Mathews Road
Bartle Road
Umbilo Road
Sydney Road
Intersection
Repainting - Additional Spare Capacity (pcu/h)
10% Increase in Green / Cycle Split - Additional Spare Capacity (pcu/h)
Existing Spare Capacity (pcu/h)

Annexure E – Proposed Intersection Geometry Upgrades

Annexure F – Proposed Repainting of Intersections

Annexure G – Proposed Timing Adjustments of Intersections

No	Alternative Route	Intersection
1	Solomon Mahlangu Drive - M7	N2 Western Terminal
2	Solomon Mahlangu Drive - M7	Bellair Road
3	Solomon Mahlangu Drive - M7	Titren Road
4	Solomon Mahlangu Drive - M7	South Coast Road
5	Solomon Mahlangu Drive - M7	Recreation Road
6	King Cetshwayo Highway - M13	Locksley Drive
7	King Cetshwayo Highway - M13	Cullingworth Road
8	King Cetshwayo Highway - M13	N3 Northern Terminal
9	St Johns Avenue / Umgeni Road - M19	M13 Southern Terminal
10	St Johns Avenue / Umgeni Road - M19	M13 Northern Terminal
11	St Johns Avenue / Umgeni Road - M19	Bamboo Lane
12	St Johns Avenue / Umgeni Road - M19	Shepstone Road
13	St Johns Avenue / Umgeni Road - M19	Supply Road
14	St Johns Avenue / Umgeni Road - M19	Electron Road
15	St Johns Avenue / Umgeni Road - M19	Alpine Road
16	St Johns Avenue / Umgeni Road - M19	Smiso Nkwanyana Road
17	St Johns Avenue / Umgeni Road - M19	Sandile Thusi Road
18	Richmond Road / MR85 / Higginson Highway - M1	Surprise Road
19	Richmond Road / MR85 / Higginson Highway - M1	Marianhill Road
20	Richmond Road / MR85 / Higginson Highway - M1	Abbot Francis Road
21	Richmond Road / MR85 / Higginson Highway - M1	Wiltshire Road
22	Richmond Road / MR85 / Higginson Highway - M1	Old Richmond Road
23	Richmond Road / MR85 / Higginson Highway - M1	Hans Dettmann Highway
24	Richmond Road / MR85 / Higginson Highway - M1	Havenside Drive
25	Richmond Road / MR85 / Higginson Highway - M1	Mobeni Heights Drive
26	St James Avenue / Harry Gwala Road / Rick Turner Road	Buckingham Terrace
27	St James Avenue / Harry Gwala Road / Rick Turner Road	Link Road
28	St James Avenue / Harry Gwala Road / Rick Turner Road	N3 Northern Terminal
29	St James Avenue / Harry Gwala Road / Rick Turner Road	N3 Southern Terminal
30	St James Avenue / Harry Gwala Road / Rick Turner Road	The Pavillion Entrance
31	St James Avenue / Harry Gwala Road / Rick Turner Road	The Boulevard
32	St James Avenue / Harry Gwala Road / Rick Turner Road	Dennis Shepstone Road
33	St James Avenue / Harry Gwala Road / Rick Turner Road	ZK Mathews Road
34	St James Avenue / Harry Gwala Road / Rick Turner Road	Umbilo Road
35	Otto Volek Road / Dinkelman Road / Dumisani	M19 Northern Terminal
36	Otto Volek Road / Dinkelman Road / Dumisani	Falcon Road
37	Otto Volek Road / Dinkelman Road / Dumisani	Posselt Road
38	Otto Volek Road / Dinkelman Road / Dumisani	N2 Western Terminal
39	Otto Volek Road / Dinkelman Road / Dumisani	N2 Eastern Terminal
40	R103	Stonewall Road
41	R103	Greenway Close
42	R103	Bamboo Close
43	R102	Somerset Pl/Leslie Rd
44	R102	Umdoni Rd
45	R102	Ocean View Rd
46	R102	Joyner Rd
47	R102	The Avenue/ Baltex Ave
48	R102	N2 Prospecton Eastern Terminal
49	R102	N2 Prospecton Western Terminal
50	R102	Wilcox Rd
51	R102	Grimsby Rd
52	R102	Kenyon Howden Rd
53	R102	Blamey Rd
54	R102	Trent Rd

No	Alternative Route	Intersection
55	R102	Sarnia Rd
56	R102	Adrian Rd/Arbuckle Rd
57	R102	Sea Cow Lake Rd
58	R102	Acutt Ave/Briar Ave
59	R102	Orange Grove
60	R102	Effingham Rd
61	R102	Blackburn Rd
62	R102	Malacca Rd
63	R102	Moreland Dr
64	R102	Rinaldo Rd
65	R102	Mount Edgecombe Dr /Stonebridge Dr
66	R102	Hillhead Dr/ Markhouse Pl
67	R102	Hillhead Dr/ Phoenix Hwy
68	R102	Phoenix Hwy
69	M12	Isaiah Ntshangase Rd
70	M12	Smiso Nkwanyana Rd
71	M12	Athlone Dr
72	M12	Tyne Pl/Humber Cres
73	M12	Lonsdale Dr/Old Mill Way
74	M12	Umhlanga Rocks Dr/ Kenneth Kaunda Rd
75	M12	Longwoods Dr
76	M12	Sagewood Way
77	M12	Village Way/Falbaire Ave
78	M12	Somerset Dr/Ilala Dr
79	M12	Westridge Rd
80	Moss Kolnick Dr/Wanda Cele Rd/Mfundi Mngadi	Arbour Rd
81	Moss Kolnick Dr/Wanda Cele Rd/Mfundi Mngadi	Citrus Dr
82	Moss Kolnick Dr/Wanda Cele Rd/Mfundi Mngadi	Phila Ndwandwe Rd/ Aster Pl
83	Moss Kolnick Dr/Wanda Cele Rd/Mfundi Mngadi	Jeffels Rd
84	Moss Kolnick Dr/Wanda Cele Rd/Mfundi Mngadi	Stroude Pl
85	St James Avenue / Harry Gwala Road / Rick Turner Road	Bartle Road
86	St James Avenue / Harry Gwala Road / Rick Turner Road	Dennis Shepstone Road
87	St Johns Avenue / Umgeni Road - M19	Isaiah Ntshangase Road
88	R102	Kissoon Road
89	R102 South Coast Road	Jacobs Road
90	R102 Umbilo Road	Hannah Road
91	R102 Umbilo Road	Franks Avenue
92	R102 Magwasa Maphalala Road	Eaton Road
93	R102 Magwasa Maphalala Road	Alan Paton Road
94	R102 Magwasa Maphalala Road	Canbera Road
95	R102 Magwasa Maphalala Road	Canada Road
96	R102 Sydney Road	Canada Road
97	R102 Sydney Road	Spradbrow Road
98	R102 Sydney Road	Franks Avenue
99	R102 Sydney Road	Pioneer Road
100	R102	Sbu Mkhize Rd (Main Rd)
101	R102	Khoto Mkhunya Rd
102	R103	Van Eck Place
103	R103	Washington Road
104	R103	Gladys Manzi Road
105	R103	Portland Road
106	R103	Claveshay Road
107	R103	Poinsettia Road

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Annexure I– Road Incident Management System (RIMS) SOPs / Protocols

Annexure J– Freeway Management System (FMS) SOPs

The detailed FMS SOPs can be access on EDMS as follows:

- SOP-4 Network Surveillance and Incident Detection - #17472835
- SOP-6 Incident Notification - #17472628

Annexure K– Marketing, Communication and Digital Communication Strategy

The detailed Communication plan can be access on EDMS Doc No #17447079