11.5.3	REQUEST FOR APPROVAL OF STELLENBOSCH ROADS MASTER PLAN

Collaborator No: 702617
IDP KPA Ref No: Good Governance and Compliance
Meeting Date: 14 April 2021 and 28 April 2021

1. SUBJECT: REQUEST FOR APPROVAL OF STELLENBOSCH ROADS MASTER PLAN

2. PURPOSE

That Council approves the 2018 - 2019 Roads Master Plan.

3. DELEGATED AUTHORITY

Municipal Council

4. EXECUTIVE SUMMARY

The aim of the Roads Master Plan (RMP) is to analyses the capacity of road network and identify current and future mobility needs and recommend the required road infrastructure that will ensure an effective road network and a balanced supply of accessibility and mobility.

The Transport model developed, not only identifies additional road infrastructures requirements, but also identifies spaces that must be reserved for future roads and transport needs. The RMP provides recommendations and serves as reference in preparing short-term (5 year), medium and long term (20+ year) perspectives for implementing transportation projects in future.

The RMP also provides input into other strategic plans, such as the Spatial Development Framework (SDF), Integrated Development Plan (IDP), Comprehensive Integrated Transport Plan (CITP) and Integrated Public Transport Networks (IPTN).

The modeling results suggest that main roads leading into Stellenbosch and various roads within the Stellenbosch are heavily congested, and operate beyond their capacity, particularly in the peak periods.

5. RECOMMENDATIONS

(a) that the content of this item be noted;

(b) that the Draft Roads Master Plan attached as **ANNEXURE A**, be accepted; and

(c) that the Draft Roads Master Plan be advertised for public comment as part of the public participation process.

6. DISCUSSION / CONTENTS

6.1 Background

Stellenbosch Municipality undertook the development of a RMP in 2012, and the document as finalised in November 2012. The Attached Draft 2018 - 2019 RMP is a full review of the 2012 Roads Master Plan.

The compilation of the RMP compromises an assessment of the road network, collecting traffic data and developing a transport network model taking into account the latest information from Spatial Development Framework (SDF), Housing Pipeline and Integrated Development Program (IDP) were taken into account to ensure that the RMP update reflected the latest policy objectives.

6.2 Discussion

Some of the recommendations highlighted in the RMP are:

- Adam Tas Road could become the busiest section of road in Stellenbosch, and will require additional capacity.
- Upgrade and reconfigure the Adam Tas intersections with the R44/Alexander Street and Merriman Avenue.
- Jamestown Road: Road Network Development required due to major residential developments planned for this area.
- The conceptual planning of the following intersections upgrades has been undertaken, the detail design and construction should be implemented as soon as possible:
    - Adam Tas and Helshoogte Road (including the closure and relocation of the Helshoogte Rd/La Colline Road T-junction further east).
- Stellenbosch Municipality should start the process to expropriate and purchase the land required to construct future roads, specifically the implementation of portions of the Western Bypass and Eastern Link Road, and other roads associated with proposed housing developments and catalytic projects as defined in the draft 2019 MSDF. Future road reserves should be formally registered with the Surveyor General to protect them.
- The planning of portions of the western bypass and/or a combination of substantial upgrading of the R44 must commence in conjunction with the Provincial Western Cape Government (PWCG). This should ideally occur prior to the construction of the proposed intersection upgrades along the R44 to prevent abortive work.

The RMP proposes various types of projects, both small and large, for implementation over a 20 year period. Once a proposal is identified for further assessment or possible implementation, the following is required:

- Further feasibility studies and assessments including the compilation of cost estimates and an assessment on resource requirements.
- Compliance with internal municipal processes such as incorporation onto the Municipality's Capital Prioritization System and Integrated Development Plan (IDP).
- Council approval.
- External approvals such as environmental and public participation.
- Confirmation that funding and other resources (human resources) are in place.

6.3 Financial Implications

Detailed cost estimates are carried out once a proposal is identified for further assessment or implementation. The cost estimates / funding analysis will determine the financial implications and the most appropriate funding source / model will be selected. The implementation of proposals may be phased to coincide with available funding. Examples of sources of funding are: Municipal Capital Funding, Development Contributions, Provincial Roads Authority and Infrastructure Grants.

6.4 Legal Implications

The Departments of Transport's Draft White Paper on Roads Policy for South Africa (December 2017) states that "Roads master planning must be undertaken as part of an integrated transport and land use planning process.

Public participation is carried-out on the following platforms:

- Municipality's Mobility Forum – the RMP, and proposals contained therein are regularly discussed at the quarterly Municipality's Mobility Forum Meetings.
- The IDP Process – namely Ward and Sector Engagements.
- A full public participation process is undertaken prior to the implementation of listed proposals.

The recommendations in this report comply with Council's policies and all applicable legislation.

6.5 Staff Implications

A detailed resource requirement assessment will be carried out once a proposal is identified for further assessment or implementation. This assessment would determine, for example, whether internal capacity is sufficient or whether external resources will needed. Proposals listed in the RMP could be undertaken by:

- Stellenbosch Municipality's` internal staff or appointed consultants and contractors.
- Developers, in accordance with Municipal standards, and to the approval of the Municipality.
- The PWCG (Roads and Transport Department) in collaboration with the Municipality.

6.6 Previous / Relevant Council Resolutions:

The Municipality's first RMP (2012) was commissioned and by the Municipality's Roads and Transport Division and approved by the Infrastructure Services Directorate. At the time it was considered a high-level technical management tool with a purpose to inform decision making, with-in the Directorate. At the time the RMP was not considered an item to be tabled at Council, it was subsequently decided that all Master Planning, including the Roads Master Plan would be tabled to Council.

6.7 Risk Implications

The RMP propose new routes which, in most cases, are supported by interested and affected parties, due to its merits and the benefit derived from improving and strengthening the municipality's road network. It should be noted that certain proposals may not receive support from interested and affected parties. A full public participation process will however be conducted prior to the implementation of listed proposals.

6.8 Comments from Senior Management:

6.8.1 Director: Infrastructure Services

Author of the report

6.8.2 Director: Corporate Services:

The recommendations are supported.

6.8.3 *Municipal Manager:*

Supported

RECOMMENDATIONS FROM INFRASTRUCURE SERVICES COMMITTEE MEETING TO THE EXECUTIVE MAYOR: 2021-03-04: ITEM 5.1.1

(a) that the content of this item be noted;

(b) that the Draft Roads Master Plan attached as **ANNEXURE A**, be accepted; and

(c) that the Draft Roads Master Plan be advertised for public comment as part of the public participation process.

RECOMMENDATIONS FROM THE EXECUTIVE MAYOR, IN CONSULTATION WITH THE EXECUTIVE MAYORAL COMMITTEE, TO COUNCIL: 2021-04-14: ITEM 7.5.3

(a) that the content of this item be noted;

(b) that the Draft Roads Master Plan attached as **ANNEXURE A**, be accepted; and

(c) that the Draft Roads Master Plan be advertised for public comment as part of the public participation process.

ANNEXURES

Annexure A: DRAFT ROADS MASTER PLAN 2018

FOR FURTHER DETAILS CONTACT:

NAME	Deon Louw
POSITION	***Director***
DIRECTORATE	***Infrastructure Services***
CONTACT NUMBERS	***021 808 8213***
E-MAIL ADDRESS	***Deon.louw@stellenbosch.gov.za***
REPORT DATE	***18 February 2021***

ANNEXURE A

STELLENBOSCH
STELLENBOSCH • PNIEL • FRANSCHHOEK
MUNISIPALITEIT • UMASIPALA • MUNICIPALITY

STELLENBOSCH MUNICIPALITY

STELLENBOSCH MUNICIPALITY ROADS MASTER PLAN

2018 UPDATE

30 AUGUST 2019

ORIGINAL

STELLENBOSCH MUNICIPALITY ROADS MASTER PLAN

2018 UPDATE

STELLENBOSCH MUNICIPALITY

REPORT (FINAL)
ORIGINAL

PROJECT NO.: 24310
DATE: AUGUST 2019

WSP
THE PAVILION, 1ST FLOOR
CNR PORTSWOOD AND BEACH ROAD, WATERFRONT
CAPE TOWN, 8001
SOUTH AFRICA

T: T +27 21 481 8700
WSP.COM

Your ref.: B/SM 28/16

Our ref.: 24310

30 August 2019

ORIGINAL

Roscoe Bergstedt
STELLENBOSCH MUNICIPALITY
Department: Engineering Services
PO Box 17
Stellenbosch
7599

Dear Sir:

Subject: Project B/SM 28/16 - Update of the Stellenbosch Roads Masterplan

Please find attached the Final Road Master Plan report for Stellenbosch Municipality for your approval.

Kind regards,

Christo Bredenhann
Associate: Transport Planning

THE PAVILION, 1ST FLOOR
CNR PORTSWOOD AND BEACH ROAD, WATERFRONT
CAPE TOWN, 8001
SOUTH AFRICA

T: T +27 21 481 8700
wsp.com

QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2	REVISION 3	REVISION 3
Remarks	Draft	For review	For review	For approval	Final
Date	16 July 2018	14 December 2018	15 May 2019	20 June 2019	30 Aug 2019
Prepared by	Darren Osborne & Christo Bredenhann *Pr. Eng*	Darren Osborne & Christo Bredenhann *Pr. Eng*	Darren Osborne & Christo Bredenhann *Pr. Eng*	Darren Osborne & Christo Bredenhann *Pr. Eng*	Darren Osborne & Christo Bredenhann *Pr. Eng*
Signature					
Checked by	Christo Bredenhann *Pr. Eng*	Christo Bredenhann *Pr. Eng*	Christo Bredenhann *Pr. Eng*	Christo Bredenhann *Pr. Eng*	Christo Bredenhann *Pr. Eng*
Signature					
Authorised by	Patrick Riley *Pr. Tech Eng*	Herbert Phahlane *Pr. Eng*	Herbert Phahlane *Pr. Eng*	Herbert Phahlane *Pr. Eng*	Herbert Phahlane *Pr. Eng*
Signature					
Project number	24310	24310	24310	24310	24310
Report number	Ver 1.0	Ver 2.0	Ver 3.0	Ver 4.0	Ver 4.1
File reference	Z:\24000 - 24999\24310 - Stellenbosch Mun Roads MP\31 CV\01-DOCS\02-Reports	Z:\24000 - 24999\24310 - Stellenbosch Mun Roads MP\31 CV\01-DOCS\02-Reports	Z:\24000 - 24999\24310 - Stellenbosch Mun Roads MP\31 CV\01-DOCS\02-Reports	Z:\24000 - 24999\24310 - Stellenbosch Mun Roads MP\31 CV\01-DOCS\02-Reports	Z:\24000 - 24999\24310 - Stellenbosch Mun Roads MP\31 CV\01-DOCS\02-Reports

SIGNATURES

PREPARED BY

Christo Bredenhann *Pr Eng*
Associate: Transport Planning

REVIEWED BY

Herbert Phahlane *Pr Eng*
Director: Civil & Water Infrastructure

EXECUTIVE SUMMARY

BACKGROUND TO THE ROADS MASTER PLAN UPDATE

Stellenbosch Municipality undertook the development of a Roads Master Plan in 2011 and 2012, and the document as finalised in November 2012. The 2012 Roads Master Plan was the first undertaken by the Municipality to cover the full municipal area, and included a formalised Road Network Classification and a prioritised list of road infrastructure projects.

This report is the 2018/2019 update of the 2012 Roads Master Plan.

The aim of the 2012 Roads Master Plan was to assist in integrating and coordinating the planning and implementation process for future road infrastructure. It also included the identification and classification of all Class 1 to Class 4 roads within the Stellenbosch Municipal Area. The roads in the Municipality belong to the Municipality, the Western Cape Provincial Government, SANRAL and private land-owners. The Roads Master Plan is a planning tool for the future improvement and development of Stellenbosch's transportation infrastructure. It is a key guide for local, district and provincial authorities in determining and allocating the funding for future improvements within the area. It provides recommendations and serves as reference in preparing short-term (5 year), medium and long term (20+ year) perspectives for implementing transportation projects in future. The RMP supports various other strategic plans, such as the Spatial Development Framework (SDF), Integrated Development Plan (IDP), Comprehensive Integrated Transport Plan (CITP) and Integrated Public Transport Networks (IPTN).

It is essential to plan, fund, manage and implement transportation infrastructure to ensure sustainable, economic and socially acceptable transport services for all residents, workers and visitors of Stellenbosch. Stellenbosch Municipality recognised this issue and conducted comprehensive household surveys in 2008 identifying people's transport movements and demographics. Based on the information collected, a Transport model was prepared for the SMA to identify not only additional road infrastructures required, but also establish a public transport system. The 2012 report confirmed that particular routes within Stellenbosch are heavily congested, particularly in the morning peak period.

The 2012 RMP reported that the previous Stellenbosch Comprehensive Integrated Transport Plan (CITP) identified the core issues and problems that exist within the SMA. This emphasized how complex transport planning within Stellenbosch is due to a number of factors and issues including:

- University of Stellenbosch
- Urban structure of the town of Stellenbosch
- Population and Employment
- Socio-economic disparities
- Location within the Western Cape Province
- Existing infrastructure and services
- Environmental, historical and other constraints

The 2018/2019 CITP has been updated, and it is expected that the above issues will remain, and in some cases issues and problems may have worsened. A review of the CITP is scheduled for the 2019/ 2020 financial year, and remaining issues will be assessed.

A number of critical planning studies are currently in process including the updated Stellenbosch SDF (2019 Draft), Stellenbosch IDP and various Provincial Arterial Master Plans. The existing information from drafts, and final drafts where available, was used in this report. The RMP should however be updated, and expanded on, in future when new information becomes available.

SOME KEY ELEMENTS OF THE 2018 ROADS MASTER PLAN

The existing road transport network in SM the area were assessed, including a multi-modal modelling approach. The existing road network was classified and all traffic counts available were included in the analysis of the road network.

Emphasis was placed on using the updated and calibrated EMME/4 model as an information source for the decision making process in updating the RMP. Parallel to the modelling process, traffic data collection formed a primary task to ensure that the RMP update reflected the latest policy objectives.

The EMME/4 transport network modelling utilised for the 2012 RMP was updated for the 2018 RMP update. The model has been independently developed and maintained over the past 25 years, and it can be used with confidence as a modelling platform, provided the necessary spatial refinements are undertaken.

MODELLING THE SCENARIOS

Cape Town's existing EMME/4 Metropolitan Transport Model was used as the principal transport modelling platform for the 2018 RMP update. This system incorporates the entire greater metropolitan area, including Stellenbosch, and thereby ensures a regional balance between employment and population forecasts. A number of long-term land use scenarios, which were developed by the City of Cape Town have been used as the basis of the 2018 base model update and future 2040 Transport Demand Modelling scenario. This scenario also captures the latest known residential, industrial and commercial development proposals in the Stellenbosch Municipal Area. The Base year in the model was set as 2018 and the 2040 scenario included all feasible developments extracted from information provided by Stellenbosch Municipality. Recent studies as well as data refinements were incorporated.

One of the main advantages of using the metropolitan model is its ability to address the regional interdependence between Stellenbosch, its surrounding towns and the Cape Town Metropolitan Area. The EMME/4 Metropolitan Transport Model has been in use since 1992 and has been updated regularly, i.e. to reflect changes in the transport network and land use patterns. The latest 2011 census information, and more recent 2013 metropolitan-wide household interview data, have also been incorporated into the modelling system.

RESULTS OF THE MODELLING

The 2018 modelling results suggest that the following road sections operate beyond their capacity and they should be investigated further for possible improvements, and to be included in the next RMP:

- The R304 between Bottelary Road and the R44
- The R44 (south) between Paradyskloof and the Van Reede intersection
- Bird Street between the R44 and Du Toit Street
- Merriman and Cluver Streets between Bird Street and Helshoogte Road
- Dorp Street between the R44 and Piet Retief Street
- Adam Tas Road between its junction with the R44 and Merriman Street

- Piet Retief Street
- Van Reede and Vrede Streets between the R44 and Piet Retief Street
- Alexander Street between the R44 and Bergzicht Street
- George Blake Street

In addition, a number of access roads are under severe pressure. These include the following:

- The Welgevonden access road
- Lang Street into Cloetesville
- La Colline access off the R310
- The Technopark access road

It is clear that the road network will not be able to supply the required capacity for the medium to long-term growth needs of Stellenbosch. This is very evident on the higher order Provincial roads. It is therefore acknowledged that some roads, particularly in the historic town area, may in future operate at or over capacity during peak periods (unless modal shift changes). It should also be noted that weekday AM and PM peak period traffic congestion will spread over a longer time (peak hour spreading) as a result of historic and present capacity problems.

The 2040 traffic assignment indicates the need for various general capacity improvements, and these were introduced during the modelling process and formed part of the final output:

- Polkadraai Road: It was assumed that the last remaining single carriageway sections will be dualled well before 2035, in accordance with the Provincial roads infrastructure programme.
- R44 North: This road requires a dual carriageway from Stellenbosch to Welgevonden. The R44 in the vicinity of Klapmuts also requires additional road capacity due to the proposed future residential and employment concentration in this area.
- Adam Tas Road: This could become the busiest section of road in Stellenbosch, requiring 3 lanes per direction between the R44 and Merriman. In addition, the R44, Alexander, George Blake and Merriman intersections also need to be improved or reconfigured to provide additional capacity.
- R304 (Koelenhof Road): The model results indicated that this road should be dualled between the R44 and Bottelary Road.
- Merriman and Cluver Street link: Upgrade to dual carriageway or minimum 2-lanes per direction required between Bosman Street and Banghoek Road.
- Dorp Street: Capacity improvements required between the R44 and Adam Tas Road. Conceptual planning has been undertaken for the dualling of this section.
- Van Reede / Vrede Streets: These roads required dualling between the R44 and Piet Retief Street, with further improvements at the R44 / Van Reede intersection.
- Van Reede Street westbound extension to Technopark: The extension of this road to provide a second access to Technopark linking into Electron road.
- Technopark, De Zalze, Brandwacht and Welgevonden access roads: Dualling and/or intersection improvements are required.
- Jamestown Road: Road Network development required due to major residential developments planned for this area.
- Baden Powell Drive: Dualling of remaining sections between the N2 and Polkadraai Road.

It is recommended that all the above road projects could, with further investigation and analysis, be included in the next RMP update. Some of the above projects are included in the list of identified road projects.

It should be noted that instead of providing additional traffic lanes, capacity could also be increased by changes to the road classification. For example, a vehicular lane along a mobility route can generally carry

significantly more vehicles than the same lane on a lower order road. There are also fewer delays due to fewer intersections along a mobility route.

THE EASTERN LINK ROAD

The Eastern Link Road (previously incorrectly referred to as the eastern bypass) has been contemplated for a long time, but has never been formally adopted due to public and environmental concerns. However, the scale, nature and potential benefits of this project make it an ideal candidate for inclusion in the 2018 RMP.

The preliminary alignment was coded into the model as a single carriageway Class 4 collector road. This route involves the extension of Van Reede Road and a connection with Pastorie Road at the Theological Faculty with a new proposed bridge crossing over the Eerste River. Other alignment alternatives would include the widening of the Coetzenburg bridge near the CBD. However the modelling results, of alternative routes near the CBD, are expected to be of a similar order due to only marginal differences in travel time and distance.

Based on this limited modelling assessment, the following results are important:

- The term “bypass” is a misnomer, considering that very little traffic deviates from the R44 onto this route as an alternative access into the Stellenbosch CBD.
- The link road mainly serves as an internal connector, carrying a maximum of about 450 vehicles per hour in any given direction between the R44 and the proposed Van Reede extension.
- Traffic on the proposed Van Reede extension to Dorp Street, across the Eerste River, is however significantly higher (850 vehicles per hour), serving as an alternative to the congested Piet Retief Road.
- Traffic on the R44 near the Technopark intersection reduces by about 300 vehicles per hour as a result of local traffic using the new link road. Between Van Reede and Dorp Street, the reduction is more than 200 vehicles per hour, mainly as a result of the proposed Van Reede extension.
- If planned correctly, the link road could also play an important role as a non-motorised transport (NMT) and public transport route, and will provide suburbs such as Paradyskloof and Brandwacht with easy access to the CBD.
- In future, the Eastern Link Road would also service residential developments in Jamestown with access to the CBD.

In terms of these findings, a strong case can be made for a first phase implementation between Van Reede and Pastorie Street. This should have immediate benefits, considering the lack of adequate crossings of the Eerste River and the present traffic demand in this area. The phased implementation of the Paradyskloof-Trumali Road portion would also have immediate benefits due to access restrictions on the R44 and proposed residential developments in the area.

THE WESTERN BYPASS

The concept of a western bypass (identified in the CITP) has been around for a very long time, but the actual alignment details have never been fully articulated. Generally, there is a perception that traffic conditions along the R44 have deteriorated to such an extent that an alternative high order bypass requires serious investigation.

There would be considerable long-term benefits for having a bypass to Stellenbosch, which include:

- Significant relief to motorists, especially along the R44
- Benefits to the town itself (less through traffic, congestion and pollution)
- Reduced urban creep
- Environmental benefits in the form of reduced car emissions
- The possibility of allowing future land use developments and new urban design initiatives.

Notwithstanding the benefits, there are also negative aspects:

- Environmental impacts to building new roads
- High construction costs
- Impact to affected local land owners.

Three preliminary road alignments have been used to assess the traffic impact of this bypass proposal:

- A high speed (100 km/h) Class 1 Expressway, connecting to the R44 in the vicinity of the Annandale intersection, extending north and north-eastwards to intersect with the R310 and the R304 from where it joins the R44 with a Class 2 arterial connection just north of Welgevonden.
- A similar but shorter bypass proposal which starts at a future grade separated Technopark intersection, sharing a short section of lower order Class 2 arterial with the surrounding land use developments. A speed limit of 80km/h was modelled.
- A reduced bypass proposal, starting at the Technopark access and ending at the R310 (North-South link road).

The 2040 traffic assignment results clearly show a strong northbound demand of between 600 and 1300 vehicles per hour along different sections of this road. The section from the Eerste River crossing to the R310 (Adam Tas Road) may even require a 4-lane dual carriageway cross-section, if the bypass also connects to Technopark.

The 2040 network scenario comparison with and without the Western Bypass illustrates the impact of the bypass on the surrounding road network, with numerous link road traffic increases and reductions. In terms of the modelling results, one may conclude that the bypass could have a positive impact on the existing Provincial Road system in and around Stellenbosch. For example, traffic reductions of more than 1200 vehicles per hour (both directions) are expected on Adam Tas Road and the R44 south of the CBD – generally where Stellenbosch currently experiences its worst traffic problems.

It should be noted however that the northernmost section, referred to as the Welgevonden Link Road, carries very little traffic on its own and, without the rest of the bypass scheme, and has little impact on the surrounding road system. Only when the full scheme is implemented, does this link become a viable network element.

The traffic assignment results of the second bypass proposal from Technopark to Welgevonden were modelled. The traffic volumes on the bypass are generally between 10 and 20 per cent lower than for the previous alternative, largely as a result of reduced travel time benefits. The impact on the Provincial Road system is therefore also slightly lower, as shown by the scenario comparison. Interestingly, a small (6%) increase in traffic can be observed southbound on the section between the R310 and Technopark.

In view of the findings, it was decided to also test the impact of a much reduced bypass alternative, which simply connects between the Technopark and the R310. Compared with the previous bypass proposal, the results show a slight reduction in traffic, mainly in the southbound direction towards Technopark. Nevertheless, this road still carries a significant amount of westbound traffic which otherwise would have travelled to the CBD in order to reach the R310.

A large proportion of the traffic on this section of the proposed bypass is as a direct result of future (2040) anticipated residential developments in the undeveloped areas between the bypass, Die Boord and Technopark. Different land use scenarios for this part of Stellenbosch could significantly alter the road requirements and transport patterns in this area.

Detailed geometric and transport analysis of the possible different routes, scenarios and types of intersections will be required. This will also have to be workshopped with all the relevant role players and it is expected to involve comprehensive public participation and environmental and heritage impact assessments. Since these processes normally takes a long time, it should be considered to start this process as soon as possible.

The timing for the implementation of the full bypass and in particular its Welgevonden link is dependent on the different land use scenarios for this part of Stellenbosch, however, it is expected that proposed housing developments (Northern Extension and Droëduike) as well as the proposed Adam Tas Corridor, will accelerate the need for further implementation of portions of the Western Bypass.

R44 UPGRADE AND RECLASSIFICATION

An alternative to the Western Bypass with arguably less environmental impact involves the upgrade of the existing R44 by re-establishing it as a higher speed Class 1 (urban) arterial with limited accesses. This alternative should form part of the feasibility studies for a Western Bypass discussed above.

The possibility to develop a combined mobility corridor for the R44 and commuter rail system in the urban portion of Stellenbosch, could include a better situated intermodal transport facility and possibly opening of land for development. It is expected that some of the feasibility will be tested in further studies as part of the Stellenbosch Arterial Management Plan and more micro simulations in the urban area.

Not long ago the R44 operated much like a freeway / expressway. However, due to some questionable land use decisions, this road is constantly under pressure to be downgraded and incorporated into Stellenbosch's expanding urban fabric. The result is more signalised intersections, lower speed and reduced lane capacity – all contributing to traffic congestion and delays.

Despite various road management plans and attempts to address the problems, none have been bold enough to suggest a total re-engineering of the existing R44 within its present road reserve. For this reason it was decided to use the 2040 Stellenbosch model to investigate the possible impact of such a proposal.

While keeping the number of traffic lanes on the R44 the same as in all previous modelling scenarios, the class of road was upgraded to that of an urban expressway between Jamestown and Cloetesville, with an 80 km/h speed and lane capacity of 1700 vehicles per hour. This scenario implies major changes to limit access to the R44 and further geometric improvements to intersections, including some grade separation. As expected, this resulted in significant volume increases, particularly along the Adam Tas section of the R44. Nevertheless, the traffic flow situation also improved notably due to the higher lane capacity of the upgraded road.

The scenario comparison clearly shows some of the benefits of this proposal on the traffic situation in the Stellenbosch town area.

2040 DENSIFICATION ANAYLSIS

The latest 2018 SM Zoning Scheme is in the process of being approved, and the draft document was made available for this project. An important change from the previous Zoning scheme is that the Municipality will allow densification off all single residential erven by allowing a second dwelling on SR1/SR2 erven. The potential impact of this densification on the road network could be substantial. The road network that could be impacted the most is within Stellenbosch town. This is due to the large number of suburban areas with single residential erven that could be densified, coupled with the existing constrained road network in town. Residential densification in areas such as Franschhoek, Raithby and Pniel is not expected to have a major impact on the road network.

The future uptake of this new zoning allowance and resultant residential densification in Stellenbosch town is difficult to predict. A 20% additional uptake by the 2040 design year was modelled.

The percentage uptake for the planning horizon listed above is in addition to normal growth in the number of residential units. This occurs through the development of vacant erven and the redevelopment of new residential properties through consolidation and/or rezoning of erven. Note that these potential uptakes were not informed by any economic or other analysis, and is only indicative to determine the impact on the road network. Additional analysis will be required as part of future spatial development and road master planning. The future uptake in this new zoning allowance should be accurately recorded for this purpose.

In addition to the road network tests, an impact assessment of the preliminary densification land use scenario was undertaken. The comparative results show a very small general impact on the road system, with a slight decrease of trips into the Stellenbosch town area and vice versa for outbound commuters. The traffic increases in the town centre is expected to add marginally to those network elements that are already congested, but the overall impact appears to be relatively small and of short duration.

The traffic growth is largely in proportion to the scale of the densification assumption of 20%. Although the Municipality is actively promoting NMT, no meaningful shift to NMT or public transport became apparent, largely due to the fact that this exercise did not allow for additional employment in the town centre, or for the use of second dwellings as student accommodation or lower income housing.

Significant densification/ development is expected in Klapmuts, Droëduike, Adam Tas Corridor, Botmanskop and Jamestown. The extent to which these developments will be implemented and its impact on the road network will still need to be explored.

KRIGEVILLE SCHOOLS PRECINCT

Vehicular trips to schools account for a large percentage of total vehicular trips in the AM peak period. Less than 10% of high school learners utilise public transport and even less walk or cycle. This means that the majority are dropped off and collected by private vehicles or privately operated buses. The traffic impact caused by scholars is most significant in Krigeville where five schools are located.

A Transport Management Plan with the title “The Development of a Transport Management Plan around the various schools located off the intersection of the R44 and Van Reede Street, Stellenbosch” was prepared by Pendulum Consulting in June 2011. This report dealt specifically with traffic congestion due to activities with learner transport in the area, as well as local residential streets being used as “rat-running routes” to the CBD and to drop and collect learners at the various schools.

The outcome of the report proposed several changes with respect to parking, bus parking, education, awareness as well as road improvements. Some of these improvements has since been implemented.

An additional assessment was carried out where various infrastructure upgrades were assessed, and the following was recommended: The conversion of Doornbosch Road to a 1-way with traffic travelling northbound, the signalisation of the intersection of Van Reede Road with Doornbosch Road and a left-turning slip lane on the western approach at the intersection of Van Reede Road with Doornbosch Road.

The option can be implemented in the short-term and will result in the best improvement of the traffic operations on the local road network.

COSTING OF PROJECTS

The 2012 list of all possible road infrastructure projects were updated and costed with 2018 construction rates. Prioritisation of the projects was not undertaken for the 2018 RMP update.

CONCLUSIONS

Stellenbosch Municipality has implemented minimal new or upgraded road infrastructure subsequent to the finalisation of the 2012 Road Master Plan due to various reasons. The population and economic opportunities are growing, placing an ever greater strain on the Municipality's road network.

This RMP attempts to address this shortfall. A number of critical planning studies are currently in process including the updated 2019 Stellenbosch SDF, which is currently in draft format, the Stellenbosch IDP, and various others. Existing information from drafts, where available, were used in this report. The next RMP update must incorporate the other related studies, critically the SDF.

The 2018 update of the RMP concludes the following:

- The previous CITP previously identified the core issues and problems within the Stellenbosch Municipal Area, highlighting the difficulties in preparing a "one size fits all" solution.
- Public Transport can play a major role in reducing private vehicle dependencies, and Stellenbosch needs to invest much more time and effort toward these solutions taking into account the existing poor rail services and public transport availability from neighbouring municipalities, such as the City of Cape Town's existing and planned MyCiTi IRT network.
- Approximately 7 km (2.5%) of the roads in SM are in a poor or very poor condition, and these are found throughout the SM.
- The latest EMME/4 transport model was recalibrated with 2018 and 2019 traffic volumes at critical intersections.
- The road classification system based on the principals set out in TRH26, utilised in the 2012 RMP, was retained. The classification of the Class 1 to Class 4 road network was retained unchanged.
- Stellenbosch Municipality provided high-level information of future land-use developments within the Stellenbosch Municipal Area. The land-use information has been included in the 2040 horizon-year EMME/4 model.
- Several key focus areas were identified in the 2012 RMP, based on previous studies and known constraints of the road network. The focus areas for this 2018 RMP update was moderated and limited to the following important areas :
    - General capacity improvements
    - Stellenbosch CBD
    - R44 north and south of Stellenbosch CBD
    - Western Bypass
    - Eastern Link Road - Brandwacht/Paradyskloof
    - Technopark access
    - 2040 Densification analysis
    - Krigeville schools precinct
- The proposals put forward within these key areas have been included into the EMME/4 model for the 2040 horizon-year scenario.
- Specific attention was given to the following projects due to their future impact on the Stellenbosch Municipal Area road network.

  - Eastern Link Road – a proposed class 4 road from Technopark running through Paradyskloof and Brandwacht into the CBD, thereby removing some local traffic from the R44.
  - Western Bypass – a proposed class 2 road linking the R44 south of Stellenbosch with the R304 north. Two options from the 2012 RMP were tested:
    - Technopark/R44 southern starting point
    - Annandale/R44 southern starting point
  - R44 Upgrade and reclassification – Significant upgrades to the R44 and the grade separating of some intersections to improve safety, mobility and capacity.
- The 2012 priority list of future road improvement projects were updated. The priority list identifies the key projects for implementation, and a high-level cost per project was determined form 2018 construction rates.
- The scope of this study did not include the prioritisation of these projects per planning period (short/medium/long-term). However projects are annotated as High or Medium priority.
- The existing road network and modal split will not be able to support the longer-term growth needs of the Stellenbosch area at acceptable Levels of Services. It is therefore acknowledged that some roads, particularly in the historic town area, will continue to operate at or over capacity during peak periods, unless substantial modal shift occurs. It is also expected that weekday AM and PM peak period congestion will increase, thereby worsening the Level of Service and increasing the length of the peaks.

RECOMMENDATIONS

- Refer to the Project list in Section 8.2 for the full list of road upgrade proposals. It is recommended that the prioritisation of the projects are determined in conjunction with the relevant Municipal Departments (land-use planning etc.), and revised on an at least annual basis, or as development needs requires. The planning of these proposals should then commence, with a focus on the short to medium-term projects.
- It is recommended that the following general capacity improvements should be investigated and analysed further, for inclusion in the next RMP update. Note that some of these projects fall under the jurisdiction of the Provincial Government.
  - Polkadraai Road: The remaining single carriageway sections from Cairngorm Road to Vlottenburg (unnamed road) to be upgraded to a dual carriageway (2 lanes per direction) before 2035, in accordance with the Provincial road infrastructure programme.
  - R44 north of the Stellenbosch CBD: Upgrade to dual carriageway from the end of the current dual carriageway north of Fir Road to the Welgevonden access at Hendrikse Road.
  - The R44 in the vicinity of Klapmuts will require additional capacity due to the proposed future residential and employment developments in the area, as well as future upgraded road links off the R44.
  - Adam Tas Road could become the busiest section of road in Stellenbosch, and will require 3 lanes per direction between the R44 in the south and Merriman Avenue to the north.
  - In addition, it is planned with high priority (short term) to upgrade and reconfigure the Adam Tas intersections with the R44/Alexander Street and Merriman Avenue.
  - The Adam Tas/George Blake intersection also need to be improved or reconfigured to provide additional capacity.
  - R304 (Koelenhof Road): Upgrade to dual carriageway between Adam Tas (R44) in the south to Bottelary Road/Kromme Rhee Road.
  - Merriman and Cluver Street link: Upgrade to dual carriageway or minimum 2-lanes per direction required between Bosman Street and Banghoek Road.
  - Lower Dorp Street: Capacity improvements required between the R44 and Adam Tas Road. Conceptual planning has been undertaken for the dualling of this section.
  - Van Reede and Vrede Street link: These roads required dualling between the R44 and Piet Retief Street, with improvements at the R44 / Van Reede intersection.
  - Van Reede Street westbound extension linking into Electron road to provide a second access to Technopark.
  - R44 - Technopark, De Zalze, Brandwacht and Welgevonden access roads: Dualling and/or intersection improvements are required.

  - Jamestown Road: Road Network Development required due to major residential developments planned for this area.
  - Baden Powell Drive: Dualling of remaining single carriageway sections between the N2 and Polkadraai Road.
- The conceptual planning of the following intersections upgrades has been undertaken, the detail design and construction should be implemented as soon as possible:
  - Adam Tas and Merriman Avenue.
  - Adam Tas and Helshoogte Road (including the closure and relocation of the Helshoogte Rd/La Colline Road T-junction further east).
- Stellenbosch Municipality should discuss this report in more detail with other interested and affected parties and start a public participation process to discuss the outcome of the RMP.
- Stellenbosch Municipality should adopt the RMP, giving it legal status. The RMP should be distributed privately and publically, informing planners/developers as well as the public of future road schemes within the municipal area. The RMP should be incorporated into the CITP.
- Stellenbosch Municipality should continue discussions/workshops with CoCT's IRT department to explore opportunities to extend their future MyCiTi bus services to include Stellenbosch.
- Stellenbosch Municipality should start the process to expropriate and purchase the land required to construct future roads, specifically the implementation of portions of the Western Bypass and Eastern Link Road, and other roads associated with proposed housing developments and catalytic projects as defined in the draft 2019 MSDF. Future road reserves should be formally registered with the Surveyor General to protect them.
- The planning of the western bypass and/or a combination of substantial upgrading of the R44 must commence in conjunction with the PWCG. This should ideally occur prior to the construction of the proposed intersection upgrades along the R44 to prevent abortive work.
- The RMP should be incorporated into Stellenbosch Municipality's asset management database, (IMQS). IMQS is an Infrastructure Management System software. The priority list should also be incorporated.
- Planning for the funding of the road projects must commence to ensure that the short and medium term priority listing can be achieved.
- The planning and commissioning of each project should ideally be retested using the 2018 EMME/4 model and detailed intersection capacity analysis to ensure that each project will achieve its objectives.
- Future revision and amendments to the RMP should be coordinated to ensure that other parallel planning processes are undertaken in an integrated manner, such as land-use planning and public transport planning.
- This updated RMP should assist to plan future land-use developments within the Stellenbosch Municipal area. Future planning processes such at the SDF and IDP should complement this RMP, and vice-versa.
- Future revision of and amendments to the RMP should be coordinated to ensure that other parallel planning processes are undertaken in an integrated manner.

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

ABBREVIATIONS & ACRONYMS

AADT	Average Annual Daily Traffic
AMP	Arterial Management Plan
CITP	Comprehensive Integrated Transport Plan
CBD	Central Business District
CPTR	Current Public Transport Record
CWDM	Cape Winelands District Municipality
WCPG	Western Cape Provincial Government
EIA	Environmental Impact Assessment
GIS	Geographical Information System
IDP	Integrated Development Plan
LM	Local Municipality
MIG	Municipal Infrastructure Grant
NT	National Treasury
NMT	Non-Motorised Transport
OLB	Operating License Board
OLS	Operating License Strategy
O & M	Operation and Maintenance
P/a	Per Annum
RCAMM	South African Road Classification and Access Management Manual
RMP	Roads Master Plan
PPP	Private Public Partnership
SDF	Spatial Development Framework
SMA	Stellenbosch Municipal Area
SM	Stellenbosch Municipality
ToR	Terms of Reference
US	Stellenbosch University
vpd	Vehicles per Day (24 hour period)

1 INTRODUCTION

1.1 BACKGROUND

This report is an update of the 2012 Stellenbosch Municipality Roads Master Plan. The 2012 Roads Master Plan (RMP) was the first undertaken by the Municipality to cover the full municipal area, and included a formalised Road Network Classification and a prioritised list of road infrastructure projects.

An update is required to ensure that the following are accurately reflected in the revised RMP:

- Historic and planned land-use changes.
- Planned land-use policies that may impact the road network in the future.
- Traffic volume changes, including modal split trends.
- Road upgrades (major or minor) undertaken by all road authorities within the Municipality.
- Assessment and update of the prioritised list of road infrastructure projects.
- Changes in functional classifications of road links or portions thereof, where relevant.

1.2 PURPOSE OF THE ROADS MASTER PLAN

The purpose of this RMP update is to assist Stellenbosch Municipality (SM) and other authorities such as the South African National Roads Agency Ltd (SANRAL) and the Provincial Government of the Western Cape (PGWC) to integrate and coordinate the planning and implementation of road and transportation infrastructure within and to and from the Municipality.

A RMP is a planning tool for the future improvement and development of all transportation infrastructure within the municipal area. It is also a tool for the Municipality and Provincial authority to determine and allocate funding for future infrastructure. RMP's normally provide recommendations for preparing short to long-term implementation plans, namely:

- 5-year (immediate / short-term)
- 10-year (medium term)
- 15-year (medium/long term)
- 20-year (ultimate design horizon)

The RMP therefore assist in prioritising road projects for intervention purposes, such as new links, the upgrading of existing links, rehabilitation and maintenance. Another example of such interventions would be the limiting of further development within a particular area until such time as particular road improvements, identified within the RMP, have been implemented.

Municipal officials are therefore able to use the RMP to support various transport policies such as the Spatial Development Frameworks (SDF), Integrated Development Plans (IDP), Comprehensive Integrated Transport Plans (CITP) and Integrated Public Transport Networks (IPTN).

The Committee of Transport Officials (COTO) has developed "TRH26 – South African Road Classification and Access Management Manual" which provides guidance on how a road must be managed in order to function

effectively and in accordance with its classification. It emphasises that "Road authorities in South Africa have an obligation to plan, design, construct and maintain the road network, to protect the public investment in the road infrastructure, to ensure the continued functionality of the transportation system and to promote the safety of traffic on the road network."

1.3 WHY DOES STELLENBOSCH NEED A RMP?

This explanatory section was included in the 2012 RMP, and is repeated hereunder with minor edits as no major changes has occurred to the overall transportation network.

Stellenbosch is easily accessible by road from all directions, however the primary routes into and out of Stellenbosch are currently operating at or close to capacity. All major routes through Stellenbosch serve as regional mobility routes, which as they pass through the town centre, leads to design conflicts of mobility versus access and safety. The nature of Stellenbosch being inter-linked with the Cape Town Metro and surrounding towns like Paarl and Somerset West and Strand coupled with a peculiar user and trip origin/destination profile provides an interesting, but complex conundrum.

Added to this is the presence of premium agricultural land, historical buildings, farms and routes, surrounded by mountainous geography. Public perception and the resistance to changing transport habits towards public transport and non-motorised options are also factors to be taken into account when managing and planning transportation within the SMA.

Furthermore, commuters exit or enter the SMA daily to get to their place of work. It is essential to plan, manage and implement transportation infrastructure to ensure sustainable, economic and socially acceptable transport services and facilities to those living in the SMA. Stellenbosch Municipality recognised this issue and conducted comprehensive household surveys in 2008 identifying people's transport movements and demographics. Based on the information collected, a Transport model was prepared for the SMA to identify not only additional road infrastructures required, but also establish a public transport system. The report confirmed that particular routes within Stellenbosch are heavily congested, particularly during the weekday morning peak period. It also confirmed that a large percentage of commuters travelling through the Stellenbosch Central Business District (CBD) do not live or work within the CBD, but are merely passing through in order to travel elsewhere in the District.

The situation was put into context in 2011 following the completion of the Stellenbosch Comprehensive Integrated Transport Plan (CITP) that identified the core issues and problems that currently exist within the SMA. This emphasizes how complex transport planning within Stellenbosch is due to the following limitations:

- University of Stellenbosch

  The US campus, in terms of its staff, students and operational practices, has an undeniable impact on the municipality's road and transport networks.
- Urban structure

  Over many years, Stellenbosch has developed from a compact university town to a dispersed and disjointed pattern of residential settlements, employment hubs and decentralized commercial activities. Most of the newer developments are located along the Provincial arterial roads, and are poorly integrated with the town.
- Population and Employment

  Stellenbosch is fairly unique in that it has a large employment surplus and student population, both of which contribute significantly to the severity of transport problems in and around the town area. Residential accommodation remains in short supply and land use policies have largely been unsuccessful in dealing with this problem.

- Socio-economic disparities

  Like all South African towns, Stellenbosch exhibits extreme disparities between high- and low-income residents. This manifests itself in the housing market, participation in the economy, and more specifically in terms of travel behaviour.

- Location

  Due to its location, Stellenbosch lies at the confluence of a number of high-order Provincial through routes. These roads play an important long distance mobility function, which provide connectivity between surrounding and neighbouring towns, the National Freeways, and are vital for the economic well-being of Stellenbosch. Unfortunately, this mobility function is under pressure.

- Existing infrastructure and services

  Despite major land-use developments around Stellenbosch, little has been done to improve transport infrastructure and services. Nearly all roads leading into Stellenbosch lack capacity, pedestrian facilities are inadequate and public transport is limited to minibus-taxi services for the poorer communities. Unfortunately, previous transport studies focused primarily on localised public transport initiatives within the Stellenbosch urban area, which will do little to offset the huge impact of daily car commuters from external origins.

- Environmental, historical and other constraints

  Stellenbosch's unique character and picturesque environment remains a draw card for tourist related industries, research and educational facilities as well as specialized office employment. These same features also make it extremely difficult to consider implementing radical land-use solutions or major infrastructure projects to alleviate the growing transport problems. The mountainous geographical constraints further limit Stellenbosch's growth potential and the establishment of additional access routes into or around the town area.

1.4 APPOINTMENT

WSP Group Africa (Pty) Ltd was appointed in March 2018 by Stellenbosch Municipality to update the 2012 Stellenbosch Roads Master Plan. Jeffares & Green (Pty) Ltd and Vela VKE Consulting Engineers undertook the modelling and establishment of the first Road Master Plan for the Municipality in 2012.

Emphasis was placed on using the Stellenbosch Municipalities existing EMME/4 model as an information source for the decision making process when developing the RMP. The existing Stellenbosch Town road hierarchy, cadastral boundaries and the latest aerial photographs were obtained, which were used to update the RMP.

Equilibre Multimodal Equilibrium (EMME) is a complete travel demand modelling system for urban, regional and national transportation forecasting. It is used in over half the world's populous cities and therefore one of the most trusted transportation forecasting software packages available. Version 4 was used for the modelling in this update. Refer to www.inrosoftware.com for more information.

1.5 STUDY AREA

The Stellenbosch Municipality covers 831 km², including the extents of Franschhoek, Pniel and Klapmuts. Stellenbosch falls within the Cape Winelands District Municipality in the Western Cape Province. The Cape Winelands district is situated next to the Cape Metropolitan area and encloses 22 309 km². It is a landlocked area between the West Coast and Overberg coastal regions. The district includes five local municipalities; namely Stellenbosch, Drakenstein, Witzenberg, Breede Valley and Langeberg.

A location plan of the Stellenbosch Municipality is shown in Figure 1-1. The RMP covers the entire SMA, however the EMME modelling includes the greater Cape Metropolitan area, including SMA, Paarl and Worcester.

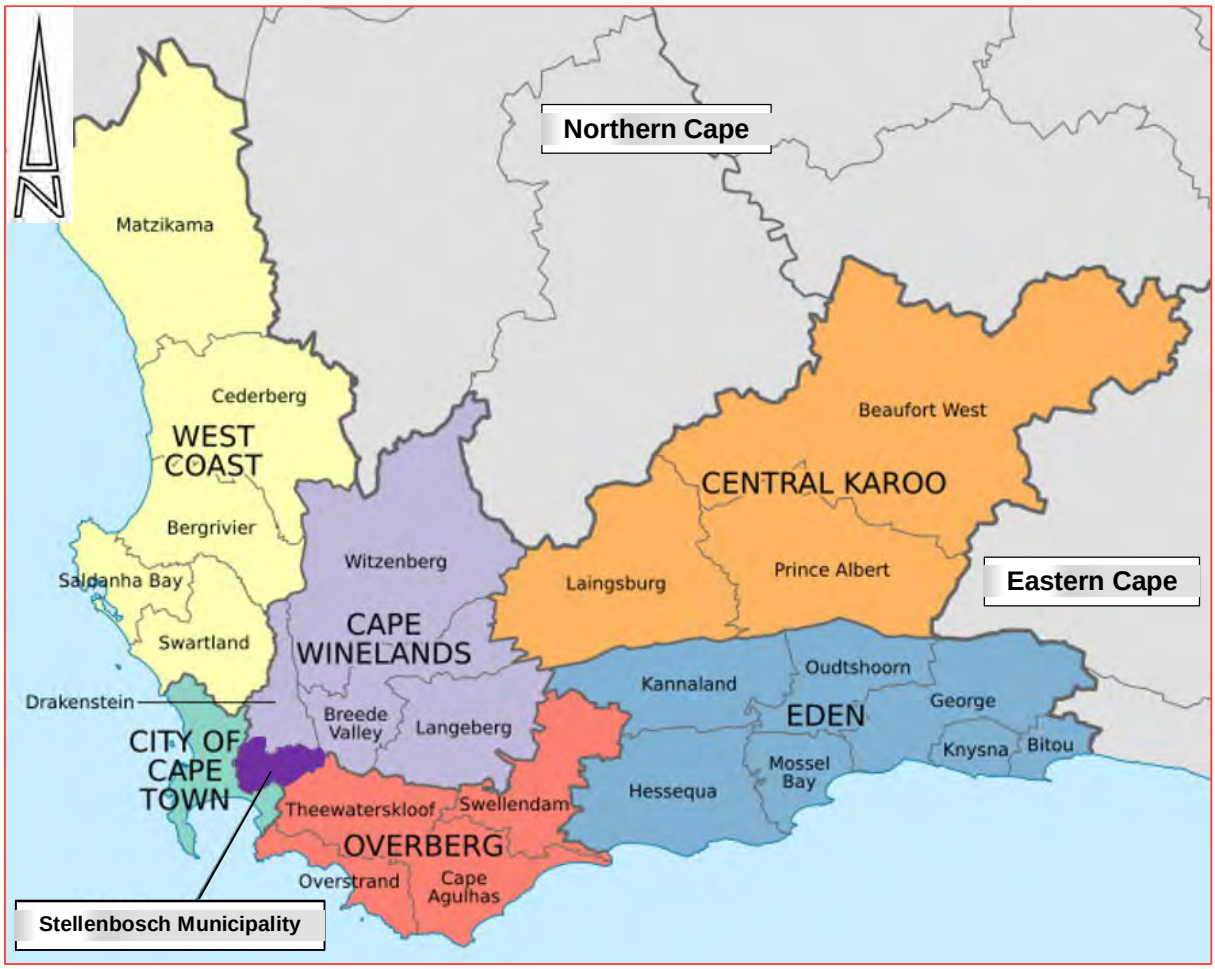


Figure 1-1: Stellenbosch Municipality location within the Western Cape Province

Source: Wikimedia.org

1.6 METHODOLOGY

The methodology is briefly described below.

1.6.1 LITERATURE REVIEW

A literature survey was undertaken of all the relevant existing documents (draft or final). These documents are the following:

- Stellenbosch Municipality 2012 Roads Masterplan.
- Stellenbosch Municipality NMT Network Plan (Vol 1 & 2), June 2015.
- Stellenbosch Transport Model: Transport Modelling Report, 2010.
- Stellenbosch Municipality Comprehensive Integrated Transport Plan (CITP) 2016 – 2020.

- Update Stellenbosch Comprehensive Integrated Transport Plan, October 2018.
- Stellenbosch Municipality Draft Strategic Development Framework (SDF), May 2018.
- Stellenbosch Municipality Draft Strategic Development Framework (SDF), January 2019.
- Stellenbosch Municipality Final Draft Strategic Development Framework (SDF), June 2019.
- Transit Oriented Development Policy.
- Integrated Public Transport Network Policy.
- Public Transport Service Network: Initial Operations and Business Plans, 2016.
- Stellenbosch Municipality Urban Development Strategy Status Que Report, Draft 1, May 2017.
- Stellenbosch Western Bypass Status Report, April 2017.
- The Development of a Transport Management Plan around the various schools located off the intersection of the R44 and Van Reede Street, Stellenbosch. Pendulum Consulting, June 2011.
- A new gateway for Stellenbosch, Conceptual Study for TOD in Stellenbosch. Royal Haskoning DHV, May 2018.
- Stellenbosch Municipality, Pavement Management System, Network / Strategic Level Assessment, Paved Roads, V&V Consulting Engineers, 2015.
- Stellenbosch Municipality, Pavement Management System, Network / Strategic Level Assessment, Unpaved Roads, V&V Consulting Engineers, 2015.
- Stellenbosch Municipality Upgrade of Intersections along R44 and Helshoogte Road, Stellenbosch. ICE Group, Revision 1, June 2015.
- Stellenbosch Local Municipality, Road Asset Management Plan, Ver. 1.1, SMEC, April 2019.

The review included verification of which of the 2012 RMP recommendations has been implemented, are in the process of implementation, has been programmed for later implementation or are no longer considered due to changes in circumstances, land-use, strategies and/or policies.

A number of critical planning studies are currently in process including the updated Stellenbosch SDF, Stellenbosch IDP and various Arterial Master Plans. The existing information (draft only where available), were used to inform this RMP update. The RMP should however be updated in future when new information becomes available.

1.6.2 EMME MODEL UPDATE, CALIBRATION AND SURVEYS

Mr Wilfred Crous, an independent expert, undertook the EMME/4 transport network modelling for the 2012 RMP, and he undertook the modelling for this 2018 update. The model has been independently developed and maintained by Mr Crous over the past 25 years, and it can be used with confidence as a modelling platform, provided the necessary spatial refinements are undertaken.

CALIBRATION

The most recent traffic survey data and the latest aerial photography were obtained and utilised to update and calibrate the EMME model. Gaps in the data, or where data is regarded as outdated or un-useable for whatever reason were identified and additional traffic surveys were undertaken. Refer to Chapter 4.

In some instances there are differences between the recommendations of the 2012 Roads Master Plan and current planning with regards to infrastructure proposals and upgrades, including major land-use planning changes. These variations were noted for consideration in the EMME modelling calibration.

1.6.3 LAND-USE DEVELOPMENT SCENARIO ANALYSIS

The primary output of the modelling of the road network for the various planning horizons is to determine the impact of densification, land-use development and public transport provision (modal shift) on the road network. The model identified and/or reconfirmed the road network requirements in order to support the land-use scenarios for the various planning horizons.

The land-use proposals were obtained from the Municipality, and will be workshopped before the Scenario testing is undertaken to ensure agreement from the various Municipal departments. Note that the modelling is not intended as a land-use planning exercise, but a road network planning exercise in support of the agreed land-use planning and other initiatives (public transport, TOD, etc.).

A number of critical planning studies are currently underway, including the update of the Stellenbosch SDF, Stellenbosch IDP and various Arterial Master Plans. The SDF is scheduled for public participation towards the end of 2018, for approval by Council in May 2019. The final SDF was scheduled for completion by March 2019.

The existing information from drafts, where available, were used to inform this update. The RMP should however be updated in future when new information becomes available.

1.6.4 ASSESSMENT OF PUBLIC TRANSPORT SYSTEM PROVISION IMPACTS

The future provision of a public transport system and services will impact the requirements for road infrastructure. It was the intention to model the Municipality's public transport proposals as part of the EMME modelling process to test the impact of the proposals. However, the available information is too high-level and with an unknown implementation framework, and was not incorporated in the modelling.

1.6.5 ROAD NETWORK ASSESSMENT AND PROPOSALS

The EMME modelling results identified current and future (horizon year) network capacity constraints. These results, and Client inputs, were utilised to test and update the RMP's recommendations. The high-level prioritisation of the projects includes cost estimates of the various recommendations to assist the Client with their implementation planning.

The current road network classification were revised, where required, with inputs from the Client.

1.7 LIAISON

A brief record of the meetings that were held are listed below:

- Inception meeting: 23 March 2018
- Client meeting: 19 April 2018
- Meeting with PGWC: 26 April 2018
- Meeting with STB Planning: 3 May 2018
- Meeting with STB Planning: 11 May 2018
- Client & Province consultants: 22 May 2018

- Client & ICE consultants: 28 May 2018
- Client meeting & R44/US meeting: 8 June 2018
- Client meeting: 27 June 2018
- Client & University of Stellenbosch representatives meeting: 4 September 2018
- Stellenbosch Mobility Forum 21 November 2018
- Client meeting: 11 December 2018
- Client meeting: 7 February 2019
- Client meeting: 25 April 2019
- Client meeting: 22 May 2019

2 EXISTING TRANSPORT WITHIN THE STELLENBOSCH MUNICIPAL AREA

2.1 GENERAL INFORMATION

The 2016-2020 CITP states the following modal split within SM:

- Light vehicles: 87%
- Minibus taxis: 7.5%
- Bus: 4.5%
- Heavy vehicles: 1.5%
- Rail : No information available

2.2 ROAD-BASED MOTORISED TRANSPORT (PRIVATE)

This transport mode is dealt with throughout this RMP and is noted here for completeness.

2.3 NON-MOTORISED TRANSPORT

Non-Motorised Transport (NMT) is a dominant mode of transport for some towns within the Stellenbosch municipal area, whereby cycling and walking provide basic mobility to a large percentage of the population. Although this Roads Master Plan does not specifically focus on NMT, it does support the fact that this mode of transport forms an integral part of present and future transport solutions.

Most new roads are utilised by NMT users and therefore NMT facilities should always be considered from the outset. NMT Master Plans for the US, the SMA as well as the Cape Winelands District have been completed and these master plans contain lists of projects to be implemented. These initiatives are wholeheartedly supported by SM. All new and existing roads should be evaluated to ensure sufficient provision is made for NMT users where applicable. Refer to Figure 2-1.

Important to note is the required policy and trade-offs between safety and mobility along high order roads, especially the Provincial arterials. Should pedestrians and cyclists be encouraged to use these routes, or should separate facilities be provided.

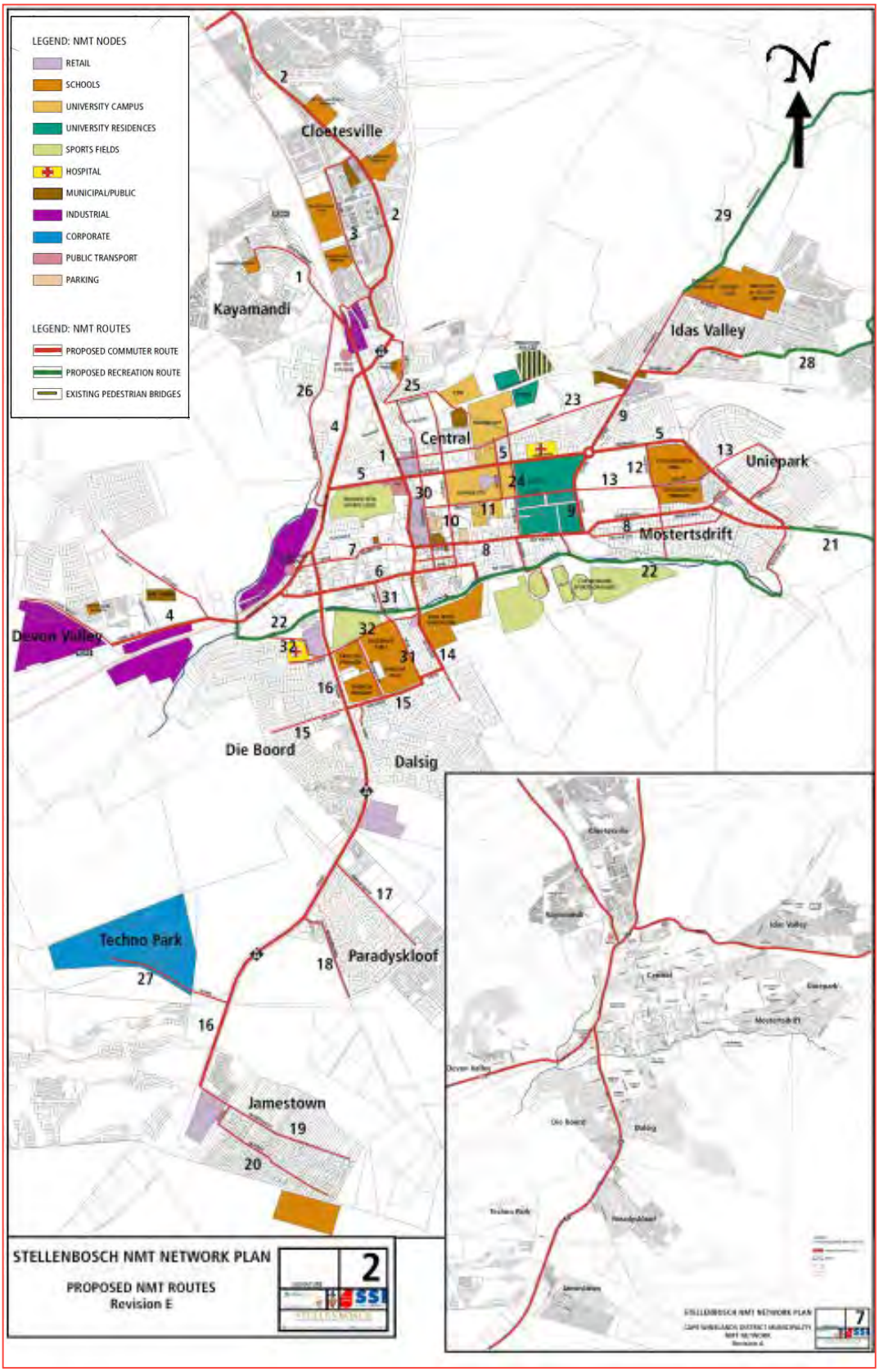


Figure 2-1: Stellenbosch and Cape Winelands District NMT Network Plan

Source: Stellenbosch Municipality

2.4 PUBLIC TRANSPORT

2.4.1 ROAD BASED PUBLIC TRANSPORT

Approximately 12% of all road traffic within the SM is public transport (buses and mini-bus taxis) - Source: 2016-2020 CITP. This is low compared to the neighbouring Cape Town Metropolitan area with approximately 36% of road based transport serviced by public transport.

Existing long distance commuter bus services are in operation in the Stellenbosch Municipal area during the morning and afternoon peak periods. They are the following:

- GABS service in operation (June 2018):
  - Mitchells Plain – Luzuko – Stellenbosch
  - Strand – Somerset West - Stellenbosch
- Limited bus services for learner transport to some schools within SM. Trip and passenger numbers are not available.
- The University of Stellenbosch operates weekday shuttle services to and from various campus destinations to decentralised parking facilities. These services are mostly free of charge and is exclusively for the use of students and staff.

There are currently 9 informal and 3 formal mini-bus taxi ranks within the Stellenbosch Municipal area. The taxi ranks include:

- Kayamandi – informal on-street rank
- Kayamandi – long distance
- Kayamandi (Bird Street/George Blake) – New formal rank
- Bergzicht – CBD, formal rank
- Stellenbosch Railway Station – External services to Stellenbosch
- Adam Tas
- Pniel
- Lanquedoc – informal rank
- Franschhoek – on-street rank near shopping centre on Main Road (R45)
- Franschhoek – Groendal rank
- Klapmuts- formal rank
- Jamestown

Three taxi associations currently operate within the Stellenbosch Municipal area. These are:

- Stellenbosch Taxi Association
- Kayamandi Taxi Association
- Franschhoek Taxi Association

2.4.2 RAIL BASED PUBLIC TRANSPORT

The Passenger Rail Agency of South Africa (PRASA) operates Metrorail passenger services in the Cape Metropolitan area, including Stellenbosch. SM is served by a branch of the Northern line, and the service is accessible via seven railway stations; namely Lynedoch, Vlottenburg, Stellenbosch (CBD), Du Toit, Koelenhof, Muldersvlei and Klapmuts. The length of this section of the railway line within SM is approximately 18km. Refer to Figure 2-2 for the rail map of the Cape Metro, including the portion that serves SM.

PRASA currently has three categories of railway lines - categories A, B and C – with the category A railway lines being the most important ones with the majority of passengers. The prioritisation of PRASA projects are sorted according to this categorization. The Stellenbosch line falls into the category C grouping.

To note: no recent rail data is available of the number of trains or rail commuters to and from Stellenbosch Municipality. The last rail census was conducted in 2012, this information is regarded as out-dated given the known deterioration of Metrorail services within the Cape Metropole. The dualling of the Northern line through Stellenbosch is critical, and is on the Priority list for planning and implementation by PRASA.

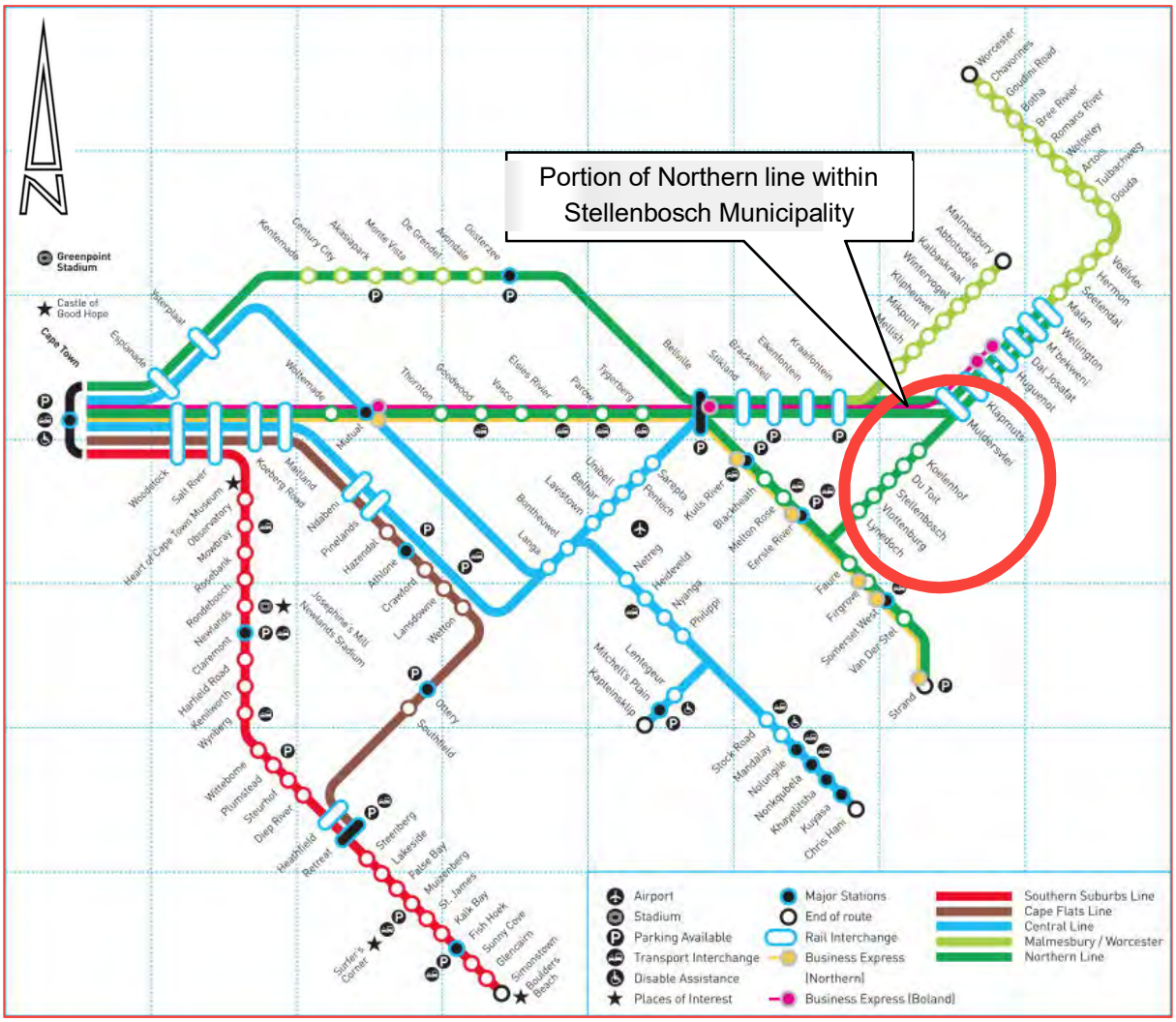


Figure 2-2: Cape Town Metro rail network

Source: Metrorail

3 EXISTING ROAD NETWORK

3.1 GENERAL

Stellenbosch Municipality covers an area of approximately 831 km^2 (90,000Ha). The SM owns and maintains the majority of the road network. The CWDM, of which the Stellenbosch area forms one of its five regions, are an agent to the Provincial roads authority and also assist in the maintenance of the Provincial road network.

The PGWC owns and maintains the Provincial road network within the SM area and within urban areas (such as the Stellenbosch and Franschhoek CBD's). The 80/20 principal is applied whereby SM contributes the smaller portion of funding towards the upkeep of Provincial roads. The extent of the Provincial Roads are primarily in the rural locations connecting the towns of Stellenbosch, Raithby, Klapmuts, Kylemore, Pniel, Wemmershoek and Franschhoek. SANRAL owns and maintains the N1 Freeway, located on the north-western border of the SM.

Figure 3-1 is an extract from the 2016-2020 CITP showing the SM major road network.

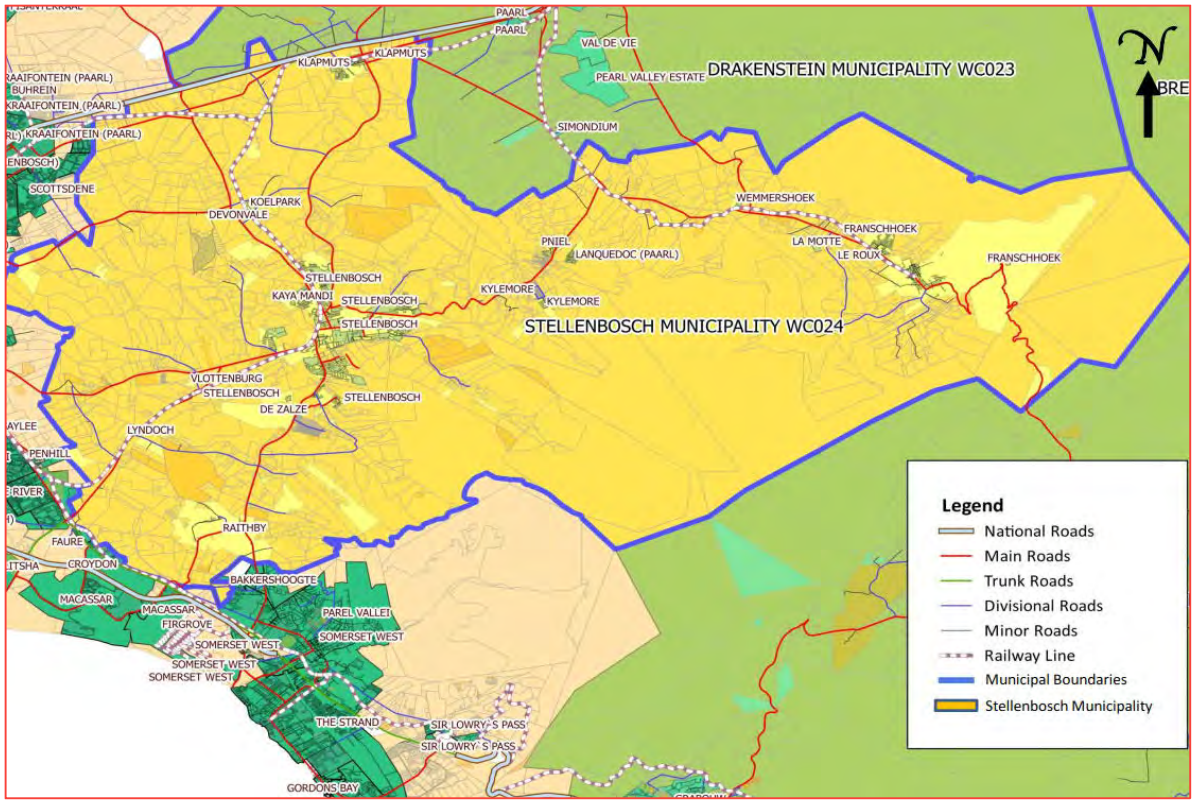


Figure 3-1: Stellenbosch Municipality National and Provincial Proclaimed road network

Source: Stellenbosch Municipality

The 2019 draft SDF estimates the current population of SM at 176 500 people. It is has a highly unequal household income distribution, with one of the highest Gini Coefficients in South Africa. 53% of households are classified as low-income, with 20% of these having no registered income. Unemployment stood at around 20% in 2011, and continues to rise.

The Gini coefficient is a measure of statistical dispersion intended to represent income or wealth distribution, and is the most commonly used measurement of inequality. The Gini coefficient measures the inequality among values of a frequency distribution, (for example income).

3.2 TRAFFIC VOLUMES ON MAJOR ROUTES

The majority of the population, job opportunities and higher education facilities are situated within Stellenbosch town, therefore the traffic volumes to and from and within the town are much higher than elsewhere in the SM. During the weekday morning and afternoon peak periods, the primary routes into and out of the CBD are congested. Table 3-1 lists a breakdown of the number of vehicles travelling in and out of town during the AM peak. Refer to Figure 3-2 that shows the 2019 weekday AM vehicle volumes in and out of the CBD along the major routes.

Table 3-1: Weekday AM Peak hour Vehicle Volumes (Inbound & Outbound)

PRIMARY ROAD	2012 RMP		June 2018*		March 2019*	
	VPH INBOUND	VPH OUTBOUND	VPH INBOUND	VPH OUTBOUND	VPH INBOUND	VPH OUTBOUND
R44 (opposite Paradyskloof)	2468	1372			2286	1849
R44 (south of Technopark)	2794	782			3167	1157
R44 / Van Reede (north of Technopark)			2229	1896	2336	1949
R310 (west of the R44)	665	491			1465	1045
R310 (before the Polkadraai intersection)	665	491				
R310 (Devon Valley Road intersection)	1725	1463				
R310 (At Dorp Street)			1984	1200	2161	1233
R304 (north of Kayamandi)	1266	429				
R304 (at George Blake Rd)			1183	674		
R44 (north of Helshoogte)	1447	479				
R44 (at Helshoogte Road)			1344	695	1586	742
R310 Helshoogte (east of Cluver Road)	530	258				
R310 Helshoogte (at La Colline Road)			508	792	652	1244
Jonkershoek Road (east of Omega Road)	139	147				

* Surveyed traffic

Figure 3-2: Weekday AM peak vehicle volumes

ANALYSIS

- The R44 conveys the highest vehicle volumes during the AM peak period with approximately 2,229 vph travelling northbound from Somerset West and Strand to the Stellenbosch CBD (June 2018 volumes). This has increased approximately 4.5% to 2336 vph (March 2019). This increase was measured in less than a year.
- Inbound volumes along the R44 (south of Technopark) has increased by approximately 13% from 2012 to 2019 to 3167 vph. As a consequence, long queues and delays are experienced on the R44 during the weekday AM peak.
- The R44 conveys approximately 1,586 vph travelling southbound to the Stellenbosch CBD from Welgevonden and further north. This has increased substantially from the 1,344 vph counted in June 2018.
- The R310 (Adam Tas) conveys approximately 2,161 vph travelling eastbound to the Stellenbosch CBD during the AM peak period, and 1,233 vph westbound towards Cape Town.
- The R310 (Helshoogte) conveys approximately 652 vph travelling westbound to the Stellenbosch CBD during the AM peak period.

  The R304 conveys approximately 1,183 vph travelling southbound to the Stellenbosch CBD from north of Kyamandi.
- From the above analysis it can be seen that the background traffic, as measured during the weekday AM peak hour, is increasing on all the major link roads, in and out of the CBD. Where intersections are operating near or at capacity, the result is an increase in the length of the peak period, and increased delays and queues.

The SM requested a high-level estimate of the number of persons entering the CBD, this is briefly discussed below. Refer to

Table 3-2 for the total number of vehicles entering and leaving the CBD during a weekday AM peak. The average vehicle classification along these links are:

- Light vehicles: 93%
- Taxis: 3.7%
- Buses: 0.2%
- Heavy vehicles: 3.1%

The number of persons per vehicle is assumed as:

- Light vehicles: 1.5 persons
- Taxis: 10 persons
- Buses 50 person

Note that the number of persons per vehicle is estimated from the EMME model's values, and averaged for income group and buses and taxis that may enter or leave town without passengers. These numbers excludes all non-motorised transport, motorcycles and rail passengers.

The total net number of persons entering the CBD during the weekday AM peak is estimated at over 18,000 and during the weekday AM highest peak hour nearly 6000.

Table 3-2: 2019 Weekday AM peak vehicle volumes to the CBD (major routes only)

WEEKDAY AM PEAK (6:00 - 10:00)				
Origin	**In**	**Out**	**TOTAL IN (vehicles)**	**TOTAL IN (persons)**
R44 (from Somerset West)	9621	3280	6341	11775
R310 (from CT)	4385	3022	1363	2531
R310 (Helshoogte)	2012	3270	-1258	-2336
R44 (Welgevonden)	4535	2709	1826	3391
R304 (George Blake)	3746	2181	1565	2906
Total	**24299**	**14462**	**9837**	**18 268**
WEEKDAY AM PEAK HOUR (+/- 7:00 - 8:00)				
Origin	**In**	**Out**	**TOTAL IN (vehicles)**	**TOTAL IN (persons)**
R44 (from Somerset West)	3167	1157	2010	3733
R310 (from CT)	1465	1045	420	780
R310 (Helshoogte)	652	1244	-592	-1099
R44 (Welgevonden)	1586	742	844	1567
R304 (George Blake)	1183	674	509	945
Total	**8053**	**4862**	**3191**	**5 926**

3.3 PAVEMENT ASSESSMENT

The Provincial Pavement Management Systems (2010), states that the average rating of the Provincial road network was “poor”. The surface and structural condition of the road network is indicated as 19% poor and 13% very poor.

The results of the latest SM Road Asset Management Plan, dated April 2019, is briefly summarised here. Refer to the report: Stellenbosch Local Municipality, Road Asset Management Plan, Ver. 1.1, SMEC, April 2019.

The total road network consist of the following:

- Paved (Dual carriageway) 5.5 km
- Paved (flexible) 288.5 km
- Paved (block) 6.0 km
- Paved (concrete) 0.1 km
- Roundabouts 1.1 km
- Gravel 11.1 km
- Earth 0.1 km
- **Total** **312.5 km**

3.3.1 GENERAL ROAD CONDITIONS

The general road conditions are described broadly in terms of the visual condition index (VCI) of each road. This index represents a weighted average of the condition based on all defects. Approximately 7 km (2.5%) of the roads in SM are in a poor or very poor condition. Refer to Table 3-3.

Table 3-3: SM General Road Condition (2019)

Town	General Road Condition					Grand Total
	1 - Very Good	2 - Good	3 - Fair	4 - Poor	5 - Very Poor	
Devonvale	3.4	0.2	3.6	0.6	0.0	7.8
Franschhoek	20.7	8.3	2.3	0.5	0.4	32.2
Klapmuts	14.8	3.2	1.7	1.1	0.0	20.8
Kylemore	3.4	2.2	0.8	0.4	0.0	6.7
La Motte	1.9	0.1	2.0	0.6	0.0	4.6
Lanquedoc	6.1	0.9	1.0	0.7	0.0	8.7
Meerlust	0.0	0.8	0.2	0.0	0.0	1.0
Pniel	7.6	1.4	0.5	0.9	0.2	10.6
Raithby	1.2	1.0	0.4	0.0	0.2	2.8
Stellenbosch	118.7	86.3	10.6	0.9	0.5	216.9
Grand Total	177.8	104.2	23.2	5.8	1.3	312.3

3.3.2 COMPONENT CONDITIONS

The distributions (per m²) of Surfacing (SCI), Pavement (PCI) and Formation (FCI) Condition indices are shown for all areas are shown in Table 3-4, Table 3-5 and Table 3-6. The generally poor surfacing condition occur throughout the SM.

Table 3-4: Surfacing condition

Town	Surfacing Condition (sqm)					Total
	1 - Very Good	2 - Good	3 - Fair	4 - Poor	5 - Very Poor	
Devonvale	0	0	356	598	28 254	**29 209**
Franschhoek	4 421	1 020	16 824	27 011	134 644	**183 921**
Klapmuts	1 011	25 715	17 676	9 913	41 985	**96 299**
Kylemore	1 087	1 629	2 914	3 827	22 187	**31 644**
La Motte	0	1 576	7 284	1 099	0	**9 960**
Lanquedoc	0	20 297	11 233	7 047	3 794	**42 372**
Meerlust	0	0	0	6 038	0	**6 038**
Pniel	2 788	1 637	4 137	10 587	34 559	**53 707**
Raithby	0	0	716	3 745	8 493	**12 954**
Stellenbosch	30 937	38 182	101 730	217 093	1 087 714	**1 475 656**
Grand Total	**40 244**	**90 057**	**162 870**	**286 958**	**1 361 630**	**1 941 759**

Table 3-5: Formation condition

Town	Formation Condition (sqm)					Total
	1 - Very Good	2 - Good	3 - Fair	4 - Poor	5 - Very Poor	
Devonvale	598	28 610	17 234	3 089	0	**49 532**
Franschhoek	17 608	155 349	13 182	12 031	3 147	**201 318**
Klapmuts	51 286	47 982	7 332	8 167	679	**115 445**
Kylemore	4 197	23 239	2 713	4 601	413	**35 164**
La Motte	8 483	1 476	9 399	4 579	0	**23 937**
Lanquedoc	28 051	9 173	5 147	0	0	**42 372**
Meerlust	0	2 546	3 491	0	0	**6 038**
Pniel	6 497	43 099	2 742	2 864	2 666	**57 868**
Raithby	0	8 292	3 946	0	1 415	**13 653**
Stellenbosch	176 700	1 070 922	194 884	49 303	20 088	**1 511 897**
Grand Total	**293 420**	**1 390 691**	**260 071**	**84 634**	**28 408**	**2 057 224**

Table 3-6: Pavement condition

Town	Pavement Condition (sqm)					Total
	1 - Very Good	2 - Good	3 - Fair	4 - Poor	5 - Very Poor	
Devonvale	0	0	16 191	13 018	0	**29 209**
Franschhoek	5 442	7 279	54 624	100 635	16 294	**184 275**
Klapmuts	8 573	37 999	25 866	27 931	7 184	**107 552**
Kylemore	1 554	1 855	8 713	13 773	6 492	**32 387**
La Motte	4 167	4 525	899	368	0	**9 960**
Lanquedoc	11 328	17 533	4 131	5 586	3 794	**42 372**
Meerlust	0	0	3 184	1 645	1 208	**6 038**
Pniel	4 359	2 849	16 642	26 435	5 038	**55 323**
Raithby	0	0	3 510	6 890	2 555	**12 954**
Stellenbosch	38 291	95 728	465 390	742 468	165 382	**1 507 259**
Grand Total	**73 714**	**167 767**	**599 149**	**938 751**	**207 947**	**1 987 329**

3.3.3 ROAD NETWORK CLASSIFICATION

The SM road network has developed over many years, primarily informed by the surrounding land- use and network needs. The size and importance of destinations that needs to be served by the network normally determines the class of road required to serve them. Access management provides the means to ensure that the designated roads are able to serve land uses in an appropriate and efficient manner. Land use and transport integration thus means that the hierarchy and protection of the different road classes, appropriate to their function, is an integral part of enabling efficient and sustainable land use.

The 2012 RMP classified the SM road network by utilising a road hierarchy system ranging from Class 1 to Class 5 depending on various criteria according to the South African Road Classification and Access Management Manual (RCAMM).

Figure 3-3 shows an extract from TRH26: South African Road Classification and Access Management Manual (COTO, 2012) indicating the Mobility and Access Functional Classification of as road. A clear distinction is

required between the mobility and access function of a road in order to ensure they operate as designed in terms of traffic volumes and safety.

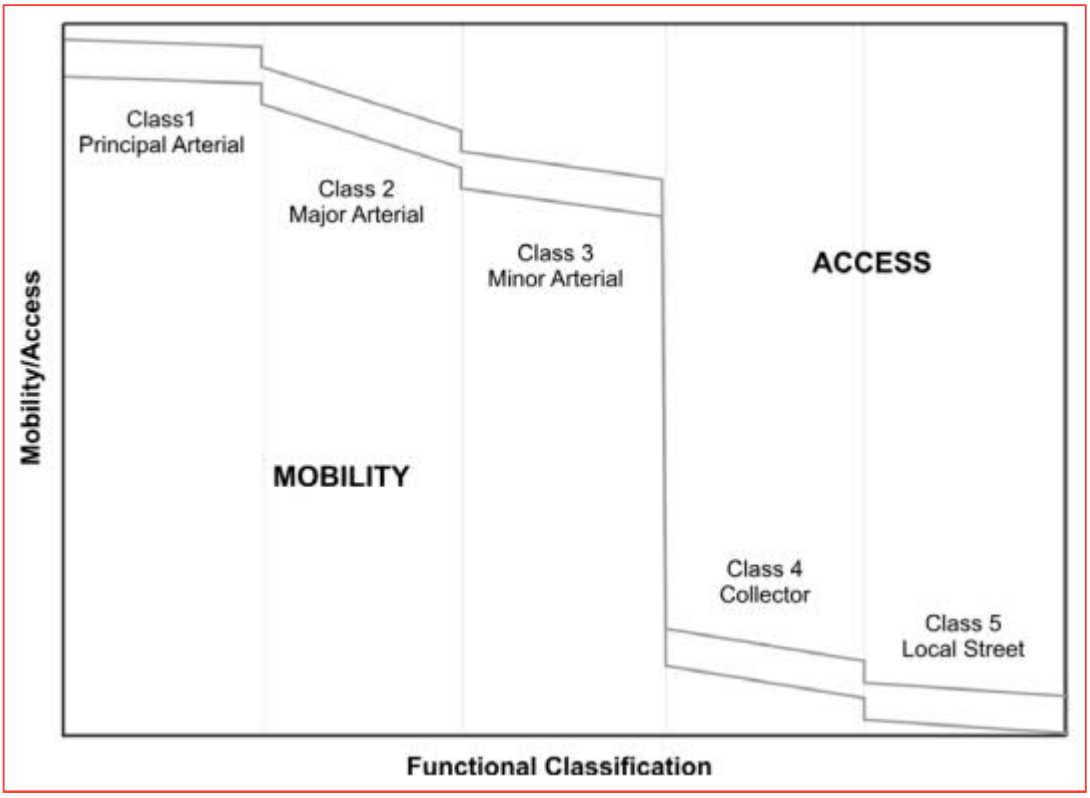


Figure 3-3: Mobility and Access functional classification

Source: TRH26

The following road categories were used in the 2012 RMP, and has been retained for the 2018 update:

Urban Roads

- Class U1: urban principal arterials

  Urban principal arterials serve the major economic activity centres of an urban area and often serve as connectors to the rural Class 1 routes. They are the highest trafficked roads, heavy utilised for freight movement, and have the longest trip lengths. These roads are mostly found in metropolitan areas and large cities. Being the longest urban routes, they often stretch from boundary to boundary and connect with other metropolitan or rural principal arterial routes. These roads would normally be 10 km or more in length.

  Class U1 principal arterials carry large volumes of traffic - typically 40 000 vpd (24 hours) or more, but can sometimes carry volumes in excess of 120 000 vpd. Because of the large traffic volumes and the requirement to carry high traffic flows over long distances, Class U1 principal arterials are typically freeways, e.g. the N1 freeway. Traffic calming is prohibited along these routes and access is limited, and typically grade separated.

- Class U2: urban major arterials

  Urban major arterials serve the larger economic activity centres of an urban area and are traffic corridors with high traffic volumes and long trip lengths. They usually connect with arterials of an equal or higher Class (1 or 2). They should be continuous with a minimum length of about 5 km with high mobility and few accesses. The major arterials would typically carry large volumes of traffic of about 20 000 to 60 000 vpd, e.g. the R44.

- Class U3: urban minor arterials

Urban minor arterials serve economic activity nodes and residential districts, have moderate traffic volumes and serve moderate trip lengths. They are the last leg on the mobility road network, bringing traffic close to (within a kilometre at most) its final destination. Minor arterials function as through routes on a district scale. While still carrying predominantly through traffic, they serve shorter distance trips with a length of around 2 km, but can be as short as a single block if connecting higher order routes. The roads usually connect Class 4 collectors to the Class 2 major arterials, but can connect to the Class 1 principal arterial network. The minor arterials would typically carry volumes of traffic of between 10 000 and 40 000 vpd, e.g. Annandale Road.

- Class U4: urban collector streets

  Collector streets are used to penetrate local neighbourhoods with the purpose of collecting and distributing traffic between local streets and the arterial system. The streets are mainly intended to serve an access function with limited mobility and traffic volumes, trip lengths and continuity must be limited. They should not carry any through traffic but only traffic with an origin or destination along or near to the street. The majority of the traffic using the collector street will have a destination in the street itself or in a local street leading off the collector, e.g. Van Reede Road. A collector street must not be quicker to use to pass through an area than a mobility road or else 'rat- running' can occurs. Rat-running along these routes may then require traffic calming measures, which is expensive to retrofit and could leads to other traffic issues.

- Class U5: urban local streets

  Class 5 urban streets provide access to individual properties. They should only provide an access function or activity, and traffic volumes and trip lengths must be limited. They must not be continuous between roads of a higher order than a Class 4, e.g. Church Street. Local streets should not carry any through traffic but only traffic with an origin or destination along the street, i.e. all the traffic using the local street will have an origin or destination along the street itself.

Rural Roads

- Class R1: rural principal arterials

  Class R1 arterials are continuous routes that would typically serve several nodes along each route. The routes are typically characterised by high through traffic volumes, long travel distances or both. They are seldom less than 50km in length. AADT would in most cases exceed 1000 vpd on the long distance routes, 5000 vpd on medium distance routes and can reach 100,000 vpd or more on shorter routes.

- Class R2: rural major arterials

  Class R2 arterials are continuous routes that would usually serve several nodes, typically within a province. The routes are characterised by relatively high traffic volumes, relatively long travel distances or both. They often start and end within the provincial boundaries, but can cross into adjoining provinces. They are seldom shorter than 25km in length. AADT would typically exceed about 500 vpd on long distance routes, 2000 vpd on medium distance routes but on shorter routes, the volumes could exceed 25000 vpd.

- Class R3: rural minor arterials

  Class R3 arterials are not always continuous, often stopping when a particular destination is reached, although they could also serve more than one node in a district and can cross adjoining districts. The typical lengths of these routes would vary between about 5km and 100km. These roads have low traffic volumes, typically between 100 and 2000 vpd.

- Class R4: rural collector roads

  These roads form the link to local destinations. They do not carry through traffic but only traffic with an origin or destination along or near the road. A collector road should not be faster to use to pass through an area than the alternative mobility road. These roads would typically give access to smaller rural settlements, tourist areas, mines, game and nature parks or heritage sites. The roads can also provide direct access to large farms. The length of these roads is mostly shorter than 10km. Traffic volumes should not be more than about 1000 vpd.

- Class R5: rural local roads

  Class 5 roads provide direct access to smaller individual properties such as within rural settlements, as well as small to medium sized farms in rural areas. They serve no other purpose than to give local access. The

length of these roads would mostly be shorter than 5km and traffic volumes should not be more than about 500 vpd.

Refer to Figure 3-4 for the road hierarchy map developed for the 2012 RMP and to Section 8.1 for additional information.

The Road Asset Management Plan states that the road network classes are as follows, refer to Table 3-7.

Table 3-7: SM Road network – Functional class

Municipality/Town	Functional Class				Grand Total
	Arterial	Distributor	Collector	Access	
Stellenbosch	**4.0**	**0.0**	**58.1**	**250.4**	**312.5**
Devonvale	0.0	0.0	0.0	7.8	7.8
Franschhoek	0.0	0.0	2.9	29.3	32.2
Klapmuts	0.0	0.0	0.0	20.8	20.8
Kylemore	0.0	0.0	0.7	6.0	6.7
La Motte	0.0	0.0	0.0	4.6	4.6
Lanquedoc	0.0	0.0	1.6	7.1	8.7
Meerlust	0.0	0.0	0.0	1.0	1.0
Pniel	0.0	0.0	0.0	10.6	10.6
Raithby	0.0	0.0	0.0	2.8	2.8
Stellenbosch	4.0	0.0	52.9	160.1	217.0

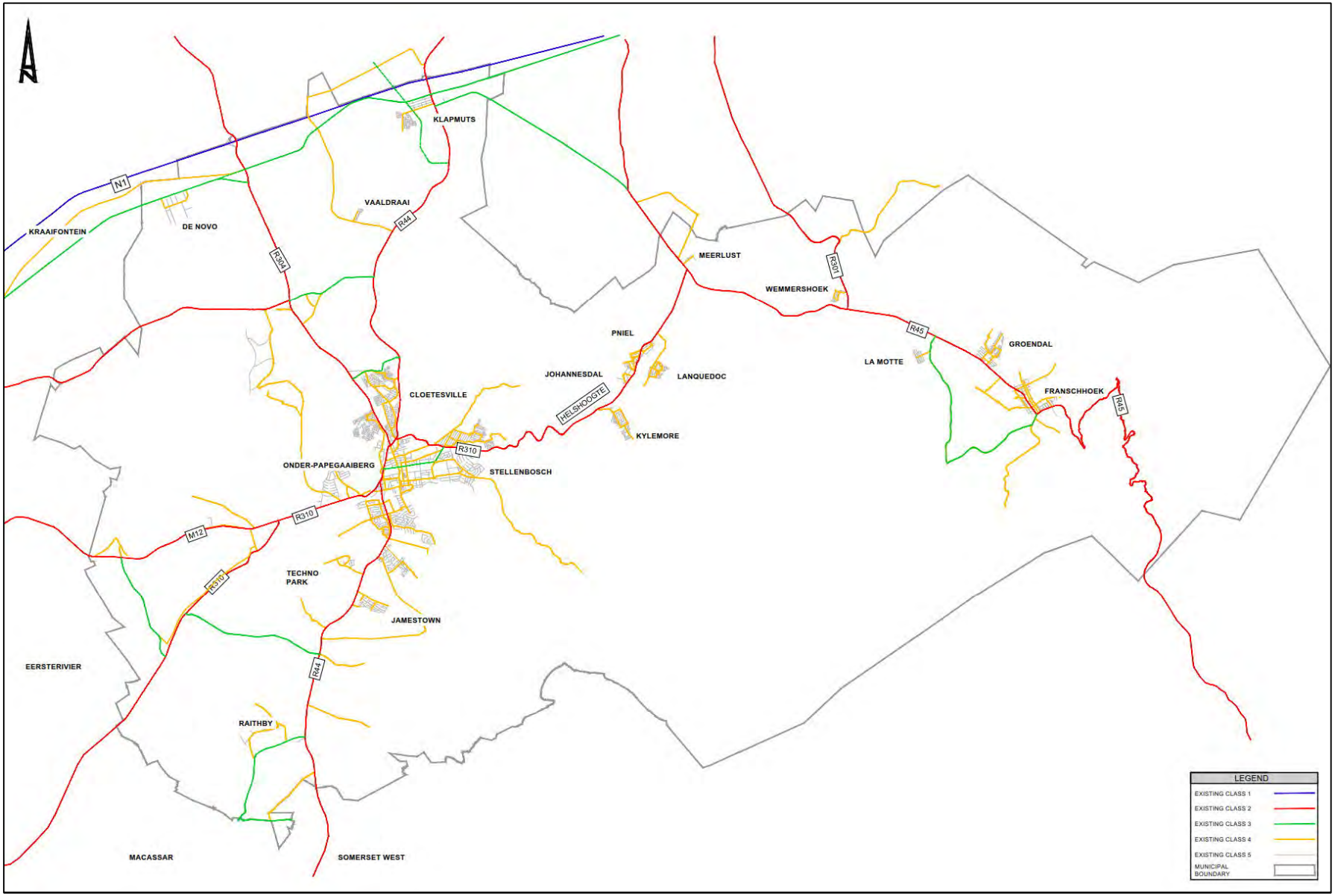


Figure 3-4: Stellenbosch Municipality Road Network Hierarchy (2018)

4 MODELLING OF THE STELLENBOSCH ROAD NETWORK

4.1 INTRODUCTION

The 2018 RMP update requires detailed transportation modelling, and the Cape Town EMME/4 Metropolitan Transport Model was used as the transport modelling platform. EMME/4 remains one of the most sophisticated, powerful and widely used transport modelling systems in the world.

The EMME model was used in 2009 as a strategic planning tool to analyse and assess the transport system in and around Stellenbosch, to develop a Public Transport Operations Plan and, later in 2012, to prepare the Roads Master Plan for Stellenbosch.

In view of the present modelling objectives, it was decided to update and continue using the EMME/4 Cape Metropolitan Transport Model as the principal modelling platform for the RMP update. One of the reasons for using the metropolitan model was that this system incorporates the entire greater metropolitan area, including Stellenbosch, and thereby ensures a regional balance between employment and population forecasts.

Using this database also provided alignment with long-term Cape Town Metropolitan growth projections. A number of long-term land-use scenarios, which were recently developed by the City of Cape Town have been used as the basis of the 2040 Transport Demand Modelling scenario. This scenario also captures the latest residential, industrial and commercial development proposals in the Stellenbosch Municipal Area.

4.2 MODELLING SYSTEM

One of the main advantages of using the metropolitan model is its ability to address the regional interdependence between Stellenbosch, its surrounding towns and the Cape Town Metropolitan Area. The EMME/4 Metropolitan Transport Model has been in use since 1992 and has been updated regularly, i.e. to reflect changes in the transport network and land use patterns. The latest 2011 census information, and more recent 2013 metropolitan-wide household interview data, have also been incorporated into the modelling system.

The model has been used for various applications, and is generally used as a basic conventional four-step demand model, which is particularly useful for strategic investigations. The traffic assignment step has recently been upgraded with a variable demand methodology which more accurately reflects the road network's capacity constraints. It therefore automatically determines the peak hour traffic demand and the length of the peak period across the metropolitan network. Another major improvement has been the introduction of a new modal split modelling routine which is more dynamic and responsive to the public transport network attributes.

In its present form, the metropolitan model focuses mainly on AM peak period commuter demand, covering the whole of the Cape Town Metropolitan Area, including Atlantis, Paarl/Wellington, Malmesbury, Franschhoek, Stellenbosch and the Helderberg area. It currently consists of 2 281 transport zones and more than 23 000 one-directional network links, representing all major metropolitan transport infrastructure components. It also incorporates all metropolitan commuter rail services and existing MyCiTi trunk and feeder systems. Future network proposals have been defined in accordance with the Cape Town's long term Metropolitan Road Network and MyCiTi public transport proposals.

The EMME/4 model has been used for a number of important metropolitan studies in the Cape Town municipal area, including the City's Development Contribution (DC) Policy, its Congestion Management Strategy and its Medium-Term Integrated Investment Framework (MTIIF). An older (2008) version of the EMME model was used as the basis for the initial transport model for the Stellenbosch Municipal Area. This work was done by Jeffares & Green (Pty) Ltd, and the results were documented in the Transport Modelling Report of June 2010. The transport zones and road network in the present (2018) model still reflect the level of detail that was introduced for the Stellenbosch study.

4.3 THE FOUR-STEP MODELLING APPROACH

For reasons of transparency and simplicity, the Stellenbosch Model has been implemented as a fairly conventional four-step modelling approach for determining the AM commuter demand across the metropolitan area, and Stellenbosch in particular. These steps are as follows:

- Trip Generation: Household and employment data are used to determine the number of commuter origins and destinations in each transport zone. This information was updated to comply with the latest land use information from the City of Cape Town and the Stellenbosch Municipality.
- Trip Distribution: Household interview data provides the basis for determining the trip distribution patterns between zones of origin and destination. A 3-dimensional matrix balancing technique is then used to compute present and future (2040) travel demand for different income groups.
- Modal Split: A two-tier modal split procedure is followed. Firstly, to determine the split between motorised and non-motorised travel, and secondly, to determine the demand for public and private transport. Different modal split functions are used for different income groups, to allow for known variations in perceptions and preferences around modal choice. The travel time effects of traffic congestion are taken into account.
- Assignment: Private transport is converted into peak hour vehicular trips and assigned onto the (road) network using a variable demand equilibrium assignment procedure. Public transport passengers are assigned onto certain (allowable) elements of the road network, as well as rail services, using a multi-path routine in EMME/4.

It should be noted that the first three modelling steps involve income stratification, where demand calculations are performed for each income group separately. In addition to the commuter demand, a separate travel matrix was constructed for students enrolled at the University of Stellenbosch. This was also converted into motorized and non-motorised trips, which were assigned in conjunction with the commuter matrices.

The Municipality also requested a more detailed study of the traffic issues currently experienced in the vicinity of the schools located along the R44 and Doornbosch Road. This study and its findings were undertaken and reported separately.

4.4 TRIP GENERATION

4.4.1 GENERAL

The trip generation model uses household and employment data to determine the home-work commuter demand, with trip productions as the origin totals at the home end and trip attractions as the destination totals at the employment end.

Usually, trip generation models allow for income variations within a particular zone, but in the Stellenbosch model, this was not necessary due to the relatively small transport zones with fairly homogeneous socio-economic population profiles. Each residential zone could be classified in terms of typical income categories, as described below.

4.4.2 INCOME STRATIFICATION

The Stellenbosch model has been developed around four separate household income groups in terms of the 2011 census categories. Although the income ranges were not determined scientifically, the following general principles were used to produce the income stratification:

- *Low Income* – Annual household income is less than R 38 200. This income group is mostly reliant upon public transport and live in low-cost housing or informal settlements. House prices are typically less than R 250 000.
- *Lower Middle Income* – Annual household income varies between R 38 200 and R 307 600. This income group prefers to use public transport. House prices vary between R 250 000 and R 1 000 000.
- *Upper Middle Income* – Annual household income varies between R 307 600 and R 614 400. These households prefer to use private transport, but will use public transport if services are up to standard. House prices vary between R 1 mil and R 2.5 mil.
- *High Income* – Annual household income is in excess of R 614 400. These households only use private transport and their house prices exceed R 2.5 mil.

Due to the relatively small number of "*High Income*" households in the metropolitan area, this income group is often combined with the "*Upper Middle Income*" group and collectively referred to as "*Higher Income*". Similarly, the "*Low- and Lower Middle Income*" groups are sometimes referred to as "*Lower Income*".

4.4.3 TRIP PRODUCTIONS

For each residential zone, the trip productions are calculated by multiplying the number of households (or residential units) in a particular zone by the average number of workers per household in that zone. These figures were obtained as follows:

- Household figures were extracted from the 2011 census data and updated by data from the 2016 IMQS infrastructure management system for Stellenbosch. More recent land use developments were also included in the model.
- Workers per household were obtained from the (2009) Stellenbosch household interview surveys and adjusted by the latest (2011) census data.
- Future household increments (2018 to 2040) were obtained from 2016 IMQS forecasts as well as previous IDP proposals. This was further updated with recently approved development applications and other known land use proposals for the Stellenbosch area.
- An alternative 2040 transport modelling scenario was developed in accordance with IDP policy objectives to attain much greater residential densities in the Stellenbosch Town area. For this purpose it was assumed that a minimum of 20% residential infill can be achieved in all higher income areas.
- Household information for the rest of the metropolitan area was obtained from the Cape Town Metropolitan Transport Model. Future land use forecasts are based upon a modified version of Cape Town's Pragmatic Densification (PD) scenario.

Table 4-1 provides a summary of the 2018 households and trip productions, as well as the 2040 estimates based on the assumptions described above. It should be noted, that the number of workers per household can vary from zone to zone depending on income category and variations in type of accommodation and family structure.

Table 4-1: 2018 – 2040 Households and Commuter Trip Productions in the Stellenbosch Town Area

(University students excluded)

Income Group	Households	%	Workers per Household	Trip Productions (person trips)	%
2018					
Higher Income	11 173	46	1.08 average	12 085	45
Lower Income	12 969	54	1.12 average	14 464	55
2018 TOTAL	**24 142**	**100**		**26 549**	**100**
2040 Trend					
Higher Income	20 622	44	1.14 average	23 550	49
Lower Income	26 225	56	0.94 average	24 640	51
2040 TOTAL	**46 847**	**100**		**48 190**	**100**
2018 – 2040 Growth	**94.0%**			**81.5%**	
2040 Densification					
Higher Income	21 381	45	1.15 average	24 645	50
Lower Income	26 225	55	0.94 average	24 640	50
2040 TOTAL	**47 606**	**100**		**49 285**	**100**
2018 – 2040 Growth	**97.2%**			**85.6%**	

The “2040 Trend” land use scenario suggests that the number of households in each income category could double over the next 23 years. This is possible due to future expansion plans for Kayamandi; some anticipated infill in and around the Stellenbosch town centre; and new higher income residential developments to the south of Stellenbosch along the R44 corridor. The trip productions are however anticipated to grow at a slower rate due to the future population mix with higher unemployment amongst the lower income groups.

The alternative 2040 Densification Scenario is based upon the Municipal Zoning Scheme By-laws, which allows moderate densification in conventional residential areas through additional dwellings with a similar built form and character. For this purpose it was decided to set a minimum target of 20% residential infill in all higher income areas where the Trend scenario indicates less growth. Otherwise, the two future scenarios are identical.

The summary results in Table 4-1show that this particular Densification Scenario does not have a significant impact on the overall housing demand in Stellenbosch, given that properties in higher income areas will primarily be subdivided to create additional dwellings of a similar price category.

The Trend and Densification growth scenarios are further discussed in **Chapter 5.**

4.4.4 TRIP ATTRACTIONS

Trip attractions refer to the number of work opportunities (employment) in each transport zone. Since there are no direct sources of reliable employment information, the following actions were used to establish some realistic estimates:

- Employment surveys in some of the larger industrial zones.
- Employment estimates from traffic counts (e.g. Technopark).
- The analysis of household interviews, which indicated where people work, by income category.
- The extraction of commuting data from the Cape Town EMME model.
- Obtaining staff figures from Stellenbosch University websites.
- Land use development applications (m^2 GLA)
- Future employment increments (2018 to 2040) were obtained from 2016 IMQS forecasts as well as previous IDP proposals. This was further updated with recently approved development applications and other known land use proposals for the Stellenbosch area.
- Employment information for the rest of the metropolitan area was obtained from the Cape Town Metropolitan Transport Model. Future land use forecasts are based upon a modified version of Cape Town's Pragmatic Densification (PD) scenario.

The summary figures in Table 4-2 indicate that the total employment in the Stellenbosch town area is approximately 33 000. This makes Stellenbosch quite unique, considering that for all income groups, the number of local work opportunities are greater than the actual workforce living in this area. Presently, the higher income surplus is about 25%, but this could change if future (white collar) employment growth fails to match the expected increase in higher income population.

It is important to realise that the figures below refer to residents in the Stellenbosch Town Area only. The surplus shown is therefore an indication of the job opportunities that need to be filled by people living outside the Stellenbosch Town Area. In reality however, the need for external workers will be greater, considering that not all Stellenbosch residents work within the Town Area.

It should be noted that the employment figures in Table 4-2 are indicative only, and should be treated with caution. As stated before, these figures were obtained from indirect sources and should therefore at some stage be updated by more extensive employment surveys.

Table 4-2: 2018 – 2040 Employment in the Stellenbosch Town Area

Income Group	Trip Attractions (person trips)	%	Trip Productions from Table 5.1 (person trips)	Net Employment Surplus
2018				
Higher Income	16 327	49	12 085	4 242
Lower Income	16 729	51	14 464	2 265
2018 TOTAL	**33 056**	**100**	**26 549**	**6 507**
2040 Trend				
Higher Income	20 861	40	23 550	-2 689
Lower Income	31 857	60	24 640	7 217
2040 TOTAL	**52 718**	**100**	**48 190**	**4 528**
2018 – 2040 Growth	**59.5%**		**81.5%**	
2040 Densification				
Higher Income	20 861	40	24 645	-3 793
Lower Income	31 857	60	24 640	7 217
2040 TOTAL	**52 718**	**100**	**49 285**	**3 433**
2018 – 2040 Growth	**59.5%**		**85.6%**	

The employment growth scenario is further discussed in ***Chapter 5***.

4.5 TRIP DISTRIBUTION

4.5.1 GENERAL

Trip distribution is usually the 2nd step in the conventional transport modelling process, and involves the number of trip interactions between given origins (productions) and destinations (attractions) in a study area, for a specific trip purpose. In the Stellenbosch model, a 3-dimensional matrix balancing technique is used to compute the distribution of commuter trips, using an observed or given profile of trip length frequencies as the 3rd dimension constraint. This is done separately for different income groups.

The results of the trip distribution process are stored in a tabular form, referred to as an origin-destination (O-D) matrix. In the case of the Stellenbosch model, the O-D matrices for commuter trips and student travel have been combined to determine the full impact of peak period travel demand. Home-school trips are not yet included in the model.

4.5.2 COMMUTER O-D MATRICES

Observed commuter matrices were used to construct and analyse trip average length frequencies for each income group. These frequency diagrams represent people's propensity to travel and are essential in the development of 3-dimensional trip distribution models.

After a preliminary assessment, the trip data for the two higher and two lower income groups were combined to produce two separate trip distribution models. The diagram in Figure 4-1shows the trip length frequencies for each of these income groups in the Stellenbosch Town Area. Typically, the vast majority of residents are employed within a 12km range, which corresponds with the location of employment opportunities in and around Stellenbosch.

Generally, the frequency patterns are very similar for the two income groups, except that the higher income group has a significantly larger proportion of short (0 – 2km) trip lengths. This is due to previous apartheid land use patterns and the increasing tendency for higher income people to work from home.

The average trip lengths in Figure 4-1 confirm that Stellenbosch residents travel shorter distances to work opportunities than their metropolitan counterparts whose trip lengths are on average more than one kilometre longer.

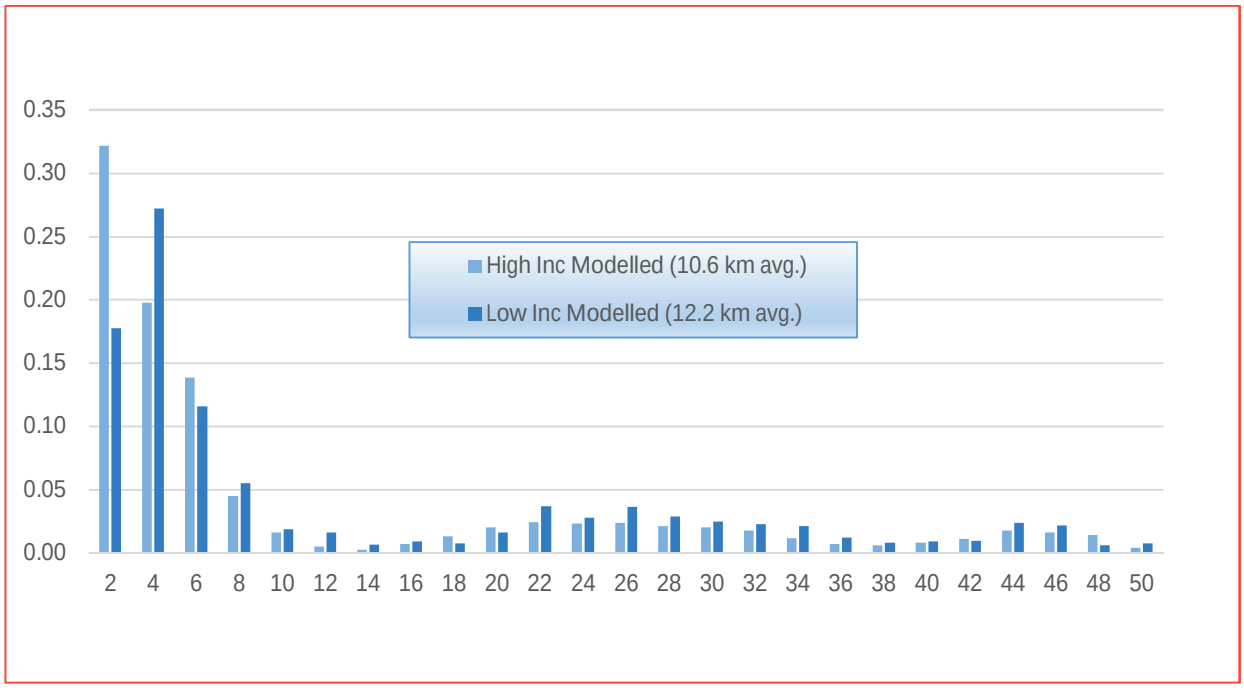


Figure 4-1: Trip length frequencies for Stellenbosch residents

Table 4-3 shows that vast majority of local residents work in the Stellenbosch area. The 30% that work elsewhere is however a normal pattern, even for areas with an employment surplus. This is due to the fact that members of multi-worker households cannot always find suitable employment in the same area, and that people do not necessarily relocate when changing jobs.

Table 4-3: Commuter Destinations for Residents in the Stellenbosch Town Area (2018)

Trip Destinations	Higher Income	%	Lower Income	%	Total %
Stellenbosch Town Area	8 526	70.9	8 124	62.1	66.3
Stellenbosch Region	230	1.9	678	5.2	3.6
Helderberg	425	3.5	433	3.3	3.4
Rest of Metro Area	2 836	23.6	3 854	29.4	26.6
TOTAL	**12 017**	**100.0**	**13 089**	**100.0**	**100.0**

Table 4-4 clearly shows the impact of the employment surplus in Stellenbosch. A large proportion of Stellenbosch's workforce (50%) resides in neighbouring towns, from where they have to commute every day. Helderberg, Kuilsriver, Brackenfell and Kraaifontein, have established themselves as the main dormitory suburbs.

Table 4-4: Commuter Origins for Employment Opportunities in the Stellenbosch Town Area (2018)

Trip Destinations	Higher Income	%	Lower Income	%	Total %
Stellenbosch Town Area	8 526	52.6	8 124	48.8	50.7
Stellenbosch Region	106	0.7	300	1.8	1.2
Helderberg	3 213	19.9	786	4.7	12.2
Paarl/ Franschhoek Valley	681	4.2	1 165	7.0	5.6
Rest of Metro Area	3 659	22.6	6 259	37.6	30.2
TOTAL	**16 185**	**100.0**	**16 632**	**100.0**	**100.0**

4.5.3 STELLENBOSCH UNIVERSITY STUDENT MATRIX

Stellenbosch University has about 20 000 full-time students, of which 6 500 reside in hostels and other University accommodation around the campus. Another 8 500 live in the Stellenbosch Town Area. The remaining 5 000 commute from neighbouring towns, as shown in Table 4-5. These figures were obtained from recent sources and used to construct a student trip distribution matrix from reported travel patterns in a 2004 US parking study. The 3 400 staff members at the University were treated as normal commuters and added to the trip attractions for Stellenbosch.

Table 4-5: University of Stellenbosch Student Accommodation

Place of Residence	Student Numbers	%*
Campus Accommodation	6 500	32.5
Stellenbosch Town Area	8 500	42.5
Helderberg	1 737	8.7*
Bellville/ Durbanville/ Kraaifontein	1 151	5.8*
Kuilsriver/ Eersteriver/ Brackenfell	808	4.0*
Paarl/ Wellington/ Franschhoek	465	2.3*
Rest of Metropolitan Area	840	4.2*
TOTAL	**20 000**	**100.0**

* Distribution for neighbouring towns obtained from 2004 US Parking Study.

It has been noted that the University recently adopted a policy to restrict future growth of its Stellenbosch campus to 24 000 full-time students.

4.6 MODAL SPLIT

4.6.1 *GENERAL*

Conventional transport models make use of modal split functions to determine the choice of mode(s) for a particular trip purpose between a given origin and destination pair. This is done separately for each income group in terms of the following sequential steps:

- A choice between motorised or non-motorised travel (NMT). This is dependent upon walking distance, topography, safe environment, NMT facilities, weather conditions, etc. The age of commuters and income also play a role. Generally higher income people tend to walk shorter distances than lower income commuters.
- A further choice for motorised travellers, between public and private transport. Trip lengths, travel time, travel cost, and quality of service are key determinants of modal choice, and the perceptions thereof vary significantly amongst different income groups. Typically, higher income groups value travel time and convenience much higher than travel cost, while the opposite is true for lower income commuters.

These choice processes have been replicated in the EMME model structure by means of a 2-level nested binomial logit model, with different calibration constants for different income groups. The resulting public and private transport matrices can then be assigned onto the relevant road and public transport networks.

4.6.2 *WALKING / WORKING FROM HOME*

For modelling purposes it was decided to include working-from-home (which does not involve commuting) into the non-motorised travel segment. Previous household interview surveys indicate that a significant proportion of

the workforce nowadays prefer to work from home, and that this is particularly prevalent in higher income suburbs where up to 20% of the residents may be employed as such.

Walking, or cycling to work is largely dependent upon income and the proximity of the employment destination. This is illustrated by the walk: non-walk diversion curves in Figure 4-2, which were developed from household interview data. NMT matrices were produced for each income group by applying these modal split functions to the commuter matrices in the previous section. The same process yielded the relevant matrices for motorized travel.

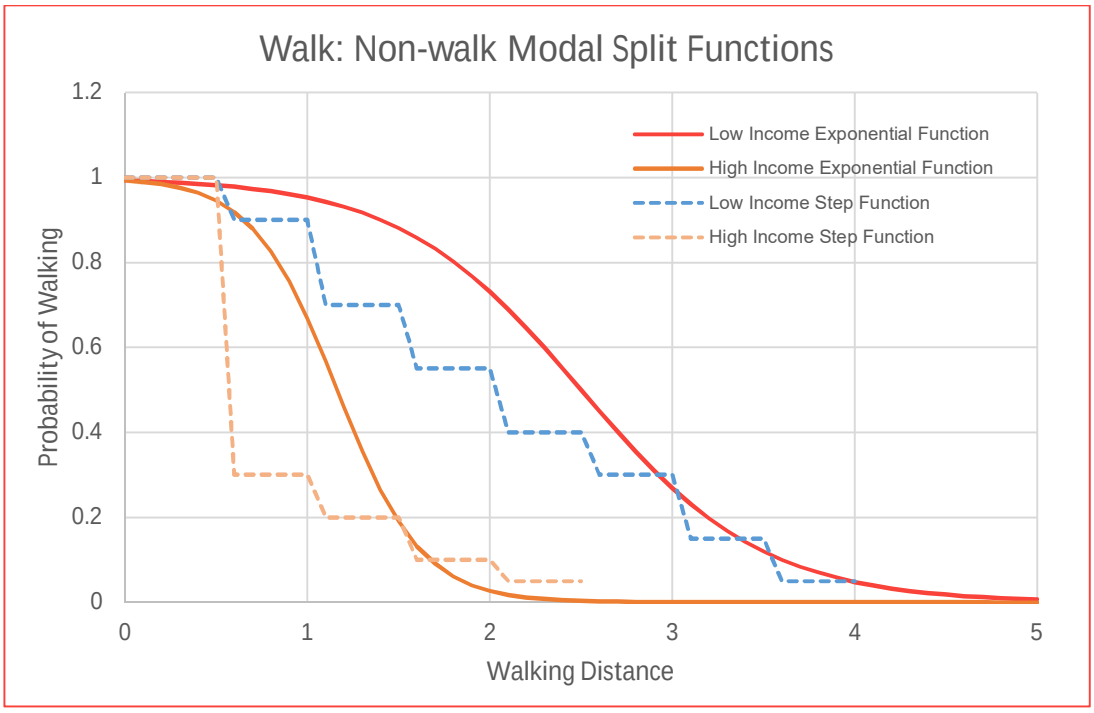


Figure 4-2: Walk: Non-walk Modal Split Functions

The main pedestrian demand patterns can be obtained by assigning the non-motorised commuter matrix onto the road network, using a simple minimum-path routine in EMME transport model.

4.6.3 PUBLIC / PRIVATE TRANSPORT

In South African cities, the choice between public and private transport is primarily a function of household income and the availability of public transport services. This has been confirmed by previous metropolitan household interview surveys which were used to calibrate modal split models for each of the four income groups referred to earlier.

Typical logit type functions were used to determine the probability of choice, based upon:

- The difference between travel time by car and travel time by public transport for the higher income groups; and
- The difference between travel cost by car and travel cost by public transport for the lower income groups.

The 2018 model results for Stellenbosch are shown as average modal split figures (for motorized travel) in Figure 4-3. The disaggregate results were then used to produce the relevant public and private transport matrices for the different income groups. An additional private transport matrix was produced for students, assuming that all longer distance motorised travel will be by car.

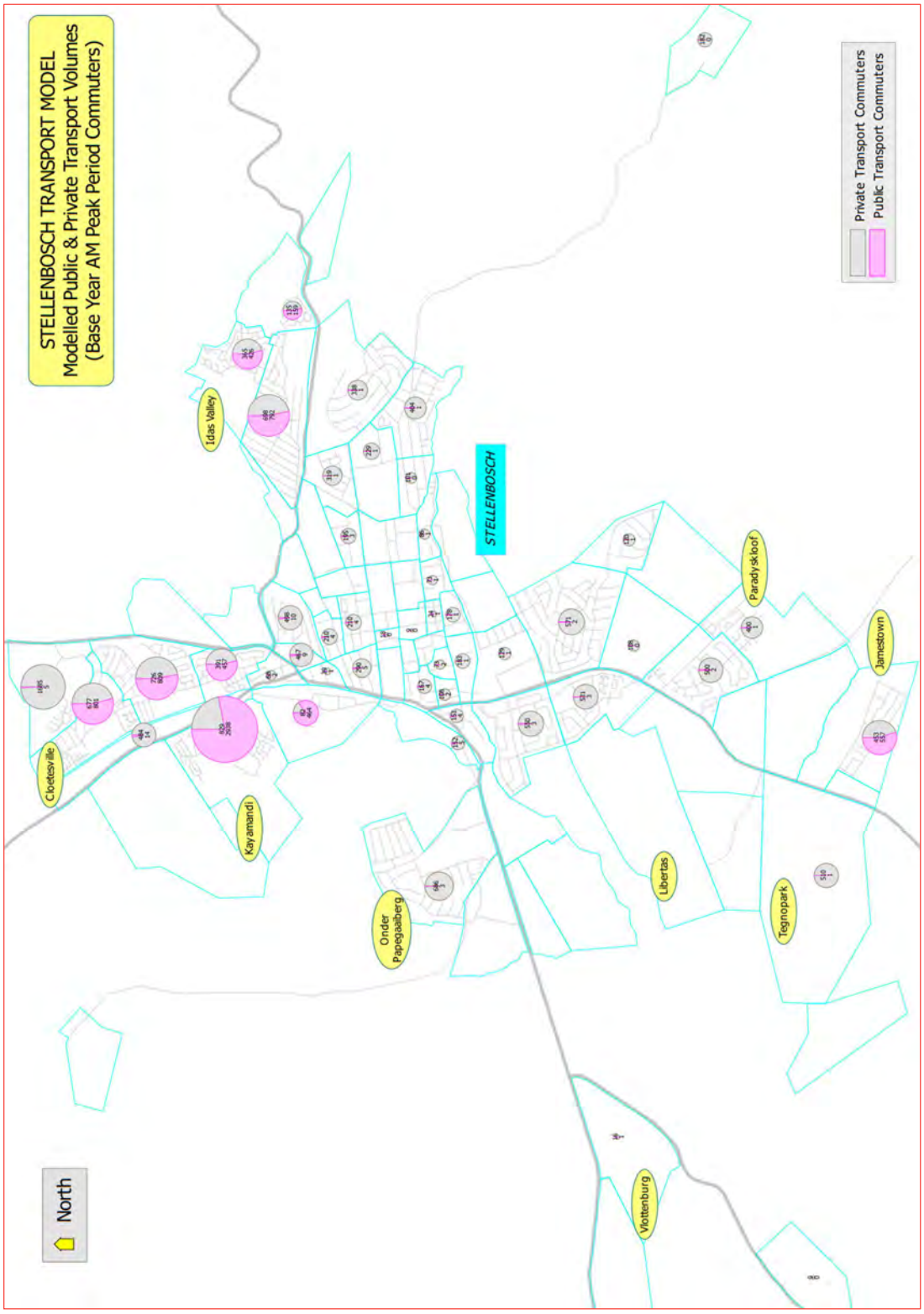


Figure 4-3: Public/ Private Modal Shares in the Stellenbosch Town Area (2018)

The public transport demand matrices can be assigned onto the road network using a minimum-path routine. This usually provides the best visualisation of demand patterns in the form of passenger desire lines. Alternatively, it can also be assigned onto specific routes and services. This involves using a probabilistic multi-path routine, based upon the concept of optimal strategies. This assignment methodology also includes the rail system, which provides public transport access to metropolitan destinations.

The private transport commuter matrices are converted into vehicular traffic using typical vehicle occupancy figures, as shown in Table 4-6**.** This private transport (vehicle) matrix can then be assigned onto the road network according to the procedure described in ***Section 4.7***.

Table 4-6: Stellenbosch Model: Vehicle Occupancy Figures for Stellenbosch Residents

Income Group	Average No. of Occupants per car
High Income	1.1
Upper Middle Income	1.1 – 1.5
Lower Middle Income	1.5 - 1.8
Low Income	2.6
Students	2.0

4.7 TRAFFIC ASSIGNMENT

EMME/4 uses a variable demand equilibrium procedure to assign vehicular traffic onto the road network. This is done by using volume-delay functions to simulate the reduction in travel speed as a result of increased traffic congestion. This methodology more accurately reflects the road network's capacity constraints, by assigning traffic beyond a single peak hour. This process can be summarised as follows:

- A given land use scenario's peak period vehicular demand matrix is used as an input into the model. The assignment procedure then splits the peak period traffic into the assigned peak hour matrix plus a matrix of the residual traffic i.e. the traffic that cannot be accommodated on the network during the peak hour.
- After the traffic in the peak hour has been assigned, secondary assignments are performed until there are no more residual demand volumes. Each additional iteration produces a new peak hour, which adds to the peak period traffic on each link.

Important outputs of the variable demand assignment are:

- The relationships between the peak hour and peak period traffic demand (peak hour factors) for each zone pair across the metropolitan area;
- The peak hour as well as the total peak period traffic demand on each link in the network; and
- The average length of the peak period at all origins and destinations.

These indicators provide valuable comparative information about the intensity and duration of peak period congestion in different parts of the metropolitan area, including Stellenbosch. The focus on the peak period conditions, rather than the peak hour alone, produces a far more rational, equitable and comprehensive approach to network analysis and planning.

The 2018 base-year vehicle assignment results and traffic counts are shown in ***Figures 4.4 to 4.7*** and discussed in Section 4.8.

4.8 CURRENT TRAFFIC (2018)

The Municipality made various recent traffic count data available to assist in the calibration of the EMME/4 model. These are briefly listed below:

- Adam Tas TOD modelling - cordon counts with number plate surveys.
- Stellenbosch signalisation update - all the signalised intersections were counted during March 2019. The results of these counts were received fairly late in the appointment, and were only used to undertake spot checks of the EMME model's calibration.

Additional traffic surveys were undertaken for the model calibration. Weekday AM classified traffic counts were undertaken from 12 – 14 June 2018 and from 19 – 21 June 2018 at the following intersections:

- R304 (Bird Street) / George Blake Street
- R304 (Bird Street) / R44 (Adam Tas Road)
- R310 (Helshoogtre Road) / Adam Tas Road
- R310 (Helshoogtre Road) / La Colline Road
- Adam Tas Road / Merriman Avenue
- Adam Tas Road / Alexander Street
- R310 (Adam Tas Road) / R44 (Strand Street)
- R310 (Adam Tas Road) / Dorp Street
- R44 (Strand Street) / Dorp Street

The following outputs of the recalibrated EMME/4 model outputs are included:

- Figure 4-4: 2018 Weekday AM *peak hour* traffic volumes – (various survey sources)
- Figure 4-5: 2018 Weekday AM *peak hour* traffic volumes - modelled
- Figure 4-6: 2018 Weekday AM peak period traffic volumes – modelled
- Figure 4-7: 2018 Weekday AM *peak hour* volume/capacity analysis – modelled

These figures are also included in Appendix A1.

The traffic counts were used in an iterative calibration process to assess the model's assignment results and, where necessary, to make adjustments to the network and link attributes.

The most recent 2018 peak hour traffic counts are shown in Figure 4-4. A comparison between the base-year model assignment (Figure 4-5) and the observed traffic confirms a generally good fit, particularly on the higher order roads leading into the study area, where the differences are in most instances less than 10 percent (within the margin of error for traffic counts). Even the higher order collectors within Stellenbosch appear to have realistic assignment results.

To illustrate the results further, the modelling system was also used to perform a link-based volume: capacity analysis. The results are shown in, and clearly illustrate the major capacity problems on the road network in and around Stellenbosch. Intuitively this appears to be correct and provides further justification of the model's accuracy.

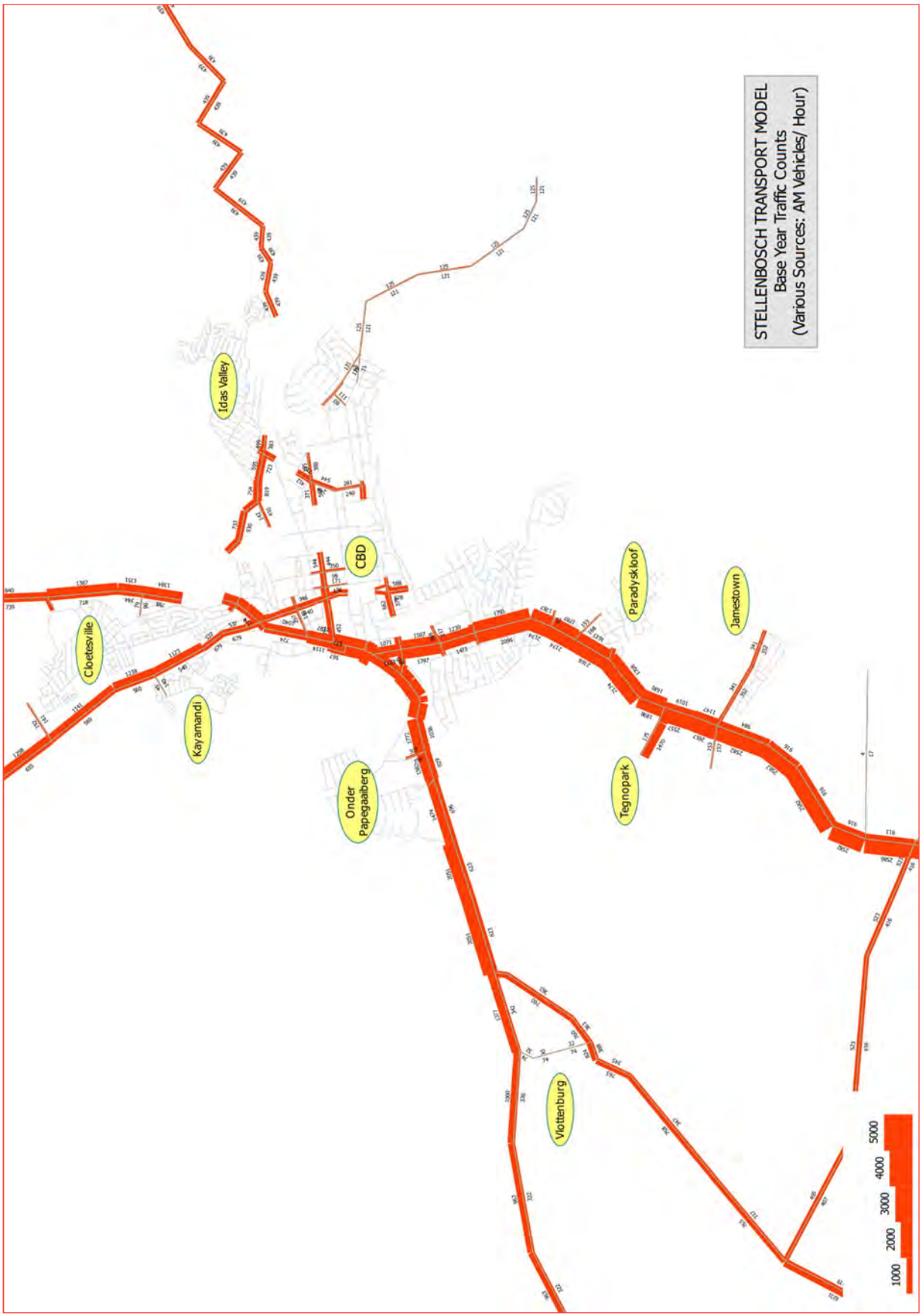


Figure 4-4: 2018 Weekday AM *peak hour* traffic volumes (various survey sources)

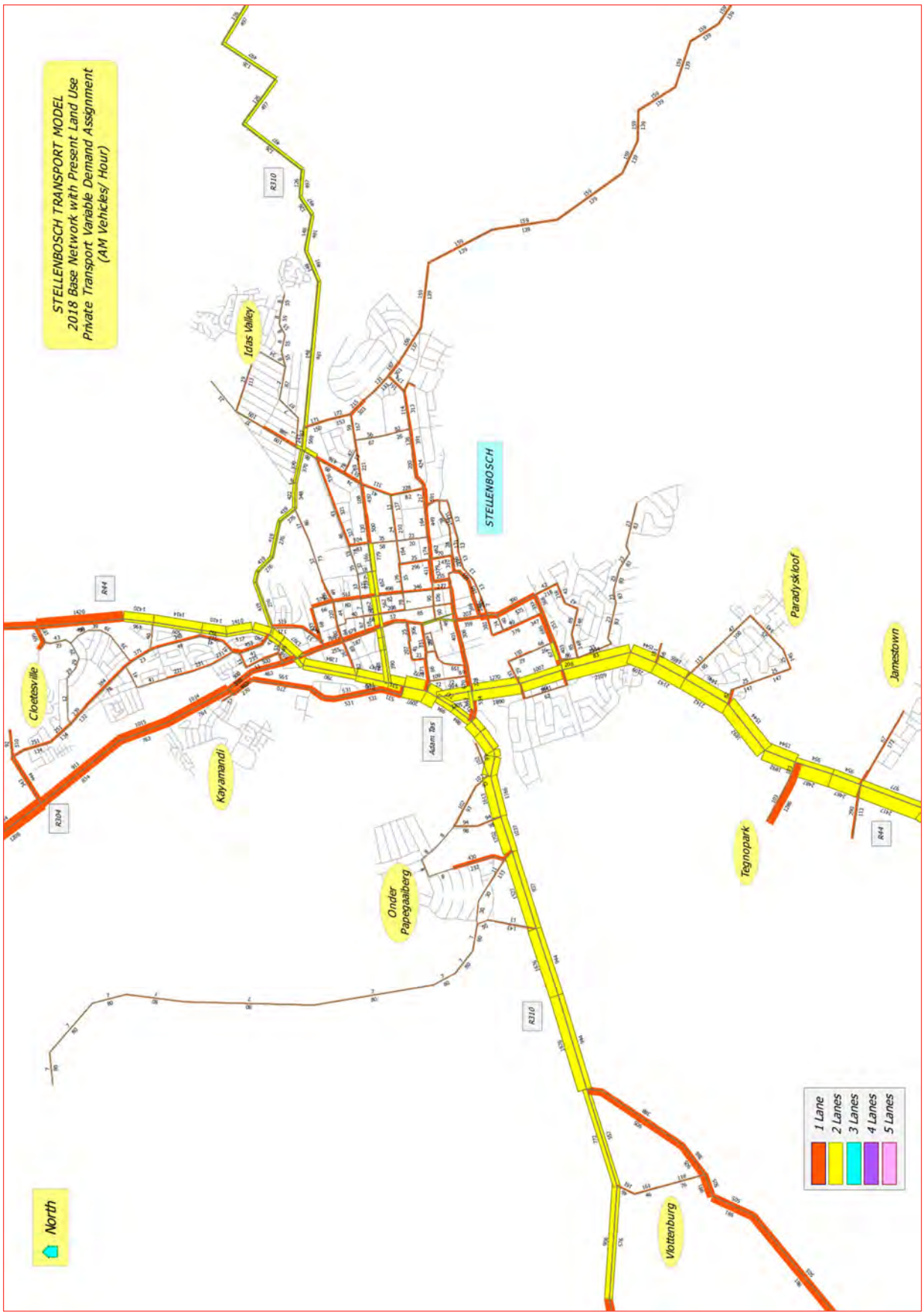


Figure 4-5: 2018 Weekday AM *peak hour* traffic volumes – modelled

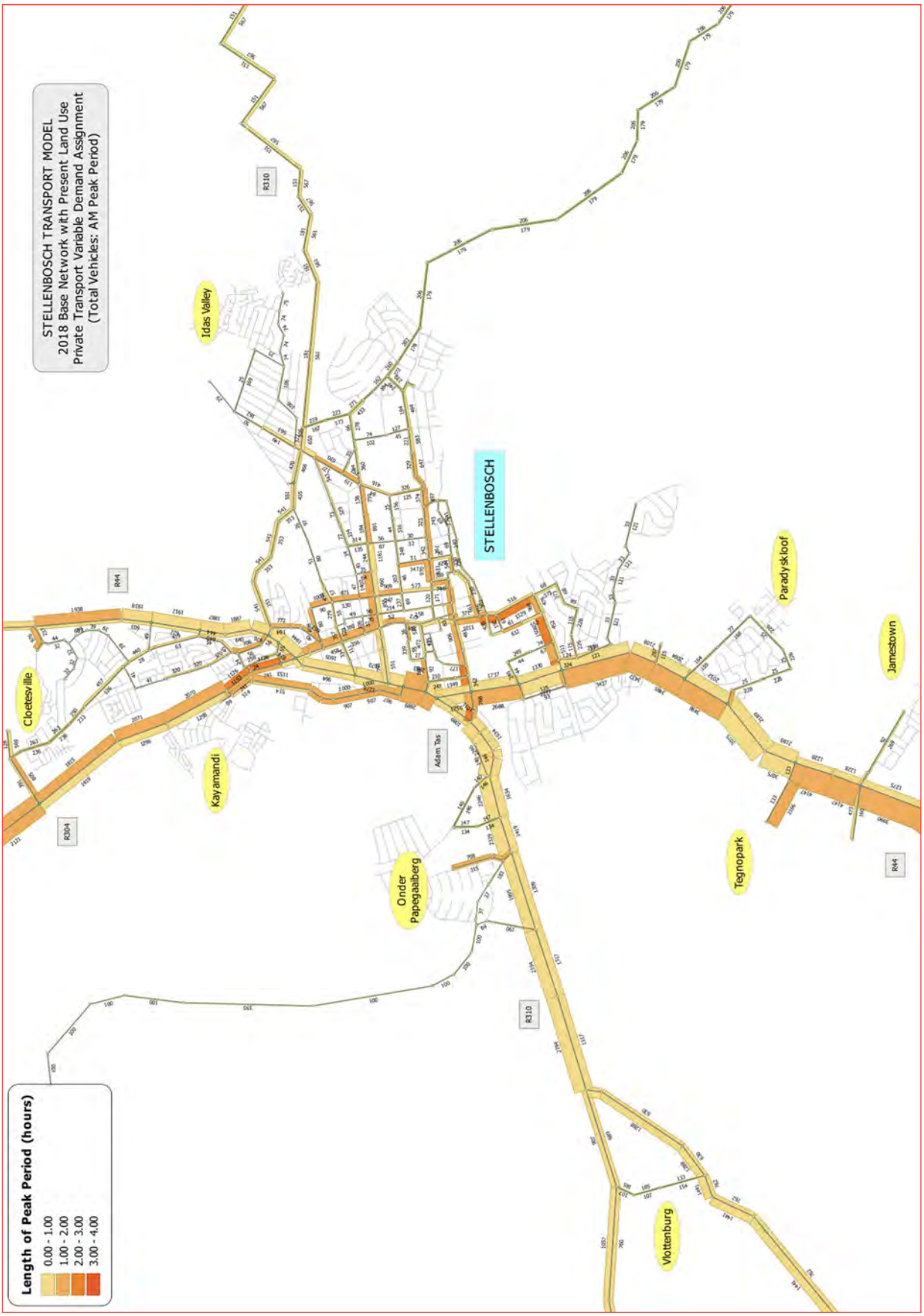


Figure 4-6: 2018 Weekday AM *peak period* traffic volumes - modelled

Figure 4-7: 2018 Weekday AM *peak hour* volume/capacity analysis - modelled

5 PRESENT AND FUTURE LAND-USE PLANNING

5.1 SPATIAL DEVELOPMENT FRAMEWORK

As the population within the SMA increases so does the need to:

- Supply land for additional homes, and
- Create opportunities for employment to all inhabitants.

The task of identifying suitable developable land for this is becoming more difficult.

The Stellenbosch SDF attempts to address this by identifying suitable developable land and to identify already developed land that could better utilised (densification, land-use changes, etc.). The 2017 SDF proposed future land uses for all urban settlements within the SMA. The SDF does not give any indication of the likely trip generation of these future developable areas, which is necessary to prepare the RMP. SM has begun to address this issue and the Planning Department has begun to populate the future land uses with densities, type of land use, area and likely timescales of implementation. The 2035 scenario therefore includes all feasible developments extracted from Stellenbosch Municipality's Asset Management System. This scenario was based on a desktop potential and should be verified in the SDF update, currently underway.

The identified developable areas are not guaranteed, since the development of land is subject to numerous factors such as environmental sensitivity, the financial environment, market demand and bulk engineering services capacity (e.g. water reticulation and sewer capacity). Nevertheless, the information obtained is the potential developable areas and is as accurate as currently available.

This will be subject to future review and updates of the 2019 SDF, which is currently ongoing.

Refer to the following outputs:

- Figure 5-1: Residential growth (Number of dwelling units). This represents the bulk of the future growth areas. The figure shows the relevant areas where the number of households is likely to rise.
- Figure 5-2: Employment growth opportunities. This figure shows the areas where the number of employment opportunities is likely to increase.

The increased household and employment growth in the various nodes will naturally lead to increased transport demand and pressure on the road network and public transport services.

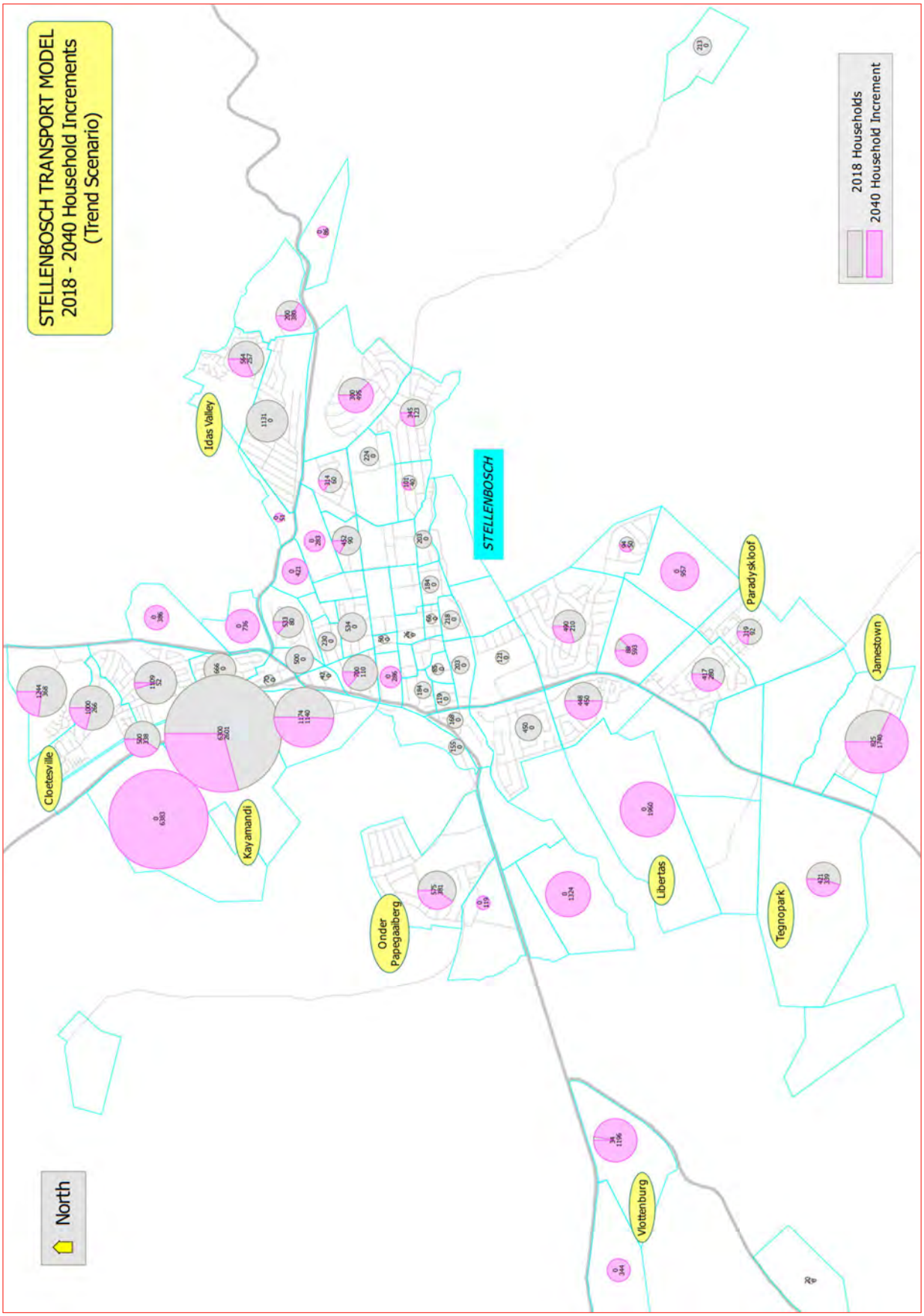


Figure 5-1: Potential residential growth areas (Trend Scenario)

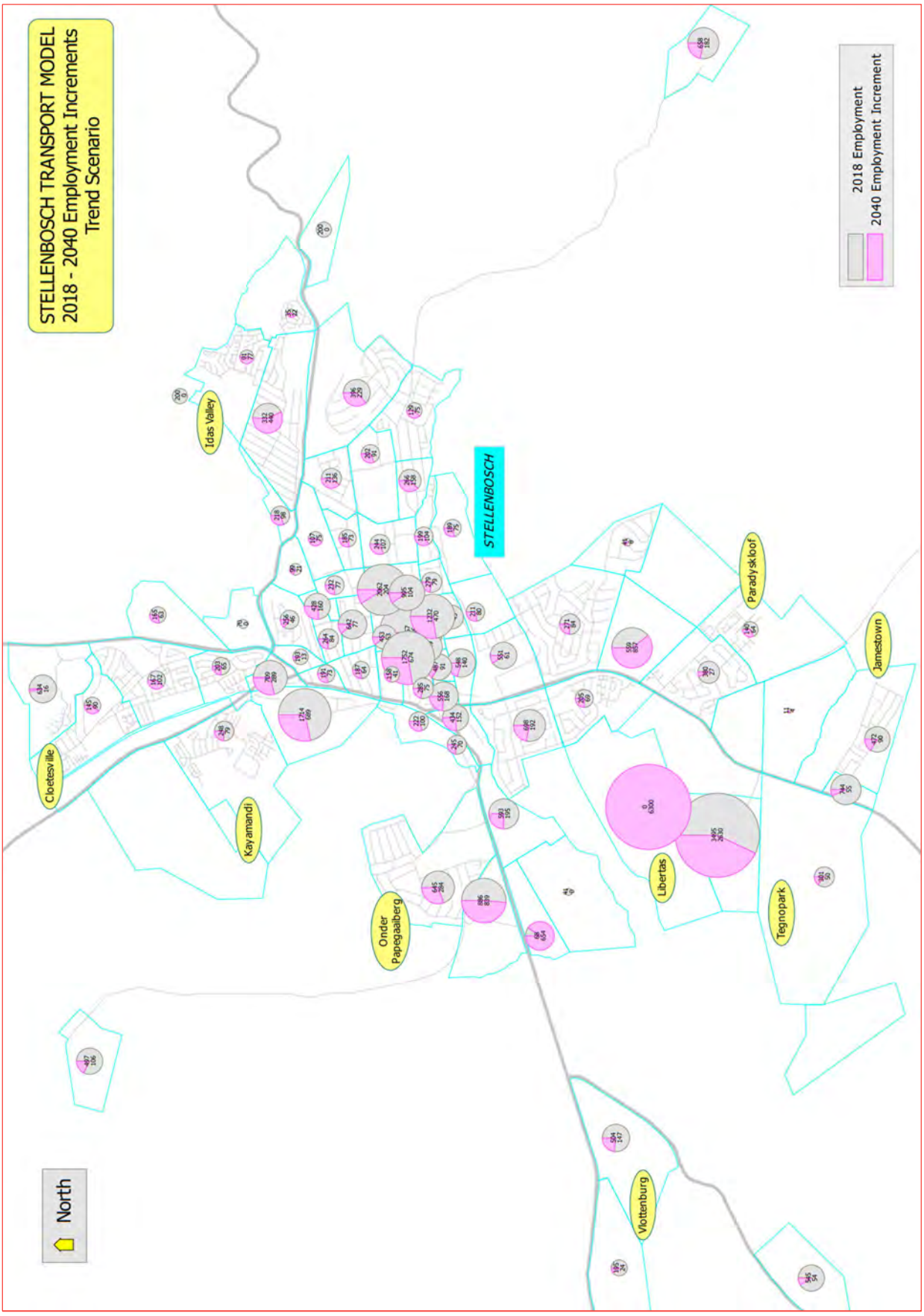


Figure 5-2: Potential employment opportunities growth areas

5.2 2018 ZONING SCHEME

The latest 2018 SM Zoning Scheme By-Law is expected to be approved soon, and will replace the current 2015 Zoning Scheme By-Law. An important change from the previous Zoning scheme is that the Municipality will allow densification off all single residential erven by allowing a second dwelling on SR1/SR2 zoned erven.

The potential impact of this densification on the road network could be substantial. The road network that could be impacted the most is expected to be within Stellenbosch town. This is due to the large number of suburban areas located here with single residential erven. These could be densified, and coupled with the existing constrained road network in town, the impact may be greatest. Residential densification in areas such as Franschhoek, Raithby and Pniel is not expected to have a major impact on the road network.

The future uptake of this new zoning allowance and resultant residential densification in Stellenbosch town is difficult to predict. The following scenario was proposed and modelled:

- 2040 design horizon (22 years): 20% additional uptake

The percentage uptake for the 2040 planning horizon is in addition to normal growth in the number of residential units. These occur through the development of vacant erven and the redevelopment of new residential properties through consolidation and/or rezoning of erven. The resultant additional number of residential units, per area, are shown in Figure 5-3.

Note that the potential uptake was not informed by any economic or other analysis, and is only indicative to determine the potential impact on the road network. Additional analysis will be required as part of future spatial development and road master planning. The future uptake in this new zoning allowance should be accurately recorded by SM for this purpose.

Refer to Chapter 7.4 for the high-level analysis results.

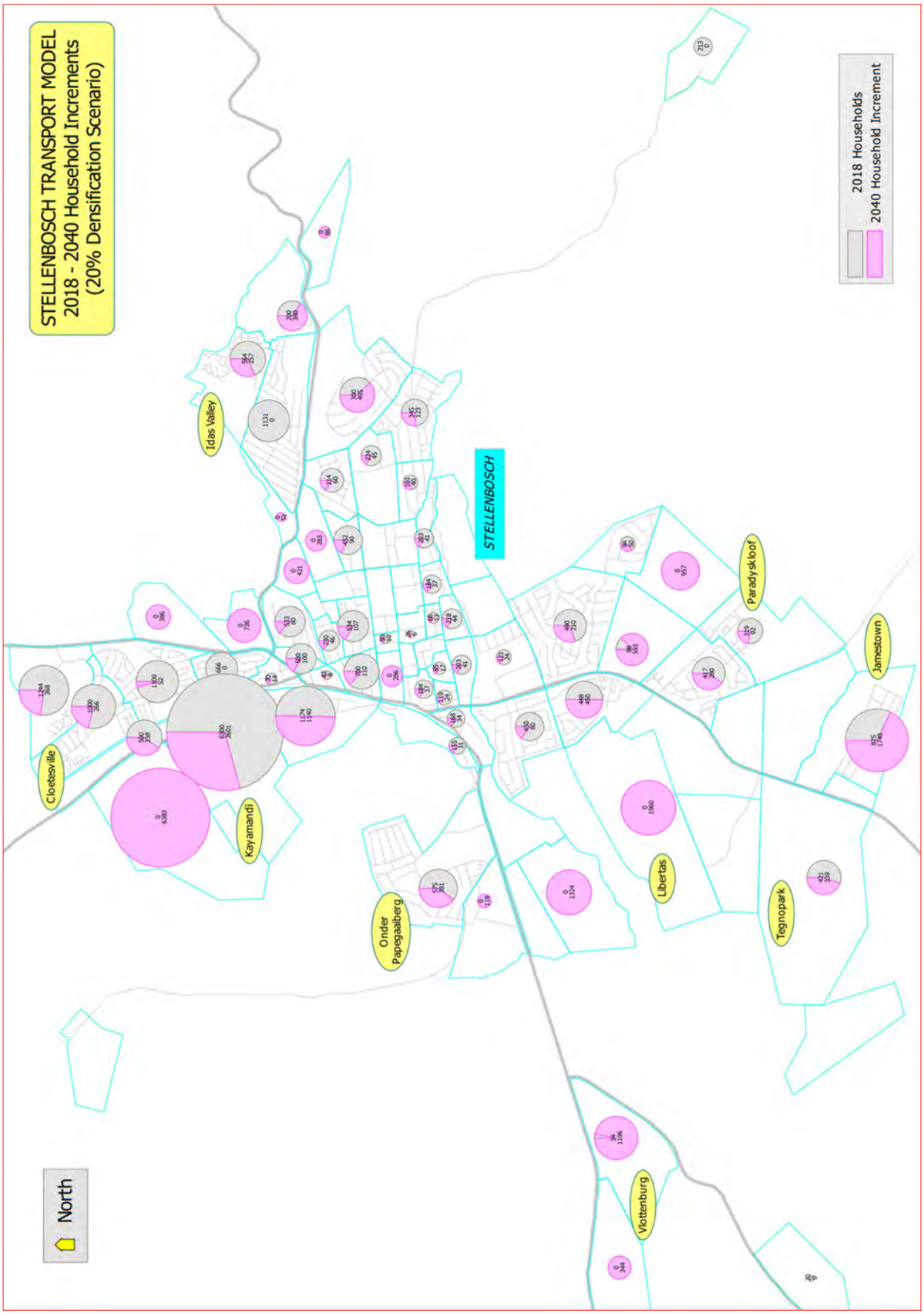


Figure 5-3: Potential residential growth (2040 Densification Scenario)

5.3 LARGE SCALE HOUSING DEVELOPMENTS

The SM has identified various areas for future residential development. The development types are broadly noted below:

- Mega projects (Mix-used developments)
- Upgrade of Informal Settlements (UISP)
- GAP market / FLISP subsidies
- BNG Housing / subsidised housing (including backyarders)
- CRU/Social Housing
- Servicing of sites

The identified areas are the following:

- Kayamandi northern extension
  - Approximately 86ha of developable land
  - Potential of +/- 6 000 residential opportunities of various housing typologies
- Jamestown Phase 2 & Phase 3
  - Potential of +/- 400 housing opportunities
  - BNG, lower GAP-housing, high density units and serviced sites
  - Phase 4: No development rights for this portion has been applied for. Possible opportunities will be a combination of lower GAP-housing, bonded houses (higher GAP-housing) and upmarket developments
- Botmaskop
  - Approximately 98ha (portion of Erf 3363 and a portion of Erf 3393) and combined sites of ±35-40ha
  - Opportunity for social and middle income housing
  - Potential for +/- 600 Social housing opportunities
  - Lower GAP-housing, high density units, bonded houses (higher GAP-housing) and upmarket developments
- Droëdyke
  - The site comprises 64ha privately owned land, 25,3ha municipal land and 102,9ha state land
  - Potential for +/- 3550 mixed-use housing opportunities
- Cloetesville
  - The site comprises 17.6ha Portion of Erf 7001, Erf 8915 and Smartie Town (Municipal owned land)
  - Undetermined potential residential housing opportunities
- De Nova
  - The site comprises a 193ha portion on Portion 10 of Farm 727 (Agricultural/institutional land outside the urban edge)
  - Potential +/- 184 mixed-used opportunities
- Idas Valley
  - Approximately 9.5ha (portion of Erf 9445 and Erf 11330, Municipal owned land)
  - Potential +/- 350 residential housing properties and +/- 89 mixed used opportunities
- Jonkershoek (Bosdorp)
  - Approximately 2ha Municipal and Government owned land
- Klapmuts
  - Approximately 39.2ha (portion of Erf 342, Erf 2181, Erf 2183 and portion 2 of Farm 744, Municipal owned land)
  - Potential +/- 1319 subsidized housing opportunities and +/- 295 other opportunities
- Kylemore

  - Approximately 5.9ha (Portion of Erf 64, Government owned land)
  - Potential +/- 171 other opportunities
- La Motte
  - Approximately 76.1ha (portion of Erf 1158, Erf 1339, Government owned land)
  - Potential +/- 592 other opportunities
- Langrug
  - Approximately 12.7ha on various erven, Municipal owned land
  - Potential +/- 1200 other opportunities
- Vlottengburg
  - Approximately 4.4ha on various farms 393, Municipal owned land
  - Potential +/- 144 other opportunities

These housing projects could be rolled out over the next 3 financial years, however the implementation will be dependent on the Division of Revenue Act's (DORA) allocations provided to the municipality and many other factors such as the land-use application process, Environmental Impact Assessments, etc. The development areas will require internal local road networks with connectivity to the higher order local roads, NMT and public transport accessibility. The road network requirements will have to be determined, and potentially modelled, as part of the planning process of these projects. These planned housing developments has not been included in the EMME modeling of this RMP update.

6 SUMMARY OF PREVIOUS & CURRENT FOCUS AREAS

6.1 INTRODUCTION

This section focus on a combination of known projects and issues, as well as those highlighted in previous technical reports or legal planning documents. Not all the studies have status of approval, but are included as information for completeness and relevance in this RMP update. Note: some sections below has been included verbatim from the 2012 RMP.

6.2 STELLENBOSCH CBD

It is widely perceived by road users that traffic conditions within the CBD are at capacity during the peak periods. The transport model does not support this, except for on arterials and some links. It is common that road improvement schemes face opposition from the public due to various reasons. Critical issues to consider include the protection of the heritage and unique historic, cultural, tourism and student nature and character of the town. With these limitations, future growth in vehicle access to the CBD will be limited and emphasis on alternative transport modes is supported. This would include linking different modes of transport into a combined transport system including NMT facilities, roads, public transport and rail infrastructure. More off-street parking will provide the opportunity for road space to become available for alternative public use.

The RMP recognises that the CBD will have road rehabilitation improvements as well as other local improvements, and that new improvements may be developed in future.

6.2.1 *CHURCH AND ANDRINGA STREETS*

SM commissioned plans for the upgrading of Church and sections of Andringa Streets to enhance the public space and provide improved pedestrian facilities for this very touristic area. These plans formed the basis for renewing the CBD into a more user and friendly area, and was implemented during 2013 and 2014.

6.2.2 *INTERSECTION UPGRADES*

The SM recently implemented intersection upgrades at the following intersections, listed below.

- R44 and Bird — Signals and intersection upgrade
- R44 and Van Reede — Signals and intersection upgrade
- R310 and Lelie — Signals and intersection upgrade
- R310 and Cluver — Signals and intersection upgrade
- Hammanshand and Ryneveld — Signals and intersection upgrade

Several other main road intersections within the Stellenbosch CDB and along the R45 (Franschhoek) are being considered for upgrading. The SM intends to carry out studies and compile designs for these upgrades, and will schedule the implementation once approval is obtained by the Western Cape Government's Department of Transport and Public Works.

6.2.3 TRAFFIC SIGNAL TIMING OPTIMISATION

The SCOOT system has been removed from all signalised intersections within Stellenbosch. The Municipality has embarked on a Traffic Signal Timing Optimisation programme, and has commenced with studies to introduce a pilot project that will allow for the optimizing of traffic timing signals at main road intersections within the CBD. By optimizing signal timing, timing will match demand, allowing for green waves along routes, ultimately reducing congestion and delays at intersections.

6.3 R44 - SOUTH OF THE STELLENBOSCH CBD

The R44 (MR27) is the only arterial between Stellenbosch and Somerset-West. Several historic studies and reports have been prepared to address access management along the link in an attempt to maintain mobility and to increase capacity, both north and south of Stellenbosch. These reports confirm that the R44 south of Stellenbosch carry the highest vehicular volumes within the municipal area, and is severely congested during weekday peak periods.

The Western Cape Government Department of Transport and Public Works commissioned the planning, design and implementation of level of service and safety improvements to the R44 between Somerset West and Stellenbosch. The improvements are planned from the Steynsrust Road interchange in Somerset West to the Van Reede Street intersection in the Stellenbosch.

The status of the project, confirmed in April 2018, is:

- Environmental Authorisation was received on 29 March 2018.
- In terms of the EIA process the statutory period for the receipt of any Notifications of Intent to appeal is underway.
- The PGWC has not confirmed an implementation timeframe due to the ongoing EIA process.
- A formal Conceptual Planning Report was not prepared, as the solution has been developed as a Work-In-Progress with the project team and the EIA process.

PROPOSED IMPROVEMENTS

In order to improve safety and the capacity of the R44, a number of improvements are recommended. These include *inter-alia:*

- Introduction of grade separated roundabouts:
  - Intersection of MR27 (R44) and Winery Road (MR166) (km 23,40)
  - Intersection of MR27 (R44) and Annandale Road (DR1050) (km 26,60)
- Closure of all the median openings and modification of some intersections between Somerset West and the Webersvallei Road signalised intersection as facilitated by the introduction of U-turn opportunities at the grade separated roundabouts.
- Closure of the median opening opposite Bredell Road and the left-in to Bredell Road.
- Relocation of the intersection of Stellenrust Road and MR27 (R44), in conjunction with a realignment of Stellenrust Road. A realignment to link in to the proposed Annandale Road roundabout should be investigated as a possible alternative to the currently proposed option of linking up to the Mountain Breeze Farmstall.
- Possible upgrading of the Steynsrust interchange to include north facing ramps for ease of providing grade separated U-turns for traffic to the south of Winery Road.
- Consolidation of driveways with the implementation of frontage and back roads to improve mobility on the route.
- Co-ordination of uniformly spaced signalised intersections on the approach to Stellenbosch by means of an automated traffic control (ATC) system operating in conjunction with the other signals along the route.

- Introduction of a comprehensive speed over distance camera monitoring system to effect a reduction in travel speed between Somerset West and Stellenbosch.
- Investigation of improved street lighting on the route south of Webersvallei Road in order to improve safety and operating conditions for all modes of travel.
- A re-evaluation and rationalisation of the plethora of particularly tourism and facility signage on the route and the renewal thereof.

Refer to Figure 6-1 to Figure 6-12 for the conceptual design drawings contained in the Basic Assessment undertaken by SLR Consulting.

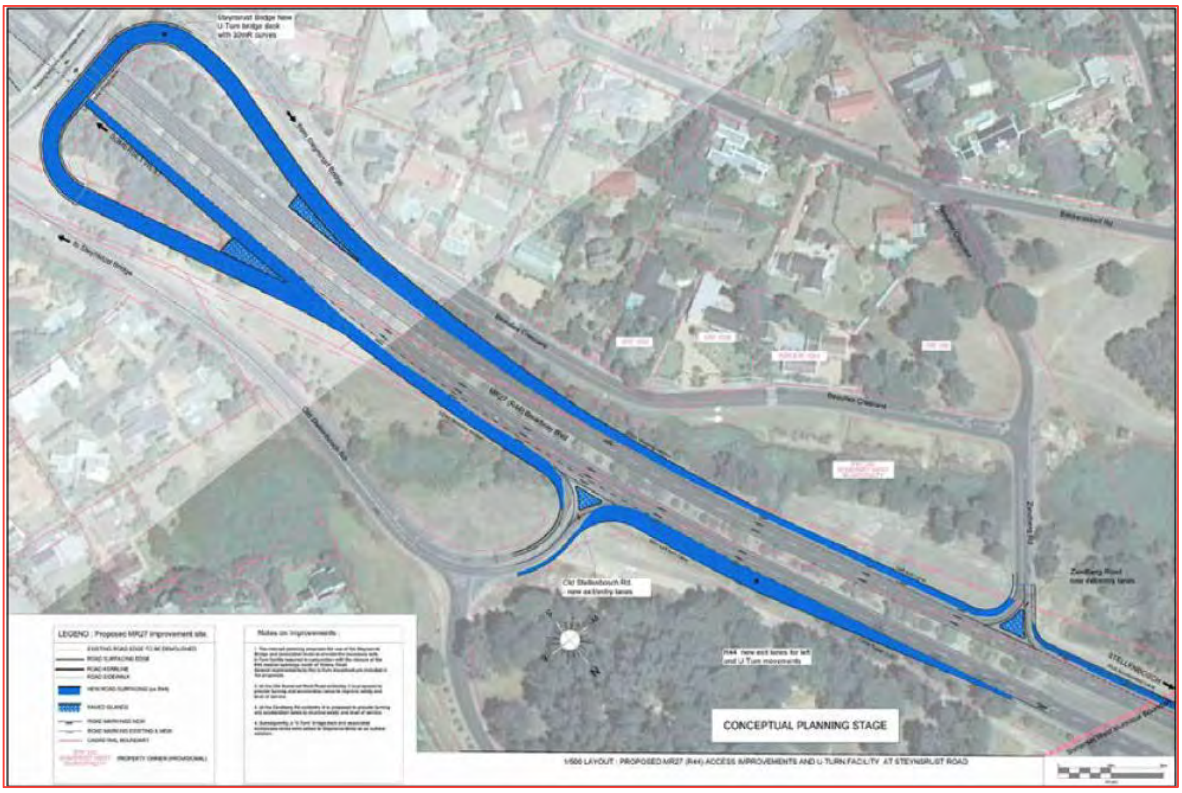


Figure 6-1: R44/Steynsrust interchange upgrade (Somerset West)

Source: Kantey & Templer

Figure 6-2: Bredell Road/Klein Helderberg Road adjustments

Source: Kantey & Templer

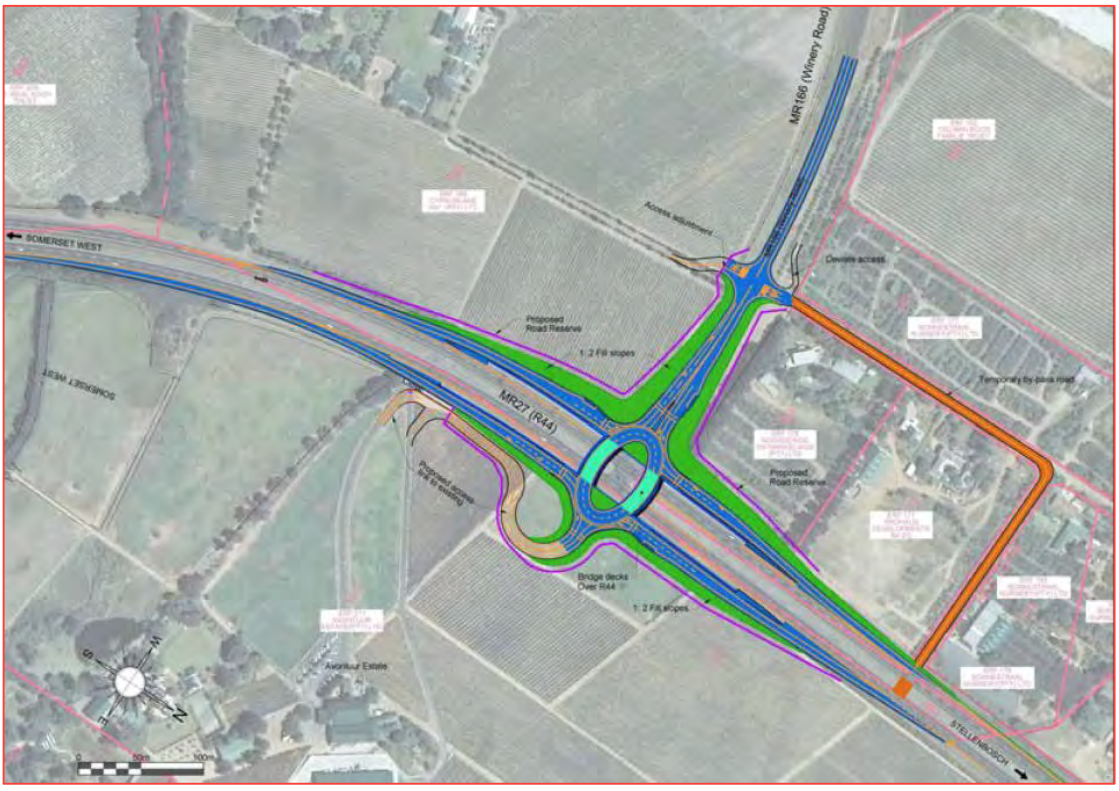


Figure 6-3: R44/Winery Road grade-separated roundabout with fill slopes

Source: Kantey & Templer

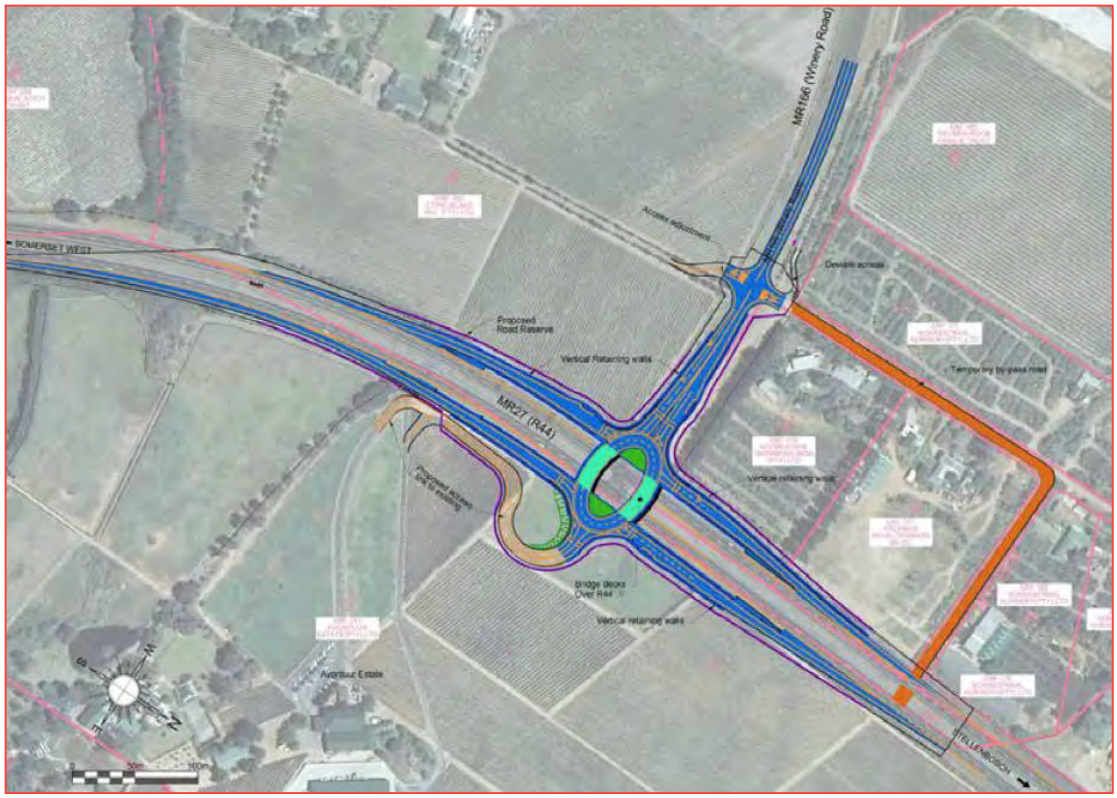


Figure 6-4: R44/Winery Road grade-separated roundabout with vertical retaining walls

Source: Kantey & Templer

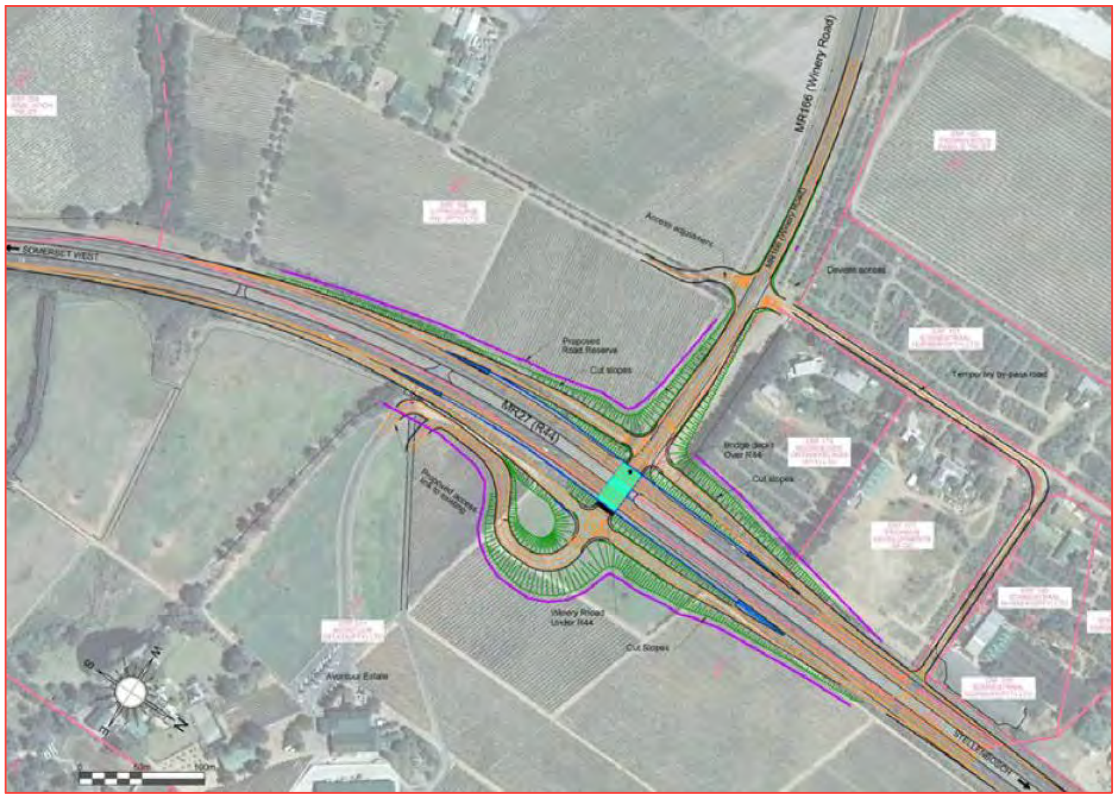


Figure 6-5: R44/Winery Road below-ground diamond interchange

Source: Kantey & Templer

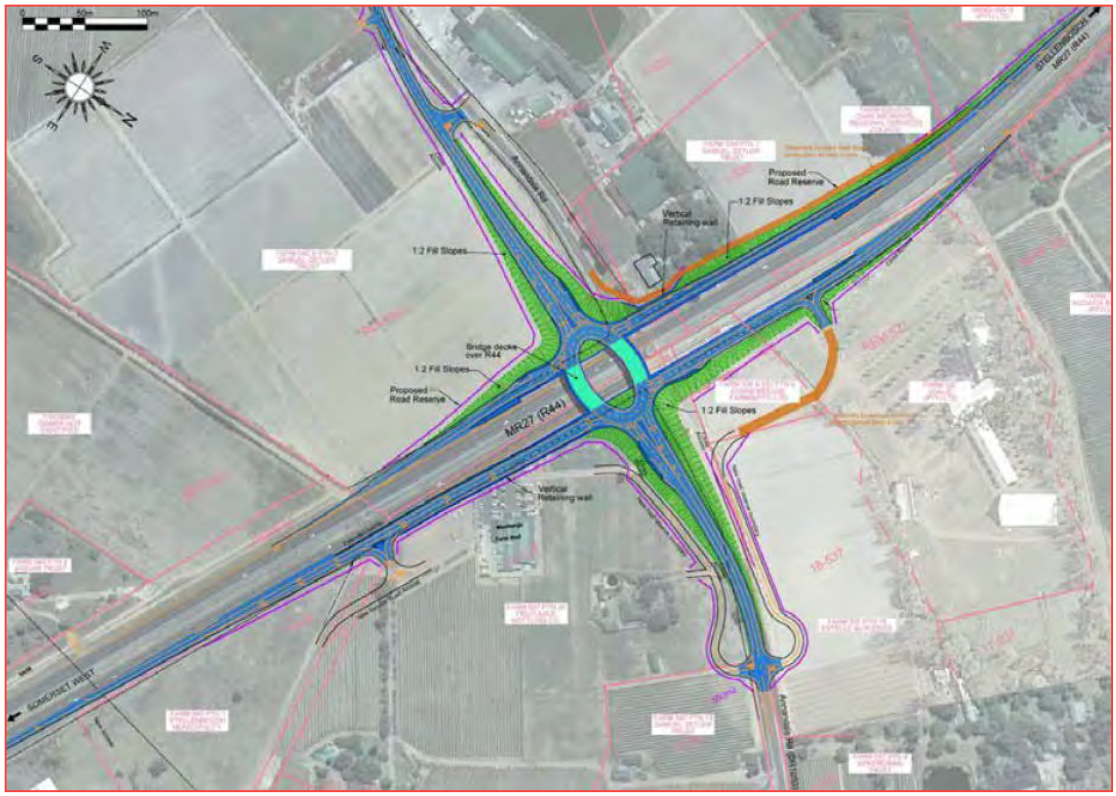


Figure 6-6: R44/Annandale Road grade-separated roundabout with ramp embankments

Source: Kantey & Templer

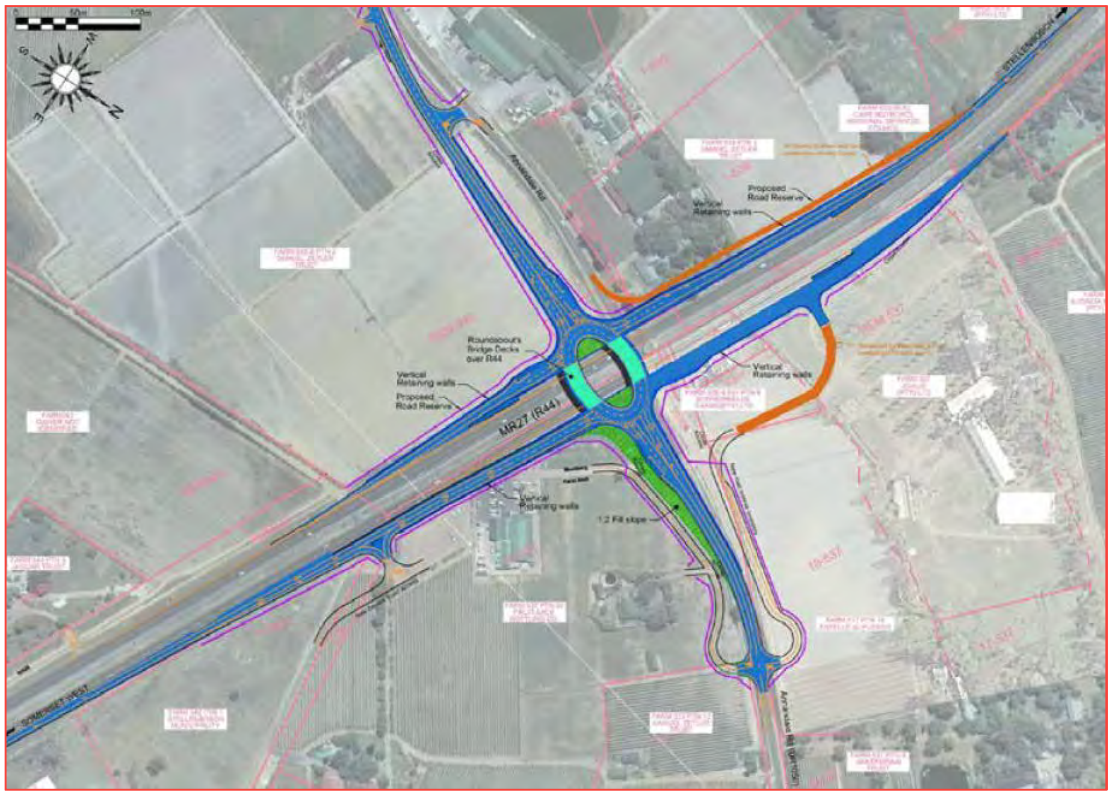


Figure 6-7: R44/Annandale Road grade-separated roundabout with vertical retaining walls

Source: Kantey & Templer

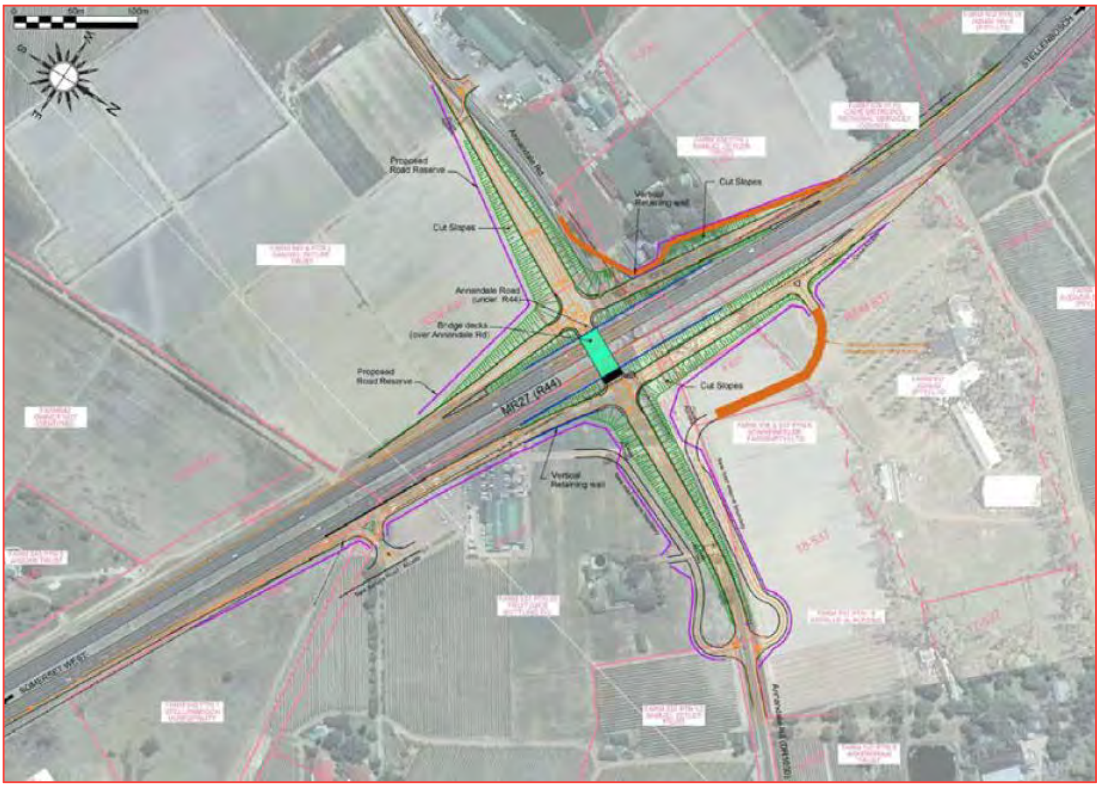


Figure 6-8: R44/Annandale Road below-ground diamond interchange

Source: Kantey & Templer

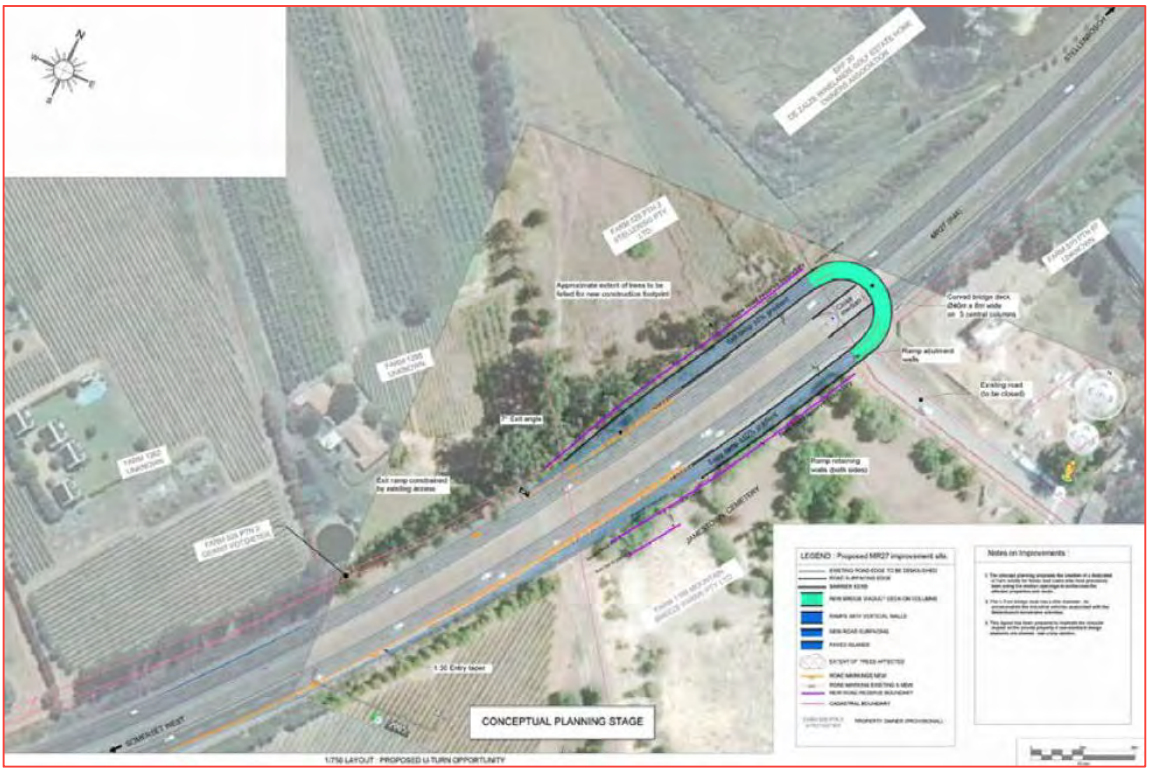


Figure 6-9: R44/Jamestown grade-separated U-turn facility

Source: Kantey & Templer

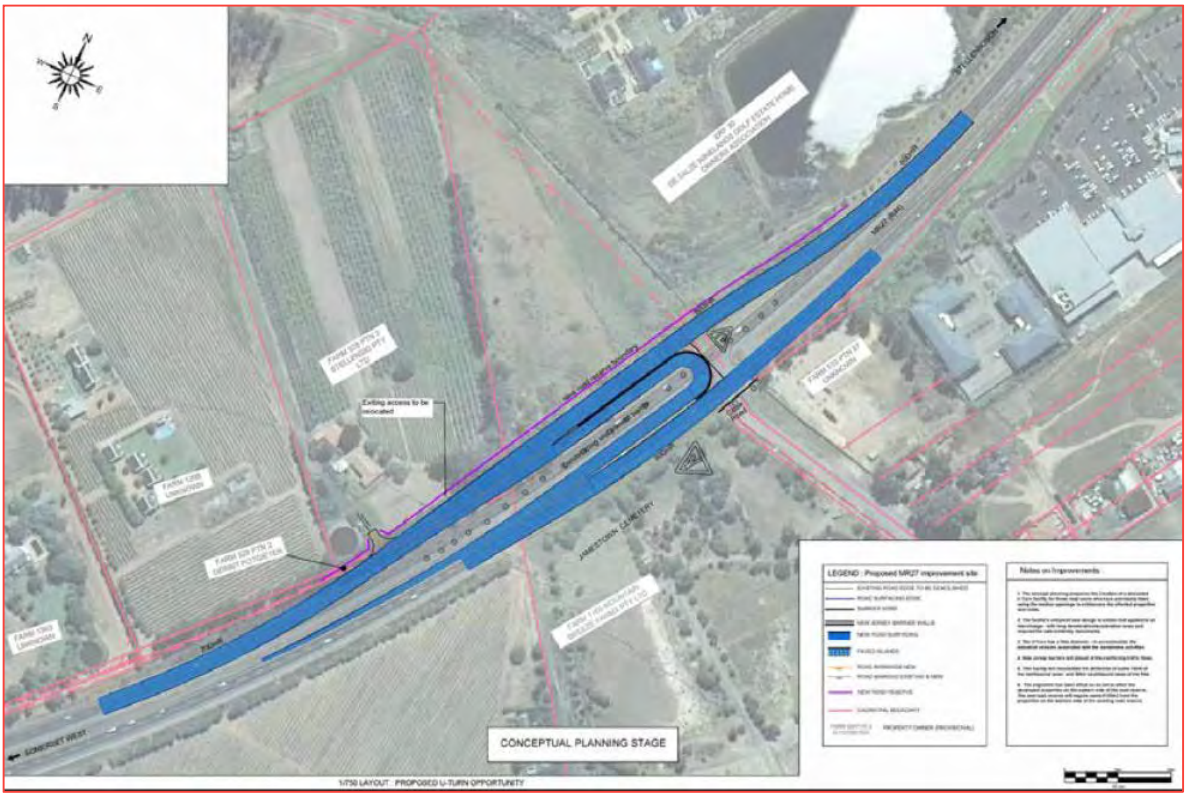


Figure 6-10: R44/Jamestown at-grade U-turn facility

Source: Kantey & Templer

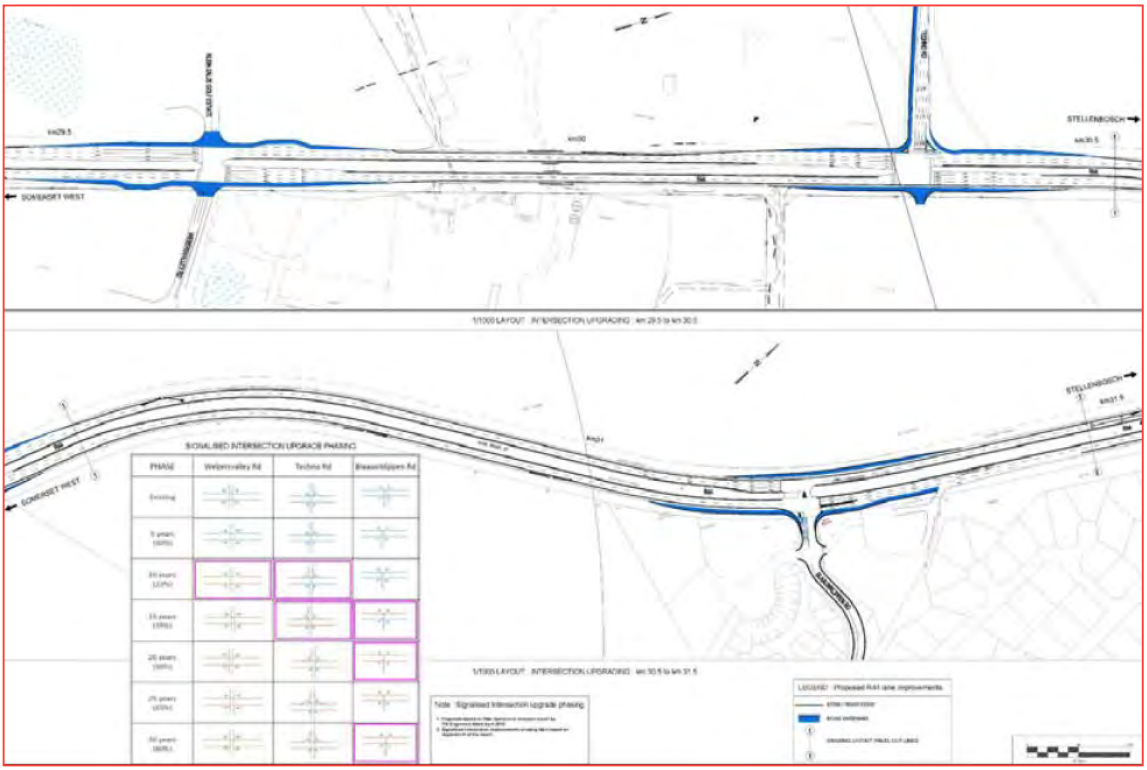


Figure 6-11: R44/Webersvallei Road/Technopark & Blaauwklippen Road improvements

Source: Kantey & Templer

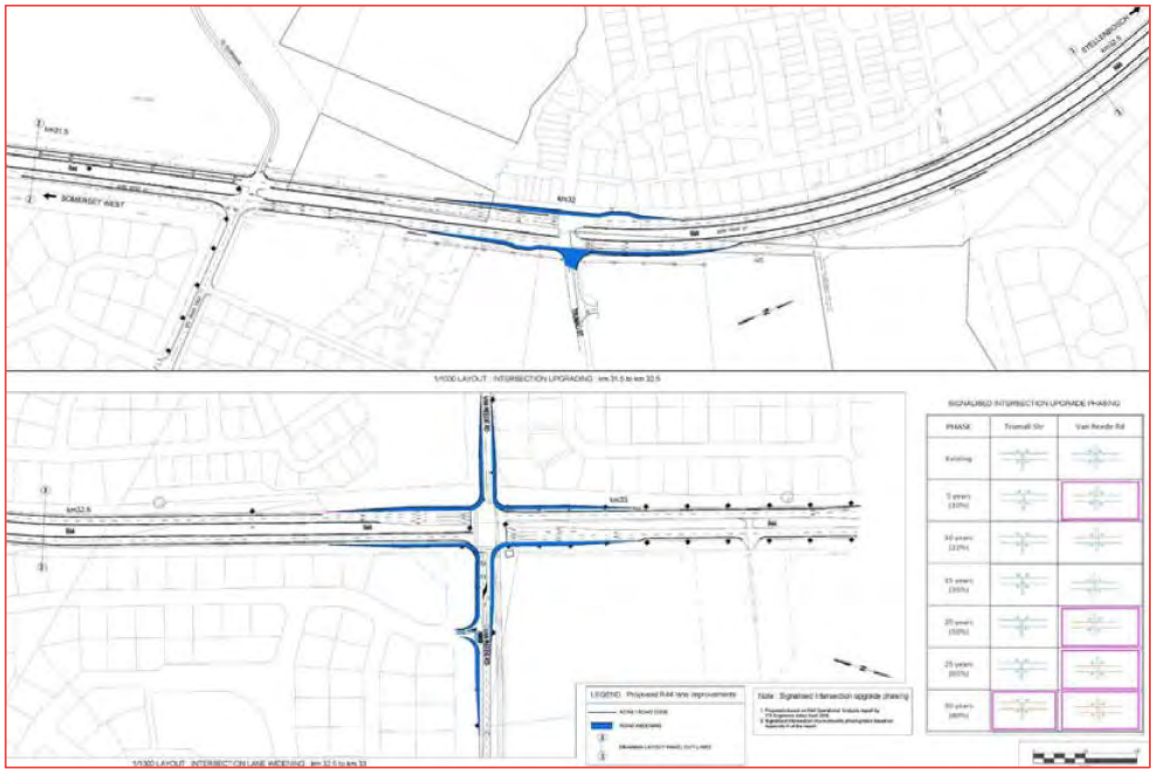


Figure 6-12: R44/Trumali Street & Van Reede Street improvements

Source: Kantey & Templer

6.4 R44 - NORTH OF STELLENBOSCH CBD

The Western Cape Government Department of Transport and Public Works commissioned the drafting of an Access Management Plan (AMP) for the portion of the R44 from the Stellenbosch CBD to just north of the N1. Given the predicted growth for the wider study area and the availability of land, two future road reserves were proposed: a narrower 32 m reserve for the urban section and a wider 50m reserve for the northern rural section.

An Access Management Study is included within the AMP providing details of all accesses that would need to be closed, relocated or amended. The list is extensive and not included within this report.

The status of the expected phased implementation of this project could not be confirmed.

6.5 BRANDWACHT/PARADYSKLOOF (EASTERN LINK ROAD)

The Brandwacht and Paradyskloof suburbs has close proximity to the Stellenbosch CBD, and are expected to have several infill densification developments in future. A review of existing transport documents suggest that the concept of a connector link has been noted for many years given that the only available current connector route is the R44. The suggested Eastern Link Road would essentially be a connection of Paradyskloof to Brandwacht, thereby negating the need for residents to use the R44. This will reduce traffic along the R44.

The Stellenbosch NMT Network Plan of 2009 makes mention of the opportunity to create the Eastern Link road from Paradyskloof running through Brandwacht and linking onto Piet Retief Street within the CBD. This route could increase the usage of NMT and reduce vehicle usage.

Due to an increase in the rate of development presently encountered in Brandwacht and Paradyskloof, two additional link roads have been analysed: namely Schuilplaats and a connecting road between Schuilplaats and the Eastern link road. Refer to Section 7.3.2

6.6 UPGRADING OF INTERSECTIONS

The transport model and volume capacity analysis clearly illustrates the major capacity problems on the major and to a lesser extent on the minor road network in and around Stellenbosch. It also shows that the R44 towards Helderberg and the R304 towards Koelenhof cannot support any further developments without significant infrastructure improvements. The Helshoogte road has some capacity for further residential developments at Kylemore, Pniel and the Boschendal area.

Previous studies indicated that the following intersection upgrades are needed due to saturated peak hour traffic:

- Van Reede and Strand Street
  Upgraded in 2015
- Langstreet South/Helshoogte Road and Adam Tas Street
  Not undertaken to date
- Merriman Avenue and Adam Tas Street
  Not undertaken to date
- Integrate the Alexander Street intersection at Adam Tas Street with the existing Adam Tas and Strand Street intersection
  Not undertaken to date
- Update Dorp Street/Strand Street intersection.
  Minor upgrades in 2016

Also refer to Chapter 6.18 for more information on these local (lower order) improvements.

6.7 TECHNOPARK

Despite some local improvements over the years, the signalised intersection on the R44 experiences major capacity issues. The two conflicting movements are the high volume of right turning traffic into Technopark conflicting with the high volume of left turning traffic into Technopark and the northbound through traffic. The historic proposal for the upgrading of a portion of Techno Road to two lanes per direction to improve traffic flow near to the intersection with the R44 has been approved.

There is approximately 60 000 m² Gross Leasable Area (GLA) of latent development rights within Technopark, including 20,000 m² GLA of the approved new Capitec Bank headquarters.

Recent developments and approvals in Technopark has accelerated the need for improvements to the access road and its intersection with the R44. The following road upgrades are currently being implemented.

- Techno Avenue to be upgraded from the R44 to Proton Street.
- Additional turning lanes on the R44 approaches.

- New roundabout at Techno Avenue/development access & Klein Zalze Wine Estate.
- New roundabout at Techno Avenue/Proton Avenue.

Refer to Figure 6-13 for the layout of these upgrades.

Figure 6-13: R44/Techno Avenue approved upgrades

Source: ICE Group (Pty) Ltd

A second access to Technopark has also been proposed, the feasibility study and conceptual plans have been compiled. This link forms part of the future Western Bypass and links Technopark with Adam Tas Road.

6.8 WESTERN BYPASS

A western bypass route bypassing Stellenbosch CBD was formally identified as a need in the 2011 CITP. In 1975 a report entitled “Stellenbosch Traffic Study” was prepared by Mackintosh, Bergh & Sturgess which modelled the town centre for the then future years 1985 and 1995. The results indicated that a western bypass would be required in the year 1995 and that this route would need to be classified a higher order road (Class 1). The modelling undertaken at that time indicted that traffic travelling through Stellenbosch CBD attributed to a large percentage of the total traffic (generally 15 % and up to 60%).

The 2016-2020 CITP did include a conceptual proposal, which is to divert traffic from the R44 to travel around the town centre and to re-join either the R304 and/or R44 north of the town centre. The 2012 RMP considered three preliminary road alignments and assessed the traffic impact of this bypass proposal, namely:

- A high speed (100 km/h) Class 1 Expressway, leaving the R44 in the vicinity of the Annandale intersection, extending north and north-eastwards to intersect with the R310 and the R304 from where it joins the R44 with a Class 2 arterial connection just north of Welgevonden.
- A similar but shorter bypass proposal which starts at a future grade separated Technopark intersection, sharing a short section of lower order Class 2 arterial with the surrounding land use developments. A speed limit of 80km/h was modelled.
- A much reduced bypass proposal, starting at the Technopark and ending at the R310 (North-South link road).

The 2012 RMP recommended that detailed geometric and transport analysis of the possible different routes, scenarios and types of intersections is required. This will also have to be workshopped with all the relevant role players and it is expected to involve comprehensive public participation and environmental and heritage impact assessments.

The portion of the Western bypass between Technopark and Adam Tas Road is currently receiving priority.

BACKGROUND

The idea of a road to bypass Stellenbosch to the west of Stellenbosch originates 20 to 30 years ago. There was also the idea of an eastern bypass from Jamestown through Paradyskloof, Brandwacht/Dalsig area to intersect Van Riebeeck Street opposite Marais Street. This road would have provided an “eastern bypass” to link to the Helshoogte Road. The implementation of this route is difficult, due to buildings of the Boland College that are located on the planned route. It was recently discovered that a route from the R44 from opposite the Techno Avenue-intersection, through Blaauwklippen farm along Wildebosch Road (through Paradyskloof and Brandwacht) and to the east of Dalsig, across Welgevallen and Coetzenburg to tie in opposite Marais Street is a proclaimed Provincial main road. It thus appears that this proclaimed main road was supposed to be the “eastern bypass” mentioned above.

The implementation of a western bypass to Stellenbosch is not seen as the ultimate solution to the traffic congestion in Stellenbosch. Other road infrastructure requirements are the upgrading of intersections along the R44 as well as Helshoogte Road in order to provide more stop-line capacity, the adjustment of the setting of traffic signals throughout Stellenbosch and the provision of the Eastern Link Road with another link across the Eerste River.

ROUTE ASSESSMENT

In order to determine the start- and end-point of the possible bypass road, several route options were considered. Factors that needed to be considered in determining the routes were environmental issues, technical issues such as spacing of intersections and horizontal and vertical alignments standards, traffic desire lines, heritage issues, property issues, future developments, etc. Some of the routes were eliminated based on technical issues, preliminary environmental issues, future developments as well as input from affected property owners, already consulted.

The road will be planned as a dual carriageway. It will tie in with the R44 in the vicinity of the Annandale Road in the south and with the R304 in the vicinity of the Welgevonden Road-intersection in the north, a distance of ±14 km. The intention is that there will be no direct property access to the road and that all intersections will be grade separated (interchanges).

TRAFFIC MODELLING

Traffic modelling of the bypass road taking into consideration various scenarios of development is currently in an advanced stage. Currently three (3) scenarios of development will be modelled, i.e.

- Scenario 1: The current traffic flows (2018) with and without the bypass road;
- Scenario 2: The estimated traffic flows (2025) including the future developments as per the SDF Amendments of May 2017.
- Scenario 3: The estimated traffic flows (2050) including all possible future developments.

Information with regard to existing and future developments is obtained from the IMQS-system and the Stellenbosch IDP. Possible phasing of the bypass road would also be tested.

PUBLIC PARTICIPATION

Up to now most of the affected property owners (with the exception of a property that is in the process of being transferred to a new owner) have been consulted at least once in one-on-one meetings where the consultant team and the affected owner were present. In some cases more than one such meeting was held. For each meeting "Meeting Notes" were compiled and an attendance register signed. The intention is to meet with all the affected owners again when the official designs commences and more detailed studies are undertaken.

IMPLEMENTATION

It is currently anticipated that the EIA-process would take between 18- and 24 months where after the Conceptual Design would be finalised based on the conditions contained in the Environmental Authorization. During this stage a more accurate cost estimate of the full project should be conducted as well as an economic evaluation in order to determine the feasibility of the project. Refer to Section 7.3.3 for the additional modelling work undertaken as part of this project.

6.9 R304

The WCPG commissioned the preparation of road layouts for the dualling of the R304 from the Adam Tas (R44) intersection in the CBD to Klipheuwel north of the N1. Details of the future upgrades are shown in Figure 6-14, which also indicates the number of lanes required between the respective intersections. The project includes the approximate year for implementing these upgrades as indicated by the different colours.

Subsequent to this, conceptual planning of the future dual carriageway R304 from the Adam Tas intersection to the Welgevonden Boulevard intersection was undertaken. The conceptual design confirms the following geometric design aspects:

- The road reserve varies along the section from the Adam Tas Road intersection to the bridge crossing of the Plankenburg River.
- Widening of the Plankenburg River bridge.
- A 40 m road reserve from the Masitandane Road intersection to a local access road to Mount Simon Estate and Portion 4 of Farm No. 81
- A 50 m road reserve from the local access (noted above) to National Road N1 (beyond the limit of planning).
- Cross-section with two 3.4 m lanes per direction, a median island, on-street parking along some sections in town and surfaced sidewalks
- Intersection upgrades with various turning lane configurations
- Limited/consolidated Left-in Left-out accesses only.

The status of this implementation could not be confirmed.

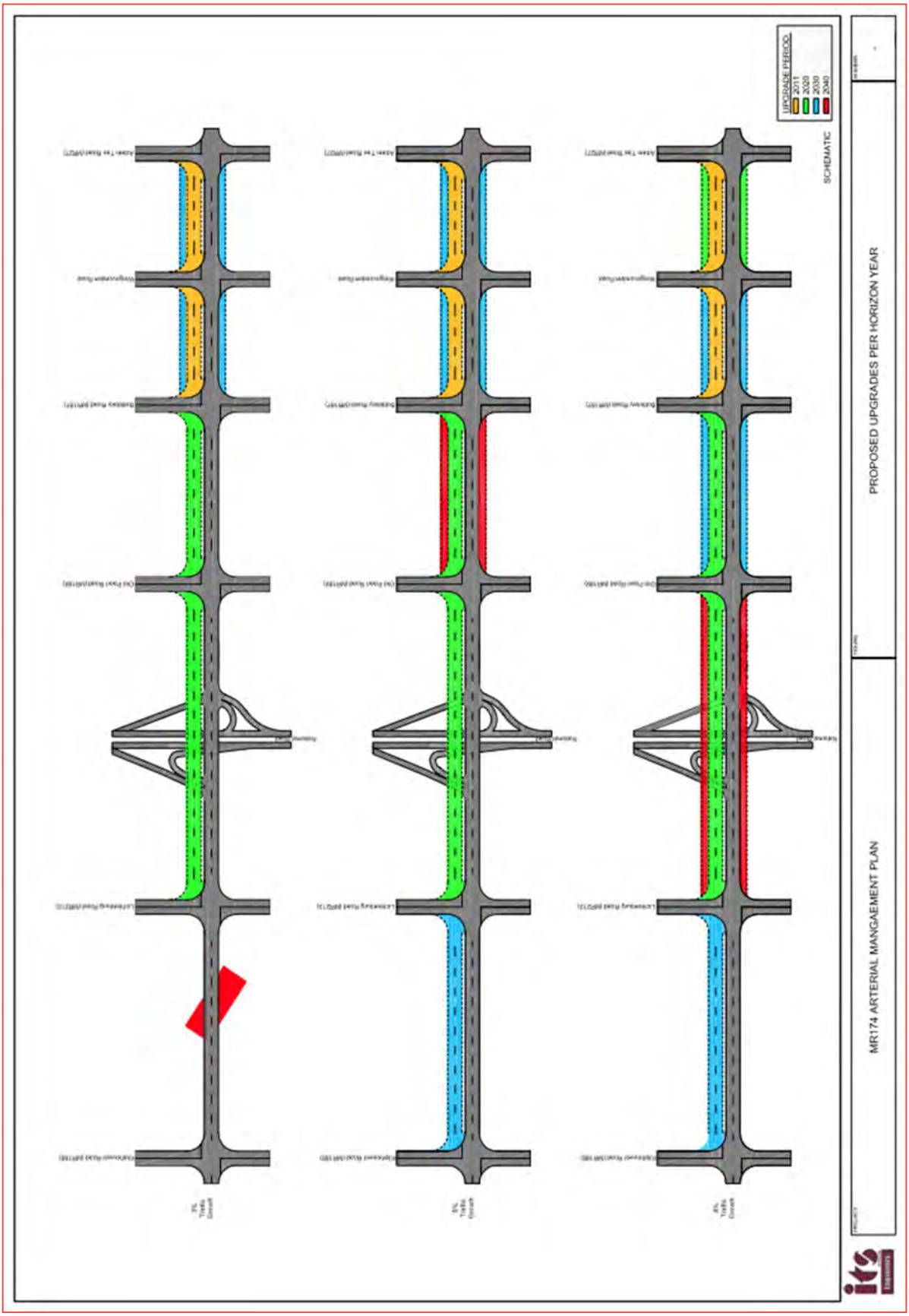


Figure 6-14: R44 future dualling

Source: ITS Engineers

6.10 NON-MOTORISED TRANSPORT PLANS

6.10.1 CAPE WINELANDS DISTRICT MUNICIPALITY - NMT TRANSPORT MASTERPLAN FRAMEWORK

CWDM appointed Nisa Mammon & Associates and SSI to prepare a NMT Transport Masterplan for the entire district, including the Stellenbosch Municipal Area, but excluding the Stellenbosch CBD. The Master Plan produced a vision, a set of objectives, undertook consultations and ultimately proposed an Implementation Plan showing prioritised projects for immediate attention. Specific mention is given to the need to provide public transport facilities at the R45/R310 intersection.

The need to enhance NMT facilities along the R310 serving Kylemore and Pniel and to enable a better connection to Stellenbosch was addressed. Plans highlighted the need to improve facilities along the R310 from Welmoed, Lynedoch and Vlottenburg into Stellenbosch. The master plan included recommendations to provide a Class 1 NMT facility from Jamestown to Paradyskloof along the R44 as well as to enhance the existing NMT facilities into Stellenbosch. It also proposed Class 1 facilities to the north of Stellenbosch along the R304 and R44.

The status and progress of the implementation of the recommendations could not be confirmed. Note that the proposed NMT facilities along the R310, R44 and R304 has not been implemented.

6.10.2 STELLENBOSCH NMT NETWORK PLAN

In 2009, SSI prepared the Stellenbosch NMT Plan, which included a number of projects to be implemented. These projects were included in the CITP.

Sturgeon Consulting undertook the expansion of the NMT network planning on behalf of SM, during 2014 & 2015. The report concluded the following:

- The NMT facilities in Stellenbosch and the municipal areas was reviewed and inventoried. At the same time possible improvements of NMT facilities were evaluated for both Stellenbosch and the municipal nodes.
- Priority NMT projects were identified from the field observations and discussions with various stakeholders. High level cost estimates were determined for the work required for each of the NMT projects.
- The projects were evaluated on various criteria determined in collaboration with SM
- A number of challenges/opportunities were highlighted which needs to be investigated further.
- The projects have been prioritised on a sound basis for future implementation.

The report recommended:

- That the priority projects identified and the determined priority ratings be reviewed by the Stellenbosch Municipality for appropriateness in terms of the municipality's strategy for NMT infrastructure improvements. This should be followed by the appropriate public processes leading to the approval of these projects which will proceed to design and construction based on available funding.
- Where funding is a problem Stellenbosch Municipality should implement the various projects identified in a phased approach per financial year to ensure that the project will be completed.
- The 2015 NMT Network Plan be approved/supported at the highest level possible to ensure future promotion, expansion, completion and integration of NMT in Stellenbosch and the municipal area with an annual budget being allocated for this priority transport mode.

The NMT projects were included in the 2016-2020 CITP, and were not assessed further in this report.

6.10.3 KAYAMANDI LINK TO THE CBD VIA BIRD STREET

SMEC (Vela VKE) prepared plans for the upgrading of Bird and George Blake Streets to improve the pedestrian facilities to the CBD. These links are highly trafficked and the route provides mobility to many pedestrians from Kayamandi and Cloetesville to Du Toit Station, Bergzicht Taxi rank and the Stellenbosch CBD. A portion of the pedestrian facilities along Bird Street was subsequently upgraded and this should proceed to complete the whole route.

The pedestrian level crossing between George Blake and Bird Street west of the taxi rank is unsafe, this was highlighted in the CITP to be resolved. The pedestrian movement at the R44 and Bird Street intersection is already at an unacceptable level of service for vehicle movements without dedicated pedestrian movement phasing. The pedestrians crossing this intersection should be considered in any future improvements to accommodate them and improve safety.

6.10.4 PROVINCIAL SUSTAINABLE TRANSPORT PROGRAMME

The Provincial Sustainable Transport Programme (PSTP) has been established to support the development and implementation of sustainable transport systems in the Greater Western Cape. SM was selected as the first municipality for the implementation of this programme. Through the program, numerous status quo and planning assessments were undertaken and priority NMT infrastructure projects implemented. During the 2016/2017 financial year, NMT Infrastructure to the value of approximate R6M was implemented. The PSTP programme still actively provides support to the municipality by promoting NMT and public transport development.

Figure 6-15: Example of NMT infrastructure

Source: SM

6.11 UPGRADE GRAVEL ROADS UPGRADING PROGRAM

The SM had, commencing in 2007, with a gravel road upgrading program, the programme aims to eradicate all gravel roads within residential settlements. The gravel roads, situated in previously disadvantaged and in low income areas, are upgraded to asphalt surface standards. Each year between 2-4 km of gravel roads are upgraded

and it is expected that all identified gravel roads will be upgraded within the next 3 years. The SM is currently upgrading gravel roads in the residential settlements of LaMotte and Wemmershoek, located in the Franschhoek region. Refer to the figures below for examples of the upgrades.

Figure 6-16: Gravel roads in residential areas

Source: SM

Figure 6-17: Example of completed road in residential areas

Source: SM

6.12 LANQUEDOC ACCESS ROAD AND BRIDGE

Lanquedoc is a previously disadvantaged community situated in the Dwars River Region, near Pniel. The access road to Lanquedoc crosses the Dwars River, and has only a single lane bridge. The access road as well as the single lane bridge does not meet the requirements of a developing residential settlement. The SM has commenced with the planning and design for an upgraded access road and additional bridge. The existing

bridge would be retained for Non-motorised Transport (NMT), and the additional bridge will accommodate 2 lanes of vehicular traffic. It is anticipated that construction would commence in 2020.

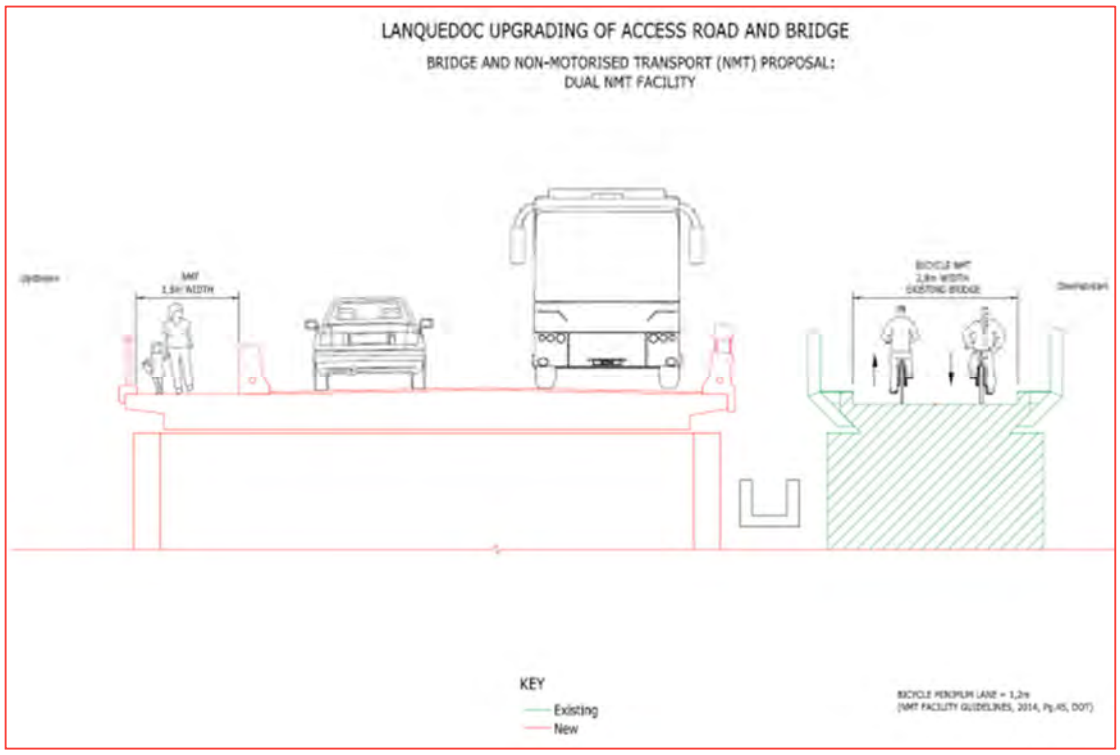


Figure 6-18: Lanquedoc access road bridge

Source: SM

6.13 PUBLIC TRANSPORT

6.13.1 BACKGROUND

In September 2008, Jeffares & Green (Pty) Ltd was appointed by the Stellenbosch Municipality for the Development of a Transport Model and Public Transport Operations Plan for Stellenbosch.

Origin-destination household questionnaire surveys were conducted within all the predetermined zones that constitute the Stellenbosch study area. Part of the questionnaire consisted of public transport related questions intended to gauge the nature of existing public transport demand.

The public transport information obtained from the household surveys was coded into the transport model to represent the existing public transport origin-destination (OD) demand in the AM peak period. OD pairs were then distributed on the known existing public transport routes to complete the existing scenario of the Stellenbosch public transport AM peak hour operations.

This Public Transport Operations Plan (PTOP) for Stellenbosch feeds off the findings of several relevant previous studies, as well as the Stellenbosch Transport Model in order to develop an appropriate scheduled public transport system that is able to more effectively serve the mobility needs of existing public transport users, as well as to attract current private car users.

The public transport system proposed in this report was developed in such a way that the system can be aligned with the proposals of two key recent studies, namely the Stellenbosch Non-motorised Transport Framework Plan (Cape Winelands District Municipality [prepared by SSI], 2009) and the CWDM Public Transport Tourism Project (Cape Winelands District Municipality [prepared by Pendulum], 2009).

This report documents the methodology, analysis and findings of the proposed PTOP. Based on the project scope of work, the following points are addressed in the development of a public transport system for Stellenbosch:

- Identifies routes and stops
- Notionally advises on the frequencies along routes
- Notionally advises on the type of vehicles
- Infrastructure required

6.13.2 PUBLIC TRANSPORT SERVICE NETWORK

Royal Haskoning DHV prepared a Public Transport Service Network: Initial Operational and Business Plans report, dated December 2016. The conclusion and recommendations of the report are repeated here for information.

This study sets out the framework for the provision of an integrated public transport system for the Stellenbosch Municipality comprising of a network of short and long routes and public transport services that will ultimately provide a safe and convenient service for all the inhabitants of the area as well as tourists and visitors. The system will ultimately provide linkages to the greater Cape Town functional region and facilities such as the Cape Town International Airport. Linkages to the MyCiTi Integrated Public Transport Network and commuter rail stations will be provided.

The proposals take into consideration sustainability, equity and cost into consideration. The role to be played by the existing public transport operators in the area is taken into consideration and proposals are made to provide for their participation and formalisation in the business model.

The role played by the Western Cape Provincial Government and their participation in the planning process is acknowledged, particularly in terms of the proposed public transport institutional framework currently being planned that includes the Stellenbosch Municipality.

A preliminary revenue and cost model has been prepared and the estimated costing was presented in the report.

The conclusions of the investigation into the provision of a Public Transport Service Network by the Stellenbosch Municipality are:

- The implementation of a Public Transport Service Network will have major financial and institutional implications for the Stellenbosch Municipality. The preparation of further detailed institutional, business and operational plans are necessary to affirm cost and revenue estimates, the sources and availability of funding required before a final decision can be taken to proceed with the implementation of the proposals.
- The Western Cape Government and the National Department of Transport be approached to ascertain the possibility and requirements for accessing grant funding from the Public Transport Network Grant.
- Consultation with the public transport operators within Stellenbosch be conducted to obtain support and the participation of the operators before the implementation of a pilot phase can take place.
- The City of Cape Town be engaged regarding the possible acquisition of second hand Optare buses from the existing MyCiTi bus fleet, as a possible cost saving measure.

The recommendations of the report are that:

- The Stellenbosch Municipal Council takes note of the outcome and conclusions of the proposals for the introduction of a Public Transport Service Network in Stellenbosch, in particular the institutional and financial implications.
- The proposal for the introduction of a Public Transport Service Network in Stellenbosch be supported, in principle, subject to:
  - The support of the Western Cape Government and the National Department of Transport being obtained for the proposals and for the future submission of an application for grant funding from the national Public Transport Network Grant.
  - The preparation of further detailed institutional, business and operational plans to affirm cost and revenue estimates and the sources and availability of funding.

The status of this report and the further work required must still be confirmed by the Client.

6.14 FREIGHT MOVEMENT

In February 2012, GIBB prepared the "Cape Winelands District Freight Strategy" which focused on the existing freight movements and facilities within the District. The report notes that the major freight routes close to Stellenbosch town are the connections between Stellenbosch and Somerset West (R44), Stellenbosch and Kuils River (310), Stellenbosch to Klapmuts (R44 north), Stellenbosch to Brackenfell (R304) and Stellenbosch to Franschhoek (R310). The portion of the R45 between Villiersdorp and Paarl is also a major freight route for the region. The report furthermore identifies secondary routes that

- Provide access to farming areas.
- Carry freight in the form of supplies for agri-processing (e.g. delivery of bottles).
- Distribute the finished product (e.g. delivery of wine) to the Port of Cape Town for export.

The 2016-2020 CITP concluded the following with regards to the SM Freight Transport Strategy:

- The freight system forms an integral part of the transport network. Freight is moved by means of the road network which is managed by SANRAL as provincial and local government and the rail network, pipelines and ports which are managed and operated for the most part by Transnet.
- The PGWC is mandated with the control of overloading of freight vehicles. There are currently 9 weighbridges within the Province, 1 of which is within the Stellenbosch municipal boundary.
- Overloading is not adequately controlled and there is inadequate legal support for enforcement.
- In Stellenbosch, the inbound heavy vehicle traffic volume accounts for 1% of the morning peak period of the inbound traffic volumes and is not demanding of the road system capacity.
- In Franschhoek, approximately 29% of heavy vehicles are through traffic on the main road. Although an alternative heavy vehicle route may alleviate some pressure on the Franschhoek main road, the majority of heavy vehicle traffic is generated in the town and the surrounding farms and will continue to make use of the main road.
- Proposed Interventions:
  - Development of an infrastructure improvement programme
  - Improve law enforcement and overload control
  - Development of a strategic freight network
  - Promoting and endorsing a self-regulatory entity such as the Road Transport Management System (RTMS)
  - Investigation of the feasibility of installing an additional weighbridge within Stellenbosch
  - Detailed freight surveys are required

- Investigate the use of alternative / preventative measures to deter heavy haul vehicles from using the Franschhoek pass as an alternative to the current Huguenot Tunnel and potentially the N1 Winelands.

6.15 FRANSCHHOEK TRANSPORT MASTER PLAN

ICE Group was appointed by the Stellenbosch Municipality in 2011 to prepare a comprehensive Transport Master Plan for the Franschhoek area. This report proposed road infrastructure improvements for Franschhoek and the surrounding areas of La Motte, Wemmershoek and Groendal. The various relevant road improvements are summarised below and have been included into the proposed RMP:

- The road environment for the R45 should be reclassified, which reduces speeds through the town and assigns a road environment to particular portions of the R45;
- The Stellenbosch Municipality should ensure that sufficient space is reserved for the north- westward extension of Dirkie Uys Street to Beaucoup de L'eau Street;
- The Stellenbosch Municipality should ensure that sufficient space is reserved for a route that will link the MR5618 to Bagatelle Street;
- The one-way bridge where Robertsvlei Road crosses the river should be widened;
- Proposed roundabouts at the following intersections:
    - Main Road / Uitkyk Street / Cabriere Street intersection;
    - Huguenot Street / Lambrecht Street intersection;
    - R45 / Le Roux Street intersection;
    - R45 / La Provence Road intersection,
    - R45 / Nerina Street / Bagatelle Street.

The proposed roundabouts were not implemented, and SM is in the process to appoint consultants to draft new proposals.

6.16 RAIL LEVEL CROSSINGS

PRASA is investigating the removal of all rail level crossings to improve road and rail safety by providing road over rail bridges. There are several level crossings within the SMA, not including those in Franschhoek, as the train line to Franschhoek is no longer operational, or those which are not on public roads. The level crossings are listed below:

- Elsenburg Road north of Muldersvlei train station (LC1)
- Kromme Rhee Road near the intersection with the R304 (LC2)
- Elsenburg Road just south of Koelpark near the R304 intersection (LC3)
- Major pedestrian crossing between George Blake and the R304 (LC4)
- George Blake Road in the CBD (LC5)
- Extension of Oude Libertas Road (Distell) (LC6)
- Winery Road (Distell) (LC7)
- Private Road (LC8)
- Private Road (LC9)
- Vredenheim Farm (LC10)

A recent rail level-crossing elimination project along Vlottenburg Road resulted in the elimination of the following level-crossings:

- Extension of Annandale Road.
- Vlaeberg Road north of Baden Powell Drive.
- Numerous privately owned road level crossings

The location of the remaining level crossings are indicated in Figure 6-19. The EMME modelling work undertaken in this report assumes that all rail level crossings are removed in future, and will have no impact on the capacity or operation of road links.

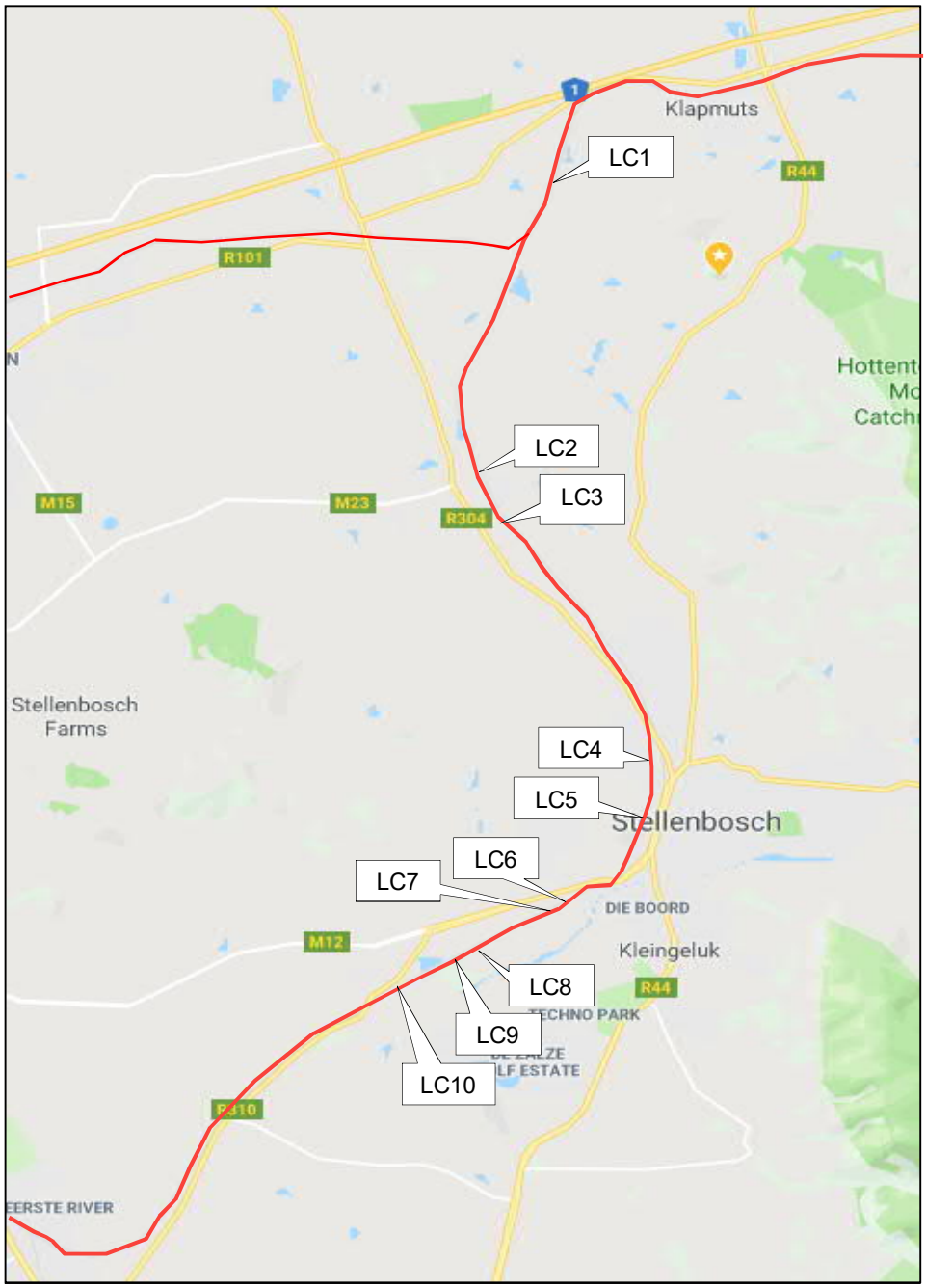


Figure 6-19: Rail Level crossings

6.17 UNIVERSITY OF STELLENBOSCH MOBILITY PLAN

SMEC (Vela VKE) completed a Mobility Master Plan for the University Of Stellenbosch (US) in November 2011. This plan was integrated into the Stellenbosch CITP. The aim of the Mobility study was to fully integrate all modes of transport within the University, while keeping to the vision of the University facilities management team. This vision clearly states: “To attract students and personnel, it is of fundamental importance to have a safe, accessible and appealing campus.”

The Mobility Study were developed in conjunction with the blueprint for the further development of the Stellenbosch campus, namely the “Basis Meesterplan” dated November 2009. In this document an important mobility mode hierarchy has been defined, namely walking, then cycling, commuter/public transport and lastly motorised transport.

The Mobility Plan was later followed up by a Traffic Impact Study based on a complete micro- simulation to show the effects of implementing the plan. In the Master plan Study the following guidelines have been defined for future campus circulation issues. These are:

- To provide safe, efficient, user-friendly and aesthetically pleasing pedestrian routes to foster personal and social interaction and a pedestrian community on campus.
- To provide sufficient functional access for vehicles to do business and provide emergency and operational services.
- To improve the provision of access and alternative transport options for disabled people.
- To cooperate with local traffic authorities to better manage traffic on the campus and to improve safety of pedestrians.
- To provide and promote the use of a regular, comfortable and safe shuttle service to the campus community.
- To make use of bicycles possible with minimal inconvenience to pedestrians. The cycle routes should be integrated with the municipal routes and planning. Safe and user-friendly cycle racks and locking facilities where applicable, must be provided at campus buildings.
- To develop the campus to include more “human spaces” which will enhance the “university town” idea.
- To discourage traffic flow through the campus by closing some roads for through-traffic and by making some roads less vehicle friendly.
- The development of periphery parking modes on the southern and northern edges of the campus to receive commuters before entering the core campus area. From these peripheral parking modes students and personnel can be transported to the core campus by means of shuttle services.
- To redefine pedestrian movement lines by developing certain main pedestrian routes on campus.
- The provision of parking will follow the “user pays” principle. Improved registration processes of vehicles and stricter policing are prerequisites.
- To cooperate closer with Stellenbosch Municipality and business sectors to look at wider solutions than only for the campus area.

The following strategy was recommended:

- To implement the principles stated above includes the integrated solutions given and recommended by the Mobility study to limit parking on the core- campus with supplementing the need with better and the higher use of public transport, shuttle services and additional parking on the periphery of the campus. It also includes the promotion and development of pedestrian and cycle routes with the associated landscaping on parts of the campus.

SHUTTLE SERVICES

A free campus shuttle operates on campus from 7:00 to 17:30. This service focuses on the following needs:

- Transport between the general parking areas on the edge of campus and central campus during the day.
- Transport between the long-term parking area and central points at the residences at specific times during the day and night.
- Transport to and from service divisions and departments on the edge of campus (e.g. Food Science and Welgevallen), to and from central campus.

– Transport of congress attendees to and from the general parking areas on the edge of campus

Refer to Figure 6-20 for the route map of the current (2018) shuttle services on campus.

LATEST PLANNING

The US confirmed that a new Integrated Transport Plan is expected to be available in June 2018, which will replace the 2012 Mobility Plan. This document was not available at the time of the completion of this report.

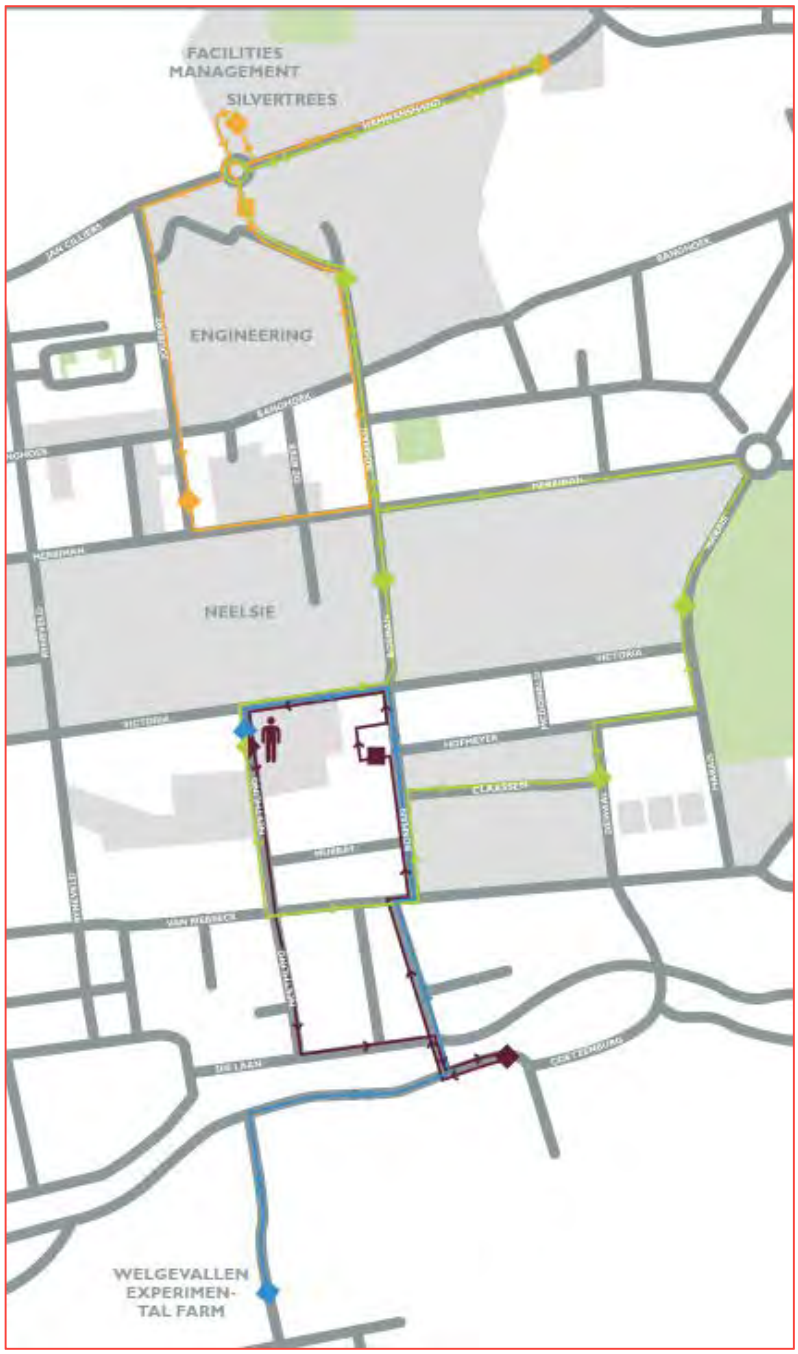


Figure 6-20: US shuttle routes

Source: University of Stellenbosch

6.18 LOW ORDER LOCAL IMPROVEMENTS

The SM has made information available with regards to local upgrades and improvements currently under consideration. The upgrades range from minor intersection upgrades, requests for signalisation etc. The RMP did not model these upgrades, as the timeframe and extent of the implementation cannot be confirmed at this stage.

Upgrades of the following intersections are planned:

- R44 and Helshoogte (R310)
- R44 and La Colline
- R44 and Merriman
- R44 and Molteno
- R44 and Alexander
- R310 and Lower Dorp
- R44 and Dorp
- R44 and Blaauwklippen
- Section of R304 between R44 pass Kayamandi to Sokuqala Street
- Bird and Molteno
- R310 and Oude Libertas
- R310 and Vredenburg
- R310 and Devonvallei
- R44 and Trumali
- R44 and Paradyskloof
- R44 and Technopark

6.19 TRANSIT ORIENTED DEVELOPMENT INITIATIVE

The SM and PGWC commissioned a conceptual study for a Transit Oriented Development (TOD) along the Adam Tas (R44) corridor adjacent to the Stellenbosch railway station. Refer to the report: A new gateway for Stellenbosch, Conceptual Study for TOD in Stellenbosch. Royal Haskoning DHV, May 2018. The broad findings of the study with regards to the potential land -use change and densification within the study area, and the proposed changes to the local road network was incorporated in the 2040 EMME model.

The following section summarises some of the findings and recommendation of the report, *verbatim:*

BACKGROUND AND SCOPE OF THIS STUDY

Stellenbosch is an internationally recognized destination for business, university education, tourism and living. It has plenty of unique heritage values, a striking natural environment and a world-renowned wine industry. In its recent past, Stellenbosch has experienced rapid economic development and growth. This has resulted in urgent urban development challenges.

The two key problems are the growing and persistent traffic congestion on main roads and in the central town area, as well as the shortage of residential space in all market segments. This leads to soaring house prices, continuing social imbalances and forced commuting by people unable to find accommodation in Stellenbosch, which in turn further exacerbates traffic peaks and congestion. These issues are threatening to undermine Stellenbosch's liability and economic vitality.

To pro-actively meet these challenges, the Municipality of Stellenbosch and the Western Cape Province have appointed Royal HaskoningDHV (Pty) Ltd (RHDHV) to undertake a conceptual study for Transit Oriented Development (TOD) in the Adam Tas Road corridor adjacent to the Stellenbosch railway station and extending to the edge of the central town area.

The scope of the conceptual study includes traffic surveys, assessment of primary issues concerning congestion and road safety, and the investigation of sustainable solutions in a holistic TOD perspective. This study follows on from an initial TOD strategy study that was performed in the period from 2013 to 2015.

TRAFFIC SURVEYS AND MICRO-SIMULATION-MODEL

A micro-simulation traffic model of the Stellenbosch road network has been developed from the greater Cape Town region macroscopic traffic model and additional traffic surveys using number plate recognition techniques were conducted in order to calibrate the micro-simulation model. From this information, traffic volumes and travel patterns between origins and destinations throughout Stellenbosch have been established. Findings from the model show that traffic capacity bottlenecks in the central part of the Adam Tas Road corridor are concentrated around the four intersections involving the R310, Alexander Street, George Blake Street and Merriman Street.

The congestion problems are further aggravated by insufficient intersection spacing and non-standard intersection layout, as well as a serious road safety issue in the form of the level crossing of the railway line at George Blake Street. These problems, including the difficulties experienced by pedestrians crossing Adam Tas Road and the railway line, lead to an unacceptable situation with negative side effects in the surrounding area.

PROPOSED INFRASTRUCTURE SOLUTION

Various options for a revised scheme for the central section of the Adam Tas corridor have been studied. The proposed scheme consolidates the four existing T-intersections into two grade separated interchanges. This simplifies traffic circulation and removes the current road safety problem. In addition, as the central segment of Adam Tas Road is freed of intersections, it can be re-positioned in a cut-and-cover tunnel of approximately 500m length. This alleviates the negative urban impact of the Adam Tas corridor and allows for a re-positioning of the railway station into the heart of the proposed TOD scheme, with convenient and safe pedestrian links to the town centre of Stellenbosch. The new station can be developed into a modern public transport hub in a pedestrian priority area. The re-positioning and modernization of the station facility does not require any alterations to the railway tracks.

TRAFFIC MODELLING RESULTS

Micro-simulation modelling has been performed both for the current situation and the proposed scheme. Its results show structural improvements to road capacity and significant reduction of traffic congestion, even taking into account future increased traffic volumes resulting from the proposed TOD developments. Average vehicle delay during morning and afternoon peak traffic periods is reduced by 45%. The revised scheme also shows substantial reductions in air pollution (20%-30%) and fuel consumption (25%) across the Stellenbosch road network. Therefore, it can be concluded that the proposed revised scheme constitutes a sustainable solution for key traffic problems in Stellenbosch.

URBAN DEVELOPMENT VISION

The proposed TOD scheme for the Adam Tas corridor is illustrated in the four conceptual diagrams on the next page. It allows for a transformation of currently underused municipal land in the vicinity of the corridor into a dense and vibrant mixed-use urban district, which extends the heart of the city from Eikestad Mall across the railway line to Papegaaiberg Park. Strategic opportunities are identified in a number of important fields, as follows:

1. An inclusive mixed-use district:

A mixed-use district with a total floor area of 350 000-400 000m2 GFA in 20-25 independent blocks can be developed, which translates into about 3500 residential apartments plus commercial urban functions. The new district can be a model for a vibrant, safe and inclusive urban environment, offering good living, working, shopping and education for all income classes. Additionally, the new district is an ideal location for strategic functions such as a new civic centre and additional university facilities.

2. Promoting non-motorized transport:

In the heart of the area, a park-like pedestrian priority setting is created, connecting existing walking lines through the city centre with the new station and public transport hub. This creates effective and safe connections to bus, taxi, cycling and pedestrian facilities. A public car parking hub can be created as part of the new district, which can be accessible from Merriman Street and Alexander Street, but also close to the historic city centre. This alleviates parking pressure in the sensitive historic centre.

3. Catalyst for urban renewal of a wider area:

The TOD will be a catalyst for the further urban renewal of adjacent inner city areas. In particular, the re-aligned George Blake Street link to Merriman Street overpass takes traffic in a northerly direction, thereby alleviating Bird Street and increasing its potential for active urban renewal. Bird Street can be downgraded and transformed into a non-motorized traffic priority boulevard with more space for its vibrant street markets.

4. Shaping a sustainable future for Stellenbosch, in line with its proud heritage:

The TOD is a strategic opportunity to not only solve a critical traffic problem, but at the same time form a game changer for Stellenbosch's urban development: Stellenbosch can move from investor-driven development along the periphery towards a TOD based inclusive and sustainable urban renewal. In this way, the further growth of Stellenbosch can take shape in a way that enhances its vibrant urban lifestyle, preserves natural and infrastructural resources and adds a new chapter to Stellenbosch's proud heritage.

PROPOSED ROAD IMPROVEMENTS

The R44 is the major road access to the Stellenbosch CBD which is becoming increasingly congested. Any improvements that will reduce congestion and increase accessibility will lead to increases in the job market and subsequent economic growth. Congestion reduction proposals that are being addressed in this study are threefold, namely; treatment of the congested Adam Tas Road intersections, improvement of accessibility to Public Transport and dramatic changes to the pedestrian and cycle network. Proposed improvements to the Adam Tas Road intersections are shown in Figure 6-21.

The proposed road infrastructure improvements include the following:

1. Grade separation of the George Blake/ Merriman Ave intersection with the R44.
A key aspect of this initiative is the removal of the level rail crossing of George Blake Street. This is a very dangerous crossing which has resulted in several fatalities in recent years. In addition, this grade separation will also substantially increase the capacity of the R44 by reducing the number of intersections and removal of the right turn traffic conflicts. It also facilitates easy access to the park-and-ride/cycle/walk facility envisaged in the proposed precinct development between Merriman and Alexander Streets.

2. Lowering of the central section of the R44
Lowering of the central section of the R44 flowing through the precinct is necessary to create a Public Transport Interchange facility at the envisaged new Railway Station site. This will create pedestrian, cycle and Public Transport priority and remove the vehicle/pedestrian conflict. It will also enhance NMT and Public transport accessibility and mobility connections to the CBD.

3. Improvements to the R44/R310 and Alexander Road intersections
It is further recommended that the R44/R310 and R44/Alexander Road intersections are combined into a single intersection, which is a short-term proposal until such time as the increase in traffic generated by the TOD and other developments in the town necessitates further improvements to this major intersection. In the long-term, it

is proposed that the dominant flow of the R44 is grade separated through an underpass. This intervention should improve safety and capacity, and reduce the number of intersections, thereby improving mobility.

Figure 6-21: Adam Tas Road Proposed Improvements

Source: Royal Haskoning DHV

WAY FORWARD

SM confirmed that the implementation of the Adam Tas TOD project is on hold indefinitely, and the extent of the upgrades may be revised and reduced. Additional EMME modelling of the TOD proposals were also not required as part of the RMP update.

In the interim, it is planned to support development in the area based on the TOD principles of housing developments near transit opportunities: the availability of public transports services along Adam Tas Road and the nearby Stellenbosch railway station.

7 EVALUATION OF NETWORK PROPOSALS

7.1 GENERAL

Stellenbosch's EMME/4 transport model can be used for the testing of a wide variety of network and land-use scenarios. This includes the analysis and evaluation of proposed (new) road projects, capacity improvements to existing infrastructure, road closures, the introduction of new speed limits and public transport proposals. On the land-use side, the model can also assist in determining the transport impact of specific development proposals.

Presently, the Stellenbosch model consists of a 2018 base year model, as well as a general 2040 future model based on a long-term land use scenario for the whole metropolitan area, including a "trend" projection for Stellenbosch. The former has been used to test the validity of the modelling approach and to highlight present problems, while the latter provides the means for establishing the long-term road improvement needs in the study area. Both models were used to evaluate general capacity improvements as well as specific new projects.

Note: All modelling outputs are included in Appendix A-2.

7.2 2018 BASE NETWORK ANALYSIS

The 2018 base year model is a much improved version of the 2011 Stellenbosch model which was based on 2009 household interview surveys, the Cape Town Metropolitan model and detailed information about US student travel demand patterns. Some network and other changes were also introduced in order to bring the model up to date. The modelling steps and calibration processes are described in ***Chapter 4***.

The traffic assignment process involved the present (2018) private transport commuter matrix, plus the student travel demand. The final 2018 base-year vehicle assignment results are shown in Figures 4.5 to 4.7 (Appendix A-1).

The 2018 modelling results confirms that the following road sections operate at capacity and should be investigated further for possible improvements included in the RMP:

- The R304 between Bottelary Road and the R44
- The R44 (south) between Paradyskloof and the Van Reede intersection
- Bird Street between the R44 and Du Toit Street
- Merriman and Cluver Streets between Bird Street and Helshoogte Road
- Dorp Street between the R44 and Piet Retief Street
- Adam Tas Road between its junction with the R44 and Merriman Street
- Piet Retief Street
- Van Reede and Vrede Streets between the R44 and Piet Retief Street
- Alexander Street between the R44 and Bergzicht Street
- George Blake Street

In addition, quite a number of access roads are under severe pressure. These include the following:

- The Welgevonden access road
- Lang Street into Cloetesville
- La Colline access off the R310
- The Technopark access road

Further from the Stellenbosch CBD, the Base Year assessment indicate that the R304/ N1 Interchange ramps require signalisation to improve safety and Level of Service.

It should be noted however that these capacity issues need to be confirmed by traffic counts, on-site inspections and further, more detailed investigations. Some of the problems could possibly be resolved by fairly simple intersection improvements, rather than major road widening schemes.

7.3 2040 TARGET YEAR ASSESSMENT

For the 20-year long-term network evaluation it was decided to use the latest (2040) Cape Town metropolitan spatial development scenario, as the basis for the transport demand modelling. This land use scenario also includes future growth assumptions for the Stellenbosch area, as described in Chapter 4. The 2040 travel demand also allows for a 30 per cent growth in University student traffic. This growth could however be lowered pending the success of the Stellenbosch University Mobility Plan and new Integrated Transport Plan. Note that the US is currently developing a new strategic framework to determine the future size and shape of the University, its campuses and student body. The expected growth rate will be determined from this.

Due to difficulties in determining short- to medium-term land use developments, it was decided to rather focus on one all-encompassing long-term scenario to evaluate the roads master plan. This was firstly used to assess the extent of road network improvements necessary to cope with the future anticipated traffic demand. Thereafter, this network provided a common basis for evaluating new road proposals.

7.3.1 GENERAL CAPACITY IMPROVEMENTS

Having analysed the 2018 model outputs (see Figures 4.5 – 4.7), and some initial model runs with the 2040 traffic demand, it soon became clear that the present road network fails to cope with the longer-term growth needs of the Stellenbosch area. This was particularly evident in the case of the higher order Provincial roads in and around Stellenbosch.

The extent of the required network improvements were then assessed by incrementally adding some additional lane capacity to the most obvious areas of constraint. The process was stopped when, for environmental or other reasons, no further capacity could be provided. It is therefore acknowledged that some roads, particularly in the historic town area, could in future still operate at capacity during peak periods (unless modal shift changes). It should however be noted that the peak period traffic congestion could spread over a longer time interval as a result of unresolved capacity problems. This has been taken into account in the demand modelling exercise.

The final results of the 2040 traffic assignment are shown in Figures 7.1 to Figure 7.3. (Also refer to Appendix A-2). The following general capacity improvements were introduced during this process and formed part of the final output:

- Polkadraai Road: The remaining single carriageway sections from Cairngorm Road to Vlottenburg (unnamed road) to be upgraded to a dual carriageway (2 lanes per direction) before 2035, in accordance with the Provincial road infrastructure programme.
- R44 North of the Stellenbosch CBD: Upgrade to dual carriageway from the end of the current dual carriageway north of Fir Road to the Welgevonden access at Hendrikse Road.
- The R44 in the vicinity of Klapmuts will require additional capacity due to the proposed future residential and employment developments in the area, as well as future upgraded road links off the R44.
- Adam Tas Road could become the busiest section of road in Stellenbosch, and will require 3 lanes per direction between the R44 in the south and Merriman Avenue to the north.
- Adam Tas: Planned high priority (short term) upgrades to and reconfiguration of the intersections with the R44/Alexander Street and Merriman Avenue.
- The Adam Tas/George Blake intersection also need to be improved or reconfigured to provide additional capacity.
- R304 (Koelenhof Road): Upgrade to dual carriageway between Adam Tas (R44) in the south to Bottelary Road/Kromme Rhee Road.
- Merriman and Cluver Street link: Upgrade to dual carriageway or minimum 2-lanes per direction required between Bosman Street and Banghoek Road.
- Lower Dorp Street – Capacity improvements required between the R44 and Adam Tas Road. Conceptual planning has been undertaken for the dualling of this section.
- Van Reede and Vrede Street link: These roads required dualling between the R44 and Piet Retief Street, with improvements at the R44 / Van Reede intersection.
- Van Reede Street westbound extension linking into Electron road to provide a second access to Techno Park.
- R44 - Technopark, De Zalze, Brandwacht and Welgevonden access roads – Dualling and/or intersection improvements are required.
- Jamestown Road – Road Network Development required due to major residential developments planned for this area.
- Baden Powell Drive – Dualling of remaining single carriageway sections between the N2 and Polkadraai Road.

It is recommended that all the above road projects could, with further investigation and analysis, be included in the next RMP update. Note, some of the above projects are already included in the list of identified road projects, refer to Chapter 8.2.

It should be noted however that, instead of providing additional traffic lanes, capacity could also be increased by changes to the road classification. For example, a vehicular lane along a mobility route can generally carry significantly more vehicles than the same width lane on a lower order road. This is because there are fewer delays such as fewer intersections along a mobility route.

Figure 7-1: 2040 weekday AM peak hour traffic

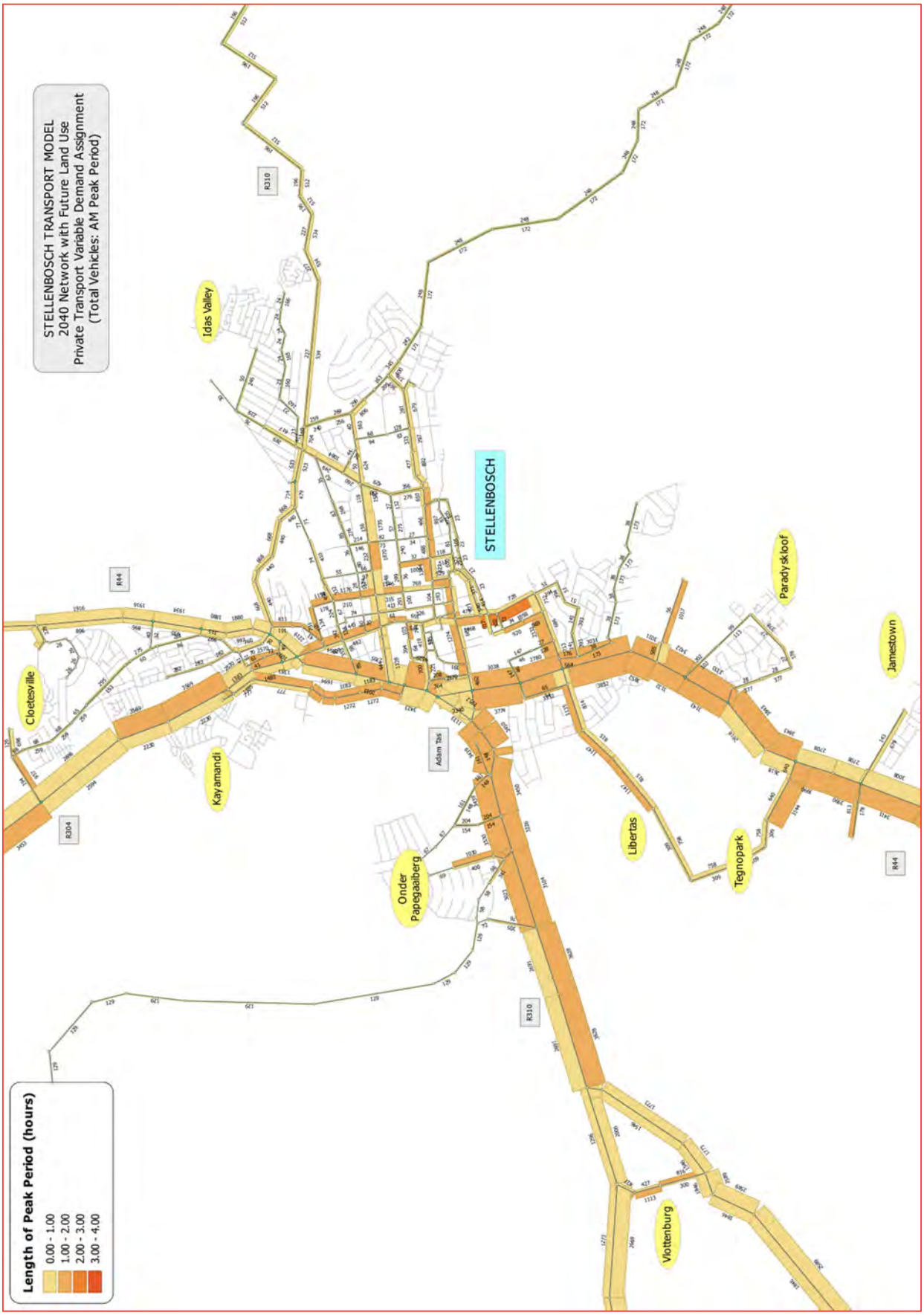


Figure 7-2: 2040 weekday AM peak period traffic

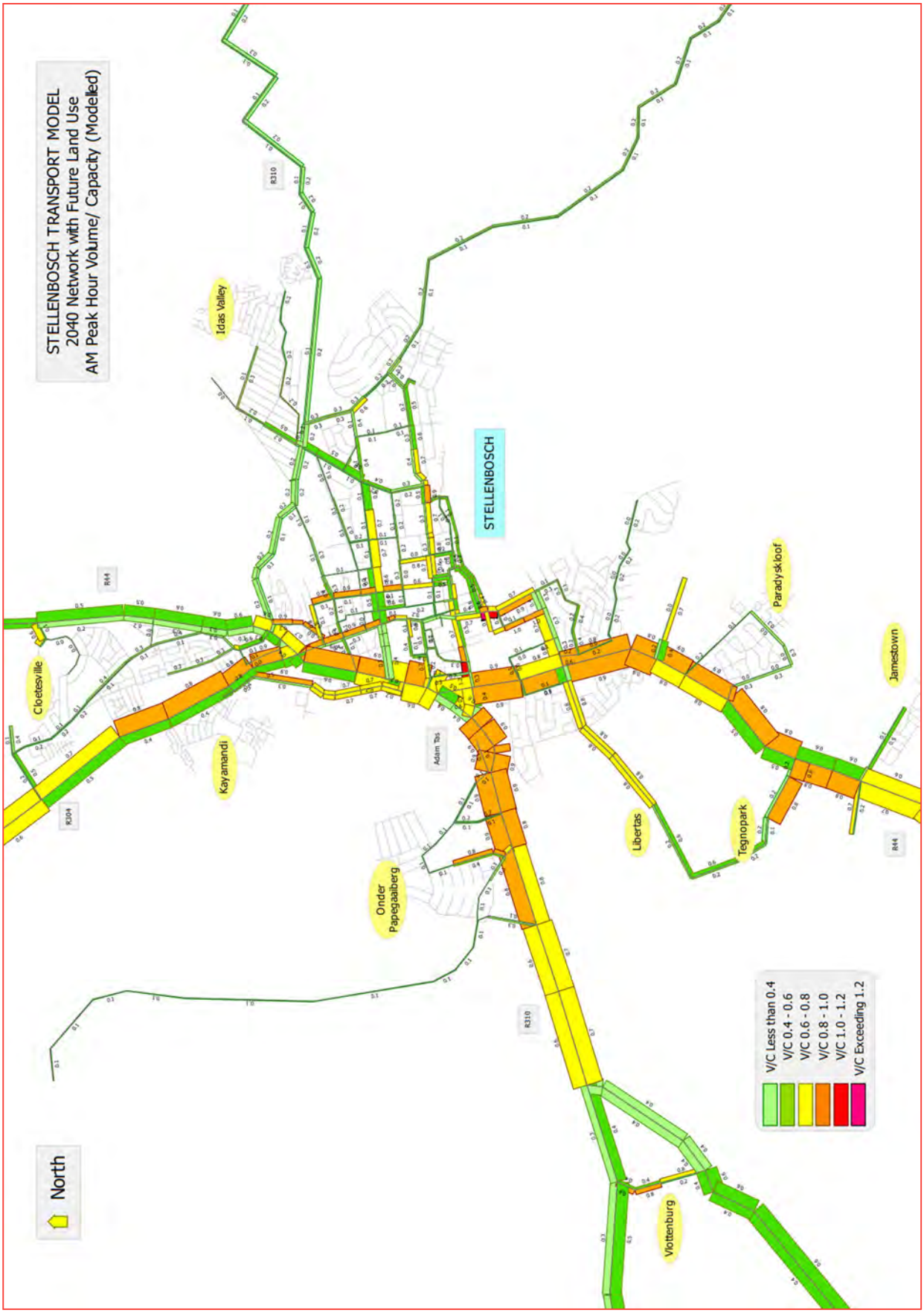


Figure 7-3: 2040 weekday AM peak hour V/C ratios

7.3.2 EASTERN LINK ROAD

The Eastern Link Road (previously incorrectly referred to as the eastern bypass) has been contemplated for a long time (see Section 6.5), but has never been formally adopted due to public and environmental concerns. However, the scale, nature and potential benefits of this project make it an ideal candidate for inclusion in the 2018 RMP.

A preliminary alignment was obtained from the ICE Group of Consulting Engineers, and coded into the model as a single carriageway Class 4 collector road. This route involves the extension of Van Reede Road and a connection with Pastorie Road at the Theological Faculty with a new proposed bridge crossing over the Eerste River. Other alignment alternatives would include the widening of the Coetzenburg bridge near the CBD. However the modelling results, of alternative routes near the CBD, are expected to be of a similar order due to only marginal differences in travel time and distance.

The 2040 private transport commuter matrix was assigned onto this modified network, and the peak hour traffic results are shown in **Figure 7.4**. The next illustration in **Figure 7.5** shows a comparison with the existing network and highlights the attraction of traffic onto the new route. (Also refer to Appendix A-2)

Based on this limited modelling assessment, the following results are of interest:

- The term “bypass” is a misnomer, considering that very little traffic deviates from the R44 onto this route as an alternative access into the Stellenbosch CBD.
- The link road mainly serves as an internal connector, carrying a maximum of about 450 vehicles per hour in any given direction between the R44 and the proposed Van Reede extension.
- Traffic on the proposed Van Reede extension to Dorp Street (across the Eerste River) is however significantly higher (850 vehicles per hour), serving as an alternative to the congested Piet Retief Road.
- Traffic on the R44 near the Technopark intersection reduces by about 300 vehicles per hour as a result of local traffic using the new link road. Between Van Reede and Dorp Street, the reduction is more than 200 vehicles per hour, mainly as a result of the proposed Van Reede extension.
- If planned correctly, the link road could also play an important role as a non-motorised transport (NMT) and public transport route, and will provide suburbs such as Paradyskloof and Brandwacht with easy access to the CBD.
- In future, the Eastern Link Road would also service residential developments in Jamestown with an alternate access to the CBD.

In terms of these findings, a strong case can be made for a first phase implementation between Van Reede and Pastorie Street. This should have immediate benefits, considering the lack of adequate river crossings and the present traffic demand patterns in this area.

The phased implementation of the Paradyskloof-Trumali Road portion would also have immediate benefits due to access restrictions on the R44 and proposed residential developments in the area.

Figure 7-4: Eastern link modified network - 2040 AM peak hour traffic

Figure 7-5: Eastern link compared to existing network, attraction of traffic 2040 Weekday AM peak hour

7.3.3 WESTERN BYPASS

The concept of a western bypass (identified in the CITP) has been around for a very long time, but the actual alignment details have never been fully articulated. Generally, there is a perception that traffic conditions along the R44 have deteriorated to such an extent that an alternative high order bypass requires serious investigation.

There would be considerable long-term benefits for having a bypass to Stellenbosch, which include:

- Significant relief to motorists, especially along the R44
- Benefits to the town itself (less through traffic, congestion and pollution)
- Reduced urban creep
- Environmental benefits in the form of reduced car emissions
- The possibility of allowing future land use developments and new urban design initiatives.

Notwithstanding these benefits, there are also some negative aspects:

- Environmental impacts to building new roads
- High construction costs
- Impact to existing land owners

Three preliminary road alignments have been used to assess the traffic impact of this bypass proposal:

- A high speed (100 km/h) Class 1 Expressway, connecting to the R44 in the vicinity of the Annandale intersection, extending north and north-eastwards to intersect with the R310 and the R304 from where it joins the R44 with a Class 2 arterial connection just north of Welgevonden.
- A similar but shorter bypass proposal which starts at a future grade separated Technopark intersection, sharing a short section of lower order Class 2 arterial with the surrounding land use developments. A speed limit of 80km/h was modelled.
- A much reduced bypass proposal, starting at the Technopark and ending at the R310 (North-South link road).

The 2040 traffic assignment results of the first proposal are shown in **Figure 7.6** and clearly show a strong northbound demand of between 600 and 1300 vehicles per hour along different sections of this road. In fact, the section from the Eerste River crossing to the R310 (Adam Tas Road) may even require a 4-lane dual carriageway cross-section, if the bypass also connects to the Technopark development.

Figure 7.7 shows a scenario comparison of the 2040 network with and without the Western Bypass (see **Section 7.3.1).** This clearly illustrates the impact of the bypass on the surrounding road network, with the red and green bars indicating traffic increases and reductions respectively. In terms of these results, one may conclude that the bypass could have a positive impact on the existing Provincial Road system in and around Stellenbosch. For example, traffic reductions of more than 1200 vehicles per hour (both directions) are expected on Adam Tas Road and the R44 south of the town – generally where Stellenbosch currently experiences its worst traffic problems.

It should be noted however that the northernmost section, referred to as the Welgevonden Link Road, carries very little traffic on its own and, without the rest of the bypass scheme, has very little impact on the surrounding road system. Only when the full scheme is implemented, does this link become a viable network element.

The traffic assignment results of the second bypass proposal from Technopark to Welgevonden are shown in **Figure 7.8**. In this instance however, the traffic volumes on the bypass are generally between 10 and 20 per cent

lower than for the previous alternative, largely as a result of reduced travel time benefits. The impact on the Provincial Road system is therefore also slightly lower, as shown by the scenario comparison in ***Figure 7.9***. Interestingly, a small (6%) increase in traffic can be observed southbound, on the section between the R310 and the Technopark.

In view of these findings, it was decided to also test the impact of a much reduced bypass alternative, which simply connects between the Technopark and the R310. Compared with the previous bypass proposal, the results in **Figure 7.10** show a slight drop in traffic, mainly in the southbound direction towards the Technopark. Nevertheless, this road still carries a significant amount of westbound traffic which otherwise would have travelled into the town in order to reach the R310 (see **Figure 7.11**).

It should be noted however that a large proportion of the traffic on this section of the proposed bypass is as a direct result of future (2040) anticipated residential developments in the "vacant" area between the bypass, Die Boord and Technopark. Different land use scenarios for this part of Stellenbosch could significantly alter the road requirements and transport patterns in this area.

Detailed geometric and transport analysis of the possible different routes, scenarios and types of intersections will be required. This will also have to be workshopped with all the relevant role players and it is expected to involve comprehensive public participation and environmental and heritage impact assessments. Since these processes normally takes a long time, it should be considered to start this process as soon as possible.

The timing for the implementation of the full bypass and in particular its Welgevonden link is dependent on the different land use scenarios for this part of Stellenbosch, however, it is expected that proposed housing developments (Northern Extension and Droëduike) as well as the proposed Adam Tas Corridor, will accelerate the need for further implementation of portions of the Western Bypass.

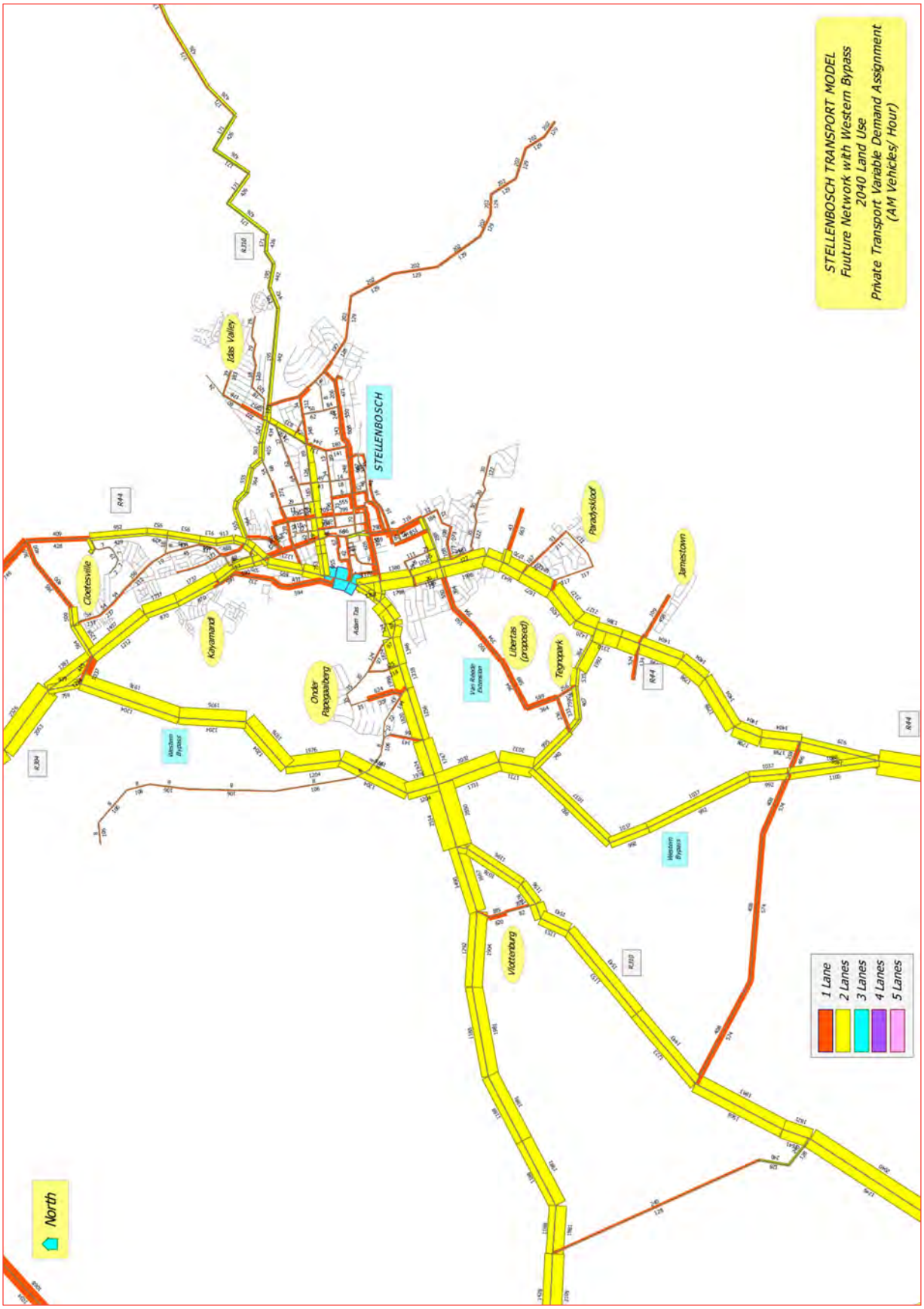


Figure 7-6: Western bypass (Class 1 Expressway, 100 km/h) – 2040 Weekday AM peak traffic

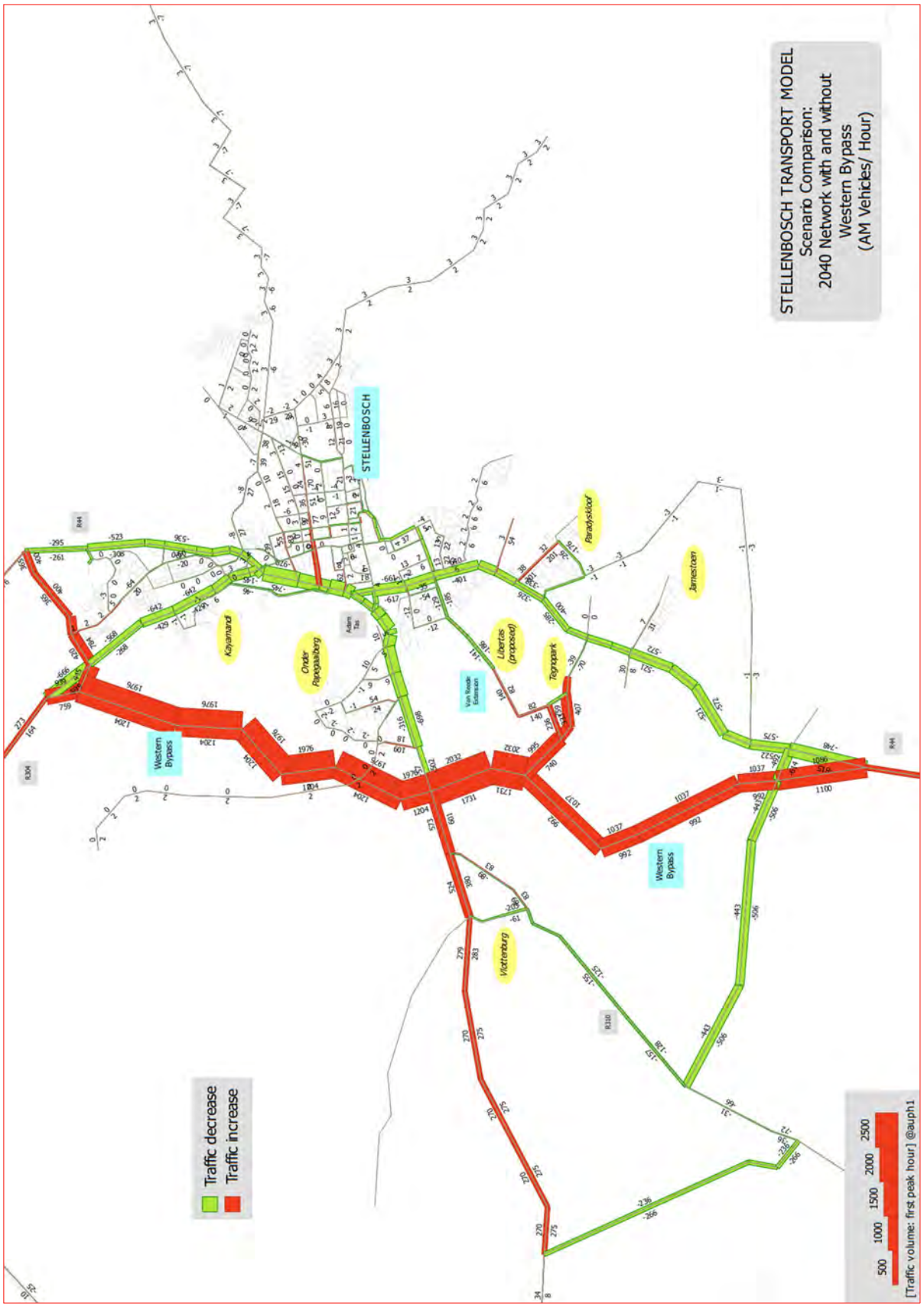


Figure 7-7: Western bypass attraction of traffic - 2040 Weekday AM peak hour

Figure 7-8: Partial Western bypass from grade separated Technopark intersection to R304 (80 km/h) – 2040 Weekday AM peak hour

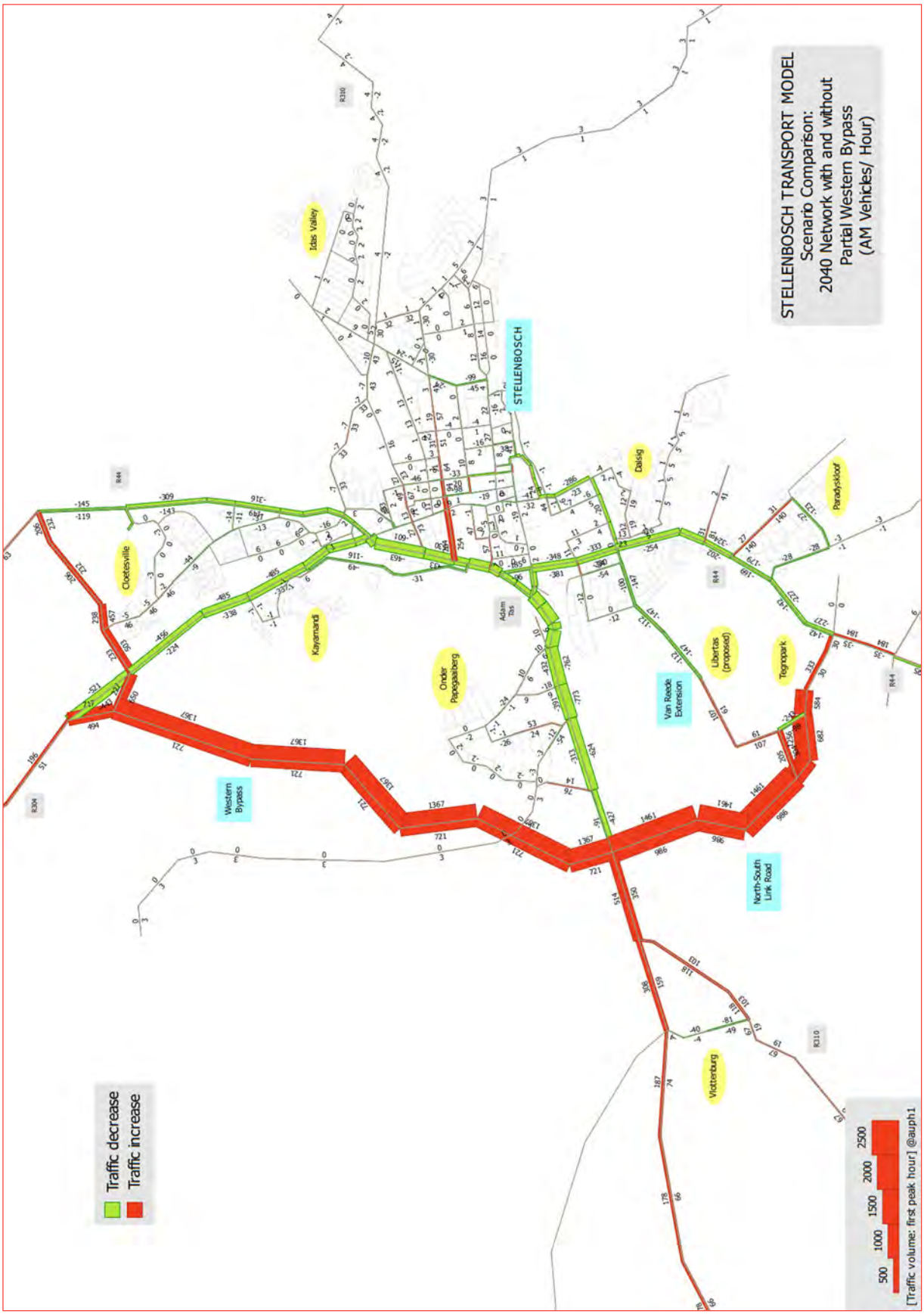


Figure 7-9: Partial Western bypass attraction of traffic - 2040 Weekday AM peak hour

Figure 7-10: Lower order north-south link road – 2040 Weekday AM traffic

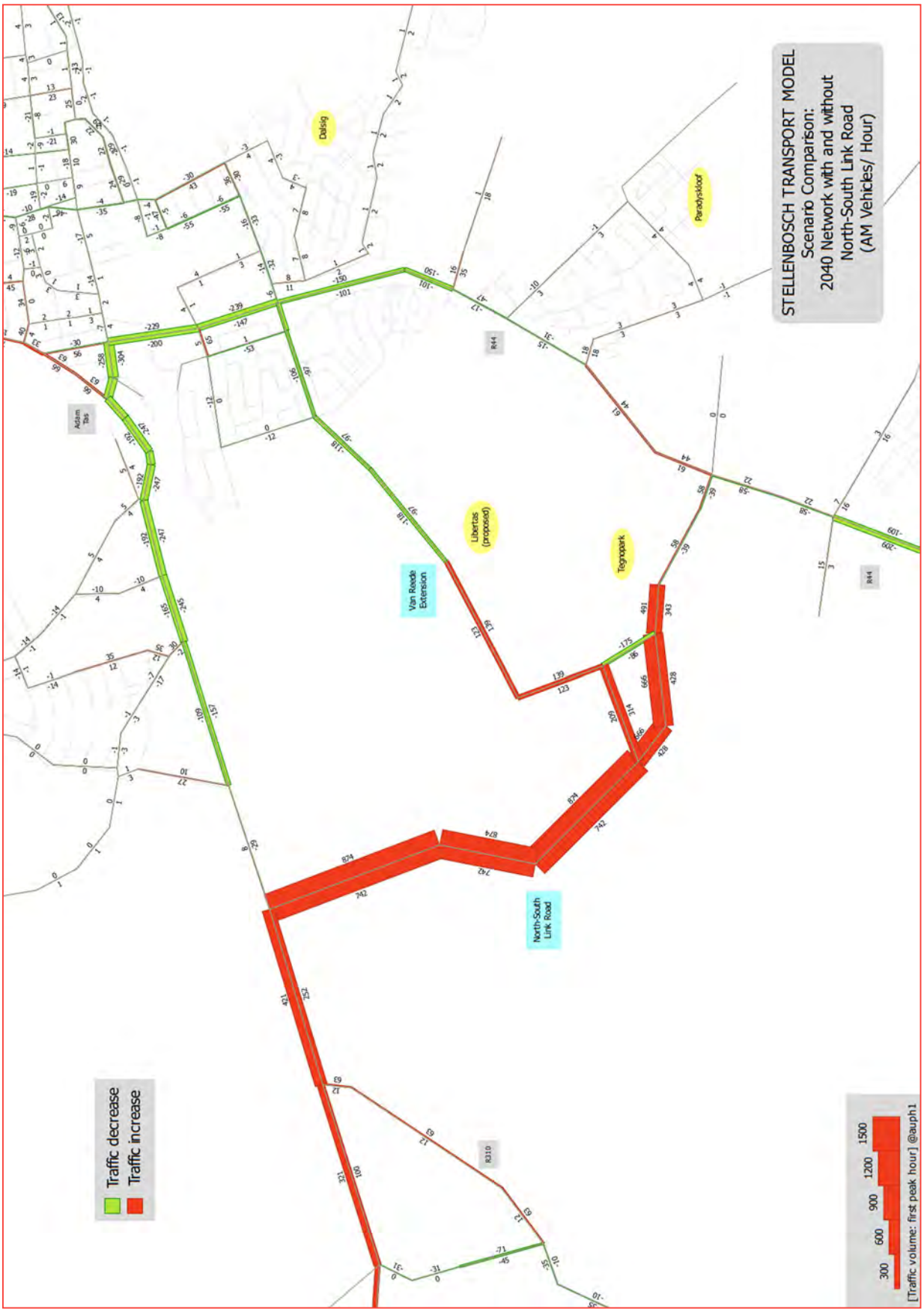


Figure 7-11: Low order north-south link road attraction of traffic - 2040 Weekday AM peak hour

7.3.4 R44 UPGRADE AND CLASSIFICATION

An alternative to the Western Bypass with arguably less environmental impact involves the upgrade of the existing R44 by re-establishing it as a higher speed Class 1 (urban) arterial with limited accesses. This alternative should form part of the feasibility studies for a Western Bypass discussed in Section 7.3.3.

The possibility to develop a combined mobility corridor for the R44 and commuter rail system in the urban portion of Stellenbosch, could include a better situated intermodal transport facility and possibly opening of land for development. It is expected that some of the feasibility will be tested in further studies as part of the Stellenbosch Arterial Management Plan and more micro simulations in the urban area.

Not long ago the R44 operated much like a freeway / expressway. However, due to some questionable land use decisions, this road is constantly under pressure to be downgraded and incorporated into Stellenbosch's expanding urban fabric. The result is more signalised intersections, lower speed and reduced lane capacity – all contributing to traffic congestion and delays.

Despite various road management plans and attempts to address the problems, none have been bold enough to suggest a total re-engineering of the existing R44 within its present road reserve. For this reason it was decided to use the 2040 Stellenbosch model to investigate the possible impact of such a proposal. Also refer to Section 6.3 for the PGWC led project to improve the level of service and safety along the corridor.

While keeping the number of traffic lanes on the R44 the same as in all previous modelling scenarios, the class of road was upgraded to that of an urban expressway between Jamestown and Cloetesville, with an 80 km/h speed and lane capacity of 1700 vehicles per hour. This scenario implies major changes to limit access to the R44 and further geometric improvements to intersections, including some grade separation. As expected, this resulted in significant volume increases, particularly along the Adam Tas section of the R44, see **Figure 7.12**. Nevertheless, as shown in **Figure 7.13**, the traffic flow situation also improved notably due to the higher lane capacity of the upgraded road.

The scenario comparison in **Figure 7.14** clearly shows some of the benefits of this proposal on the traffic situation in the Stellenbosch town area.

Figure 7-12: R44 urban expressway (80km/h) – 2040 weekday AM peak hour traffic

Figure 7-13: R44 urban expressway traffic flow changes - 2040 Weekday AM peak

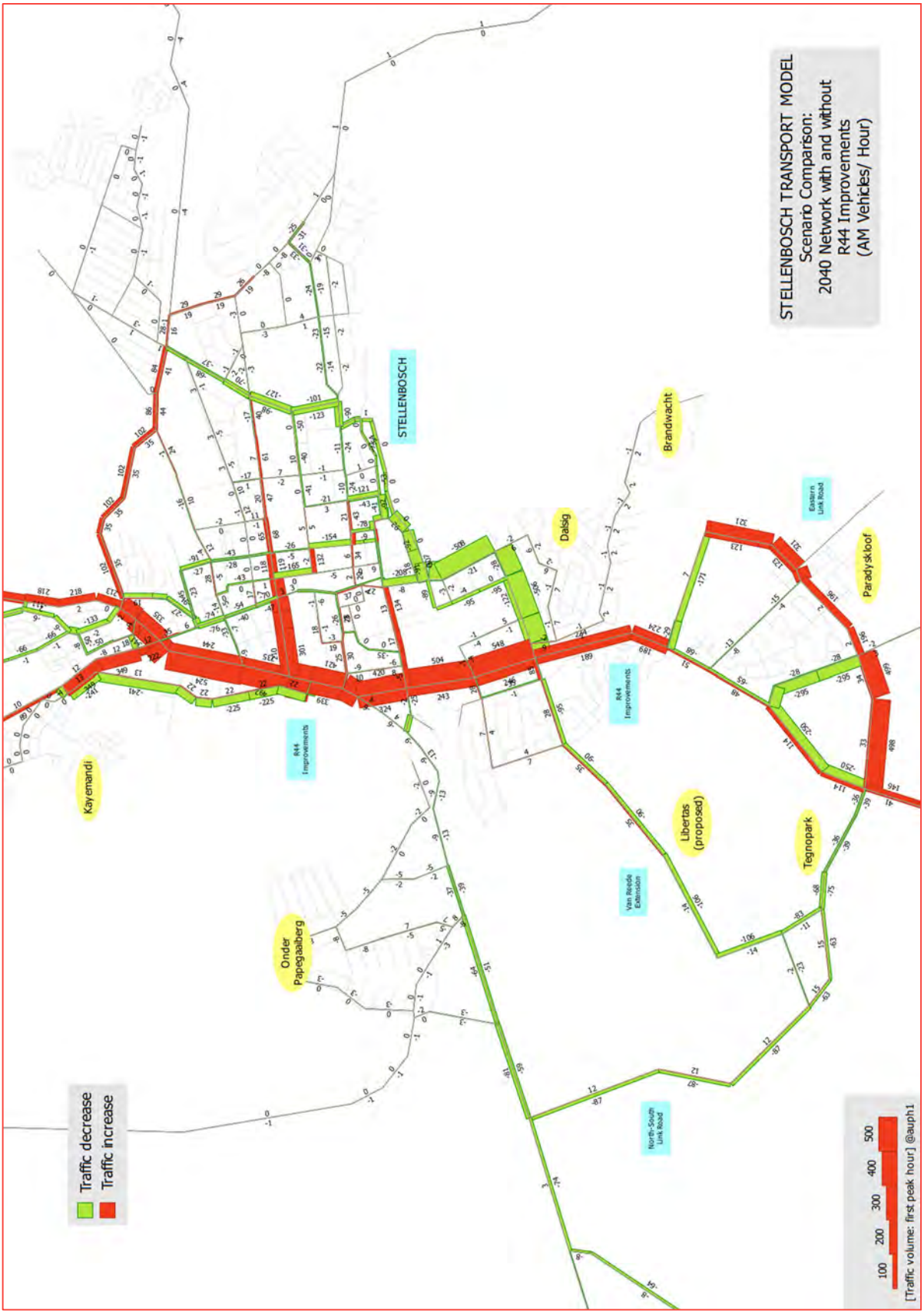


Figure 7-14: R44 urban expressway scenario comparison - 2040 Weekday AM peak

7.4 2040 DENSIFICATION ANAYLSIS

In addition to the road network tests, it was also decided to perform an impact assessment of the preliminary densification land use scenario, as described in ***Sections 4.4.3*** *and* ***5.2***.

The comparative results in Figure 7-15 show a very small general impact on the road system, with a slight decrease of trips into the Stellenbosch town area and vice versa for outbound commuters. The traffic increases in the town centre is expected to add marginally to those network elements that are already congested, but the overall impact appears to be relatively small and of short duration.

The traffic growth is largely in proportion to the scale of the densification assumption of 20%. Although the Municipality is actively promoting NMT, no meaningful shift to NMT or public transport became apparent, largely due to the fact that this exercise did not allow for additional employment in the town centre, or for the use of second dwellings as student accommodation or lower income housing.

Significant densification/ development is expected in Klapmuts, Droëdyke, Adam Tas Corridor, Botmanskop and Jamestown. The extent to which these developments will be implemented and its impact on the road network will still need to be explored.

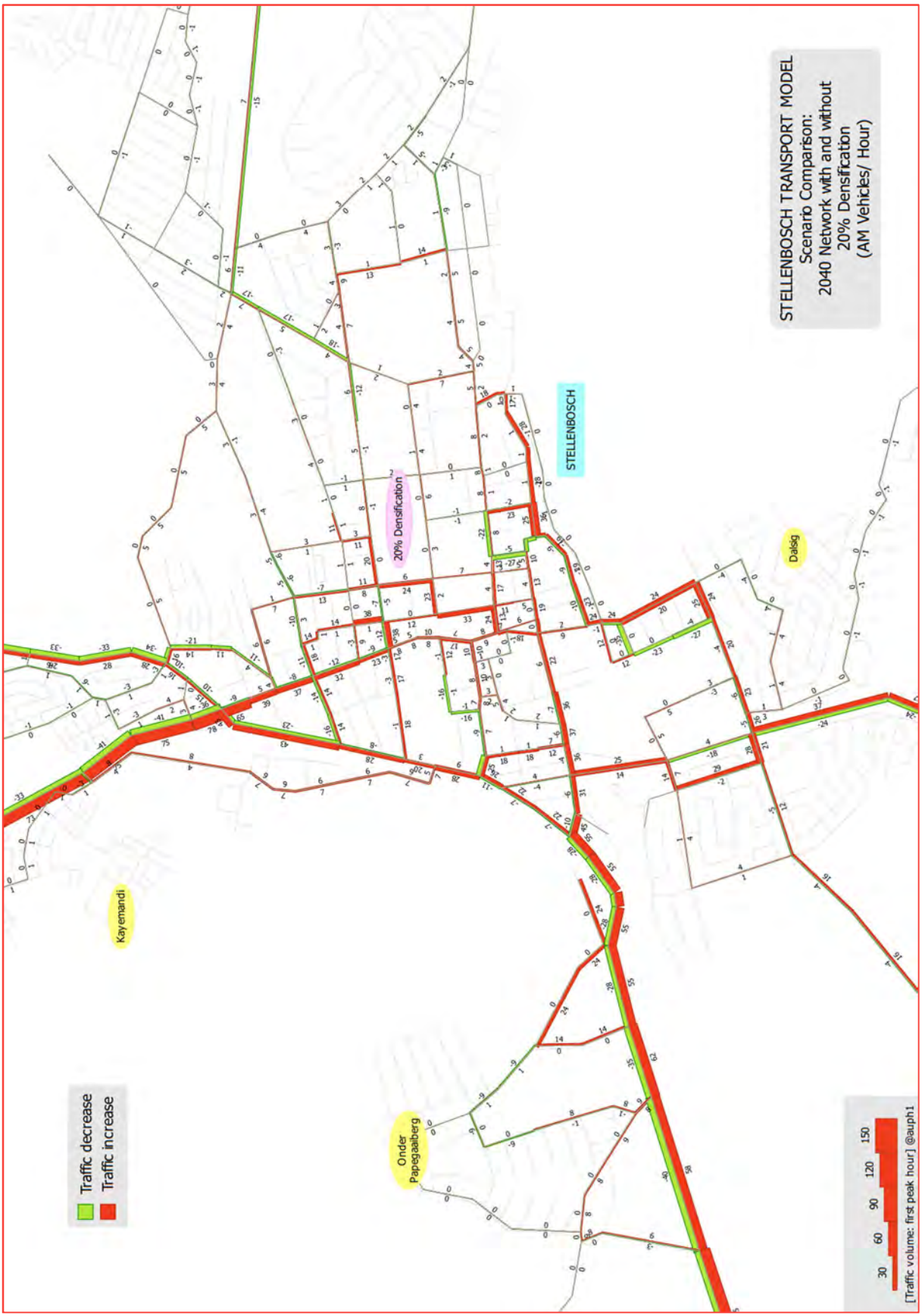


Figure 7-15: Densification land use scenario – 2040 weekday AM peak

7.5 KRIGEVILLE SCHOOLS PRECINCT

Vehicular trips to schools account for a large percentage of total vehicular trips in the AM peak period. Less than 10% of high school learners utilise public transport and even less walk or cycle. This means that the majority are dropped off and collected by private vehicles or privately operated buses. The traffic impact caused by scholars is most significant in Krigeville where five schools are located.

A Transport Management Plan with the title "The Development of a Transport Management Plan around the various schools located off the intersection of the R44 and Van Reede Street, Stellenbosch" was prepared by Pendulum Consulting in June 2011. This report dealt specifically with traffic congestion due to activities with learner transport in the area, as well as local residential streets being used as "rat-running routes" to the CBD and to drop and collect learners at the various schools.

The outcome of the report proposed several changes with respect to parking, bus parking, education, awareness as well as road improvements. Some of these improvements has since been implemented.

7.5.1 2018 REVIEW

An additional assessment of this scholar transport issue was requested as part of this RMP update. Refer to the WSP report: Stellenbosch Municipality Krigeville Schools Precinct Traffic Management Plan, dated April 2019.

The report assessed the following options, listed in Table 7-1.

Table 7-1: School precinct improvement options

Scenario	Description
Scenario 1	Current Traffic Scenario (status quo).
Scenario 2	Conversion of Doornbosch Road to 1-way with traffic travelling southbound.
Scenario 3	Conversion of Doornbosch Road to 1-way with traffic travelling southbound and the signalisation of the intersection of Van Reede Road with Doornbosch Road.
Scenario 4	Conversion of Doornbosch Road to 1-way with traffic travelling northbound.
Scenario 5	Conversion of Doornbosch Road to 1-way with traffic travelling northbound, the signalisation of the intersection of Van Reede Road with Doornbosch Road, left-turning slip lane on the western approach at the intersection of Van Reede Road with Doornbosch Road.
Scenario 6A	– New road link between Doornbosch Road and Koch Road/Suidwal Road. – The road link was included in the 2012 Stellenbosch Roads Master Plan and noted as SRMP056. – Traffic volumes have been estimated based on high-level EMME model results. – Only the addition of the new road link has been analysed in the scenario to determine the impact of the road link on the current traffic flow conditions.
Scenario 6B	– New road link between Doornbosch Road and Koch Road/Suidwal Road. – Traffic volumes have been estimated based on high-level EMME model results. – Conversion of Doornbosch Road to a 1-way from Van Reede Raod to a new roundabout to be located at the new T-junction of Doornbosch with the Suidwal Extension.

	– Signalisation of the intersection of Van Reede Road with Doornbosch Road, left-turning slip lane on the western approach at the intersection of Van Reede Road with Doornbosch Road.

Refer to Figure 7-16 for a potential alignment of the Doornbosch Road and Koch Road/Suidwal Road link described in Scenario 6A and 6B.

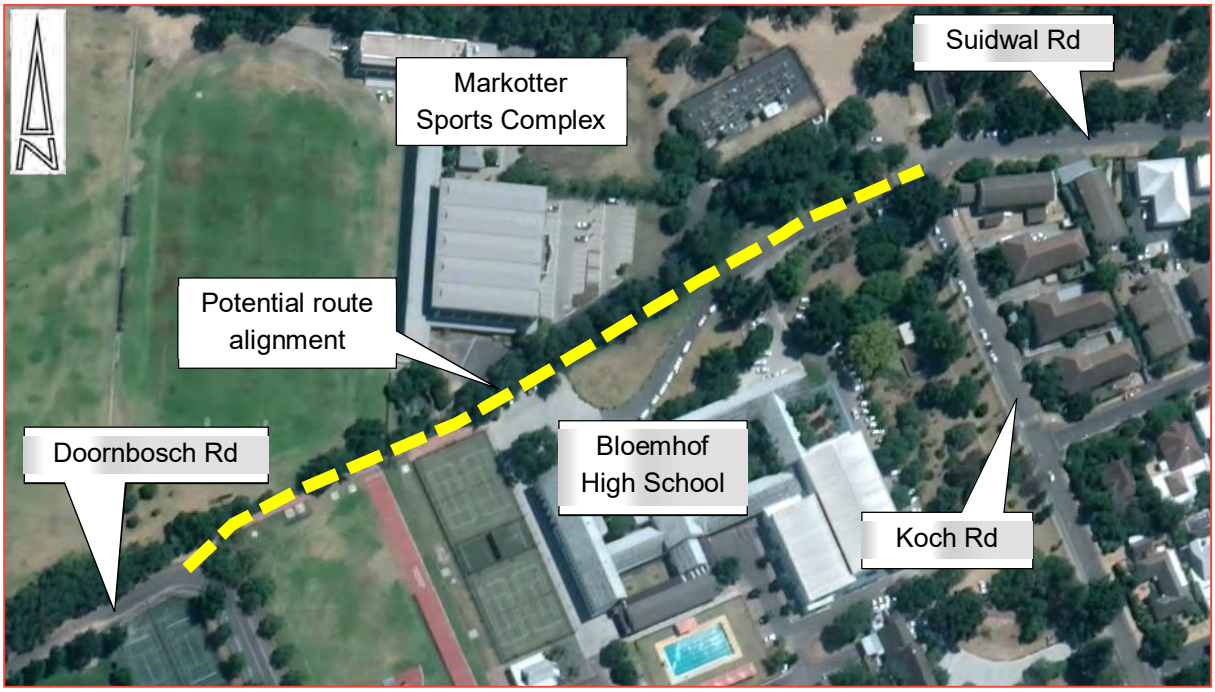


Figure 7-16: Doornbosch Road/Suidwal Rd link – potential alignment

The Traffic Management Plan concluded that Scenario 5 should be implemented. The option can be implemented in the short-term and will result in the best improvement of the traffic operations on the local road network.

The final report has been submitted to SM for approval and further liaison with the schools and other affected parties for potential implementation.

8 STELLENBOSCH ROADS MASTER PLAN PROPOSALS

8.1 ROAD CLASSIFICATION

The 2012 RMP updated the future road classification for all public roads within the Stellenbosch Municipal area. Various additions and changes were proposed at the time, as shown in the hierarchy plan in Figure 3-4

The road classification focussed on road links and not on intersection level detail. SM has confirmed that no changes are required to the current road network hierarchy plan.

8.2 PROPOSED PROJECTS

Refer to Table 8-1 for the current road network upgrade proposals based on the latest EMME modelling, land-use planning and all other relevant information. Note that the majority of these proposals were carried over from the 2012 RMP. The unique project numbers of the 2012 RMP has been carried over, namely SRMP01 etc. Note that the 2018 RMP does not include changes to the Class 5 lowest order roads.

Refer to Figure 8-1 for the location of the major proposals (also included in Appendix B). Note that some of the smaller scale proposals are not show on the drawing.

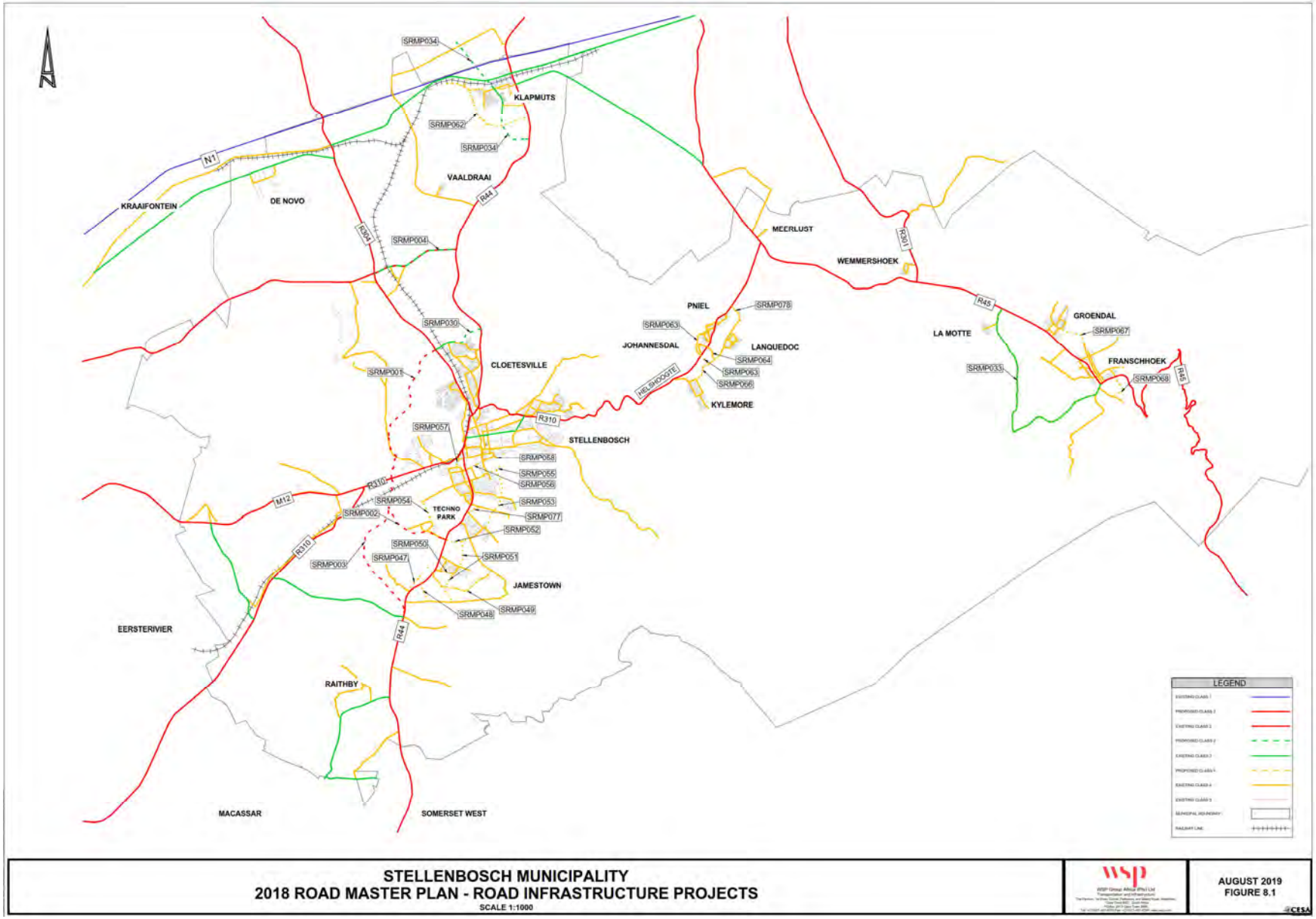


Figure 8-1: 2018 Stellenbosch Road Masterplan proposals

Table 8-1: STB RMP proposed road projects (including Provincial road projects)

PROJECT REFERENCE NUMBER	ROAD NAME	ROAD AUTHORITY	ROAD NUMBER	PROVINCIAL ROAD NUMBER	ROAD SECTION / INTERSECTION NAMES	IMPROVEMENT TYPE	IMPROVEMENT DESCRIPTION	LENGTH (+/- km)	PROPOSED CLASSIFICATION	CROSS SECTION	PRIORITY *	COMMENTS/STATUS
SRMP001	Western bypass	PGWC	tbc	-	New road between R310 and R304 (Western bypass - Portion north of Adam Tas Road)	New road	New road between R310 heading north to link with the R304 to tie into the existing intersection with Welgevonden Boulevard. The route runs east of the Stellenbosch land-fill and joins Devon Valley Road for a portion before deviating to pass over the hill	6.0	Class 2, Urban Major Arterial	Dual Carriageway		
SRMP002	Western bypass	PGWC	tbc	-	New road between R44 (Techno Park) and R310 (Adam Tas Road). Western Bypass - interim portion south of the R310.	New road	Upgrade and extension of Techno Avenue from the R44. Intersections with the R44 and R310 to be grade-separated when required. The road will have limited intersections, and access to Techno Park linking into Neutron Road. The route crosses the Eerste river (new bridge), and passes to the west of Van Ryn's Distillery before crossing the railway line (new bridge) and intersecting with Adam Tas. Detailed planning and investigation of route alternatives will be required and an EIA process due to potentially environmentally sensitive areas	4.0	Class 2, Urban Major Arterial	Single Carriageway	High	Detail planning scheduled to commence
SRMP003	Western bypass	PGWC	tbc	-	New road between R44 (near Annandale Road) and R310 (Adam Tas). Western Bypass, ultimate portion south of the R310.	New road	Ultimate north-south link between Annandale Road and Adam Tas running to the east of the airport and De Zalze Estate. The route will cross the Eerste River (new bridge) and passes to the west of Van Ryn's Distillery before crossing the railway line (new bridge) and intersecting with Adam Tas. Detailed planning and investigation of route alternatives will be required, and an EIA process due to potentially environmentally sensitive areas.	6.4	Class 2, Urban Major Arterial	Single Carriageway		
SRMP004	Kromme Rhee Road	PGWC	M23	DR1085	Kromme Rhee Road	Road upgrade	Upgrade to dual carriageway with shoulders, replacement of level crossing at Koelenhof Station with road over rail bridge.	3.5	Class 2, Urban Major Arterial	Dual Carriageway		
SRMP005	R44	Stellenbosch	R44	MR27/MR171	R44 / Van Reede Road	Intersection upgrade	Provide a left turn slip along van Reede Road. Extend existing right turn lane along R44 northbound.	N/a	Class 2, Urban Major Arterials	-		Completed
SRMP006	R44	Stellenbosch	R44	MR27	R44 / Merriman Street	Intersection upgrade	Extend the existing right turn lane along the R44 northbound and widen the carriageway. Provide left turn slip and acceleration lane for left turning traffic on Merriman Street. Provide a left-turning slip and additional lane from Dennesig to Merriman southbound.	N/a	Class 2, Urban Major Arterials	-	High	
SRMP007	Bottelary Road	PGWC	M23	MR187	Bottelary Road / R304 / Devonvale Rd (Blumberg Dr)	Road upgrade	Upgrade Bottelary Rd to dual carriageway between Devonvale Road and R304. New roundabout proposed at intersection with Devonvale Road.	1.0	Class 2, Urban Major Arterials	Dual Carriageway	Medium	Roundabout completed
SRMP008	R44/R310	Stellenbosch	R44/R310	MR27/MR172	R44 / Helshoogte Road	Intersection upgrade	Provide a left turn slip lane on the R44 southbound, and upgrade Helshoogte westbound to left turn, through and double right turn lanes.	N/a	Class 2, Urban Major Arterials	-	High	
SRMP009	Adam Tas	Stellenbosch	R44/R310	MR27/MR177	R44 / Alexander Street / Adam Tas	Intersection upgrade	Realign Alexander Road to form the 4th leg opposite Adam Tas Road southbound.	N/a	Class 2, Urban Major Arterials	-	High	
SRMP010	R44	PGWC	R 44	MR27	R44 / Winery Road	Intersection upgrade	Grade Separation of intersection with free flow on the R44	N/a	Class 2, Urban Major Arterials	Dual Carriageway		
SRMP011	R44	PGWC	R 44	MR27	R44 / Annandale Road	Intersection upgrade	Grade Separation of intersection with free flow on the R44	N/a	Class 2, Urban Major Arterials	Dual Carriageway		
SRMP012	Huguenot Road	Stellenbosch	R45	MR191	R45 (Huguenot Rd) / Le Roux Street	Intersection upgrade	Intersection upgrade and potentially a new layout / control type	N/a	Class 2, Urban Major Arterials	-	High	Commence with design for PGWC approval only
SRMP013	Huguenot Road	Stellenbosch	R45	MR191	R45 (Huguenot Rd) / La Provence Road	Intersection upgrade	Intersection upgrade and potentially a new layout / control type	N/a	Class 2, Urban Major Arterials	-	High	Commence with design for PGWC approval only
SRMP014	Huguenot Road	Stellenbosch	R45	MR191	R45 (Huguenot Rd) / Uitkyk Street	Intersection upgrade	Intersection upgrade and potentially a new layout / control type	N/a	Class 2, Urban Major Arterials	-	High	Commence with design for PGWC approval only
SRMP015	Huguenot Road	Stellenbosch	R45	MR191	R45 (Huguenot Rd) / Louis Botha Road	Intersection upgrade	Provide medians on approaches to Huguenot Road / Louis Botha intersection to improve safety.	N/a	Class 2, Urban Major Arterials	-	High	Commence with design for PGWC approval only
SRMP016	Huguenot Road	Stellenbosch	R45	MR191	R45 (Huguenot Rd) / Lambrechts Road	Intersection upgrade	Intersection upgrade and potentially a new layout / control type	N/a	Class 2, Urban Major Arterials	-	High	Commence with design for PGWC approval only
SRMP017	Lambrechts Road	Stellenbosch	R45	MR191	R45 (Lambrechts Road) / Nerina Street	Intersection upgrade	Intersection upgrade and potentially a new layout / control type	N/a	Class 2, Urban Major Arterials	-	High	Commence with design for PGWC approval only

PROJECT REFERENCE NUMBER	ROAD NAME	ROAD AUTHORITY	ROAD NUMBER	PROVINCIAL ROAD NUMBER	ROAD SECTION / INTERSECTION NAMES	IMPROVEMENT TYPE	IMPROVEMENT DESCRIPTION	LENGTH (+/- km)	PROPOSED CLASSIFICATION	CROSS SECTION	PRIORITY *	COMMENTS/STATUS
SRMP018	R44	PGWC	R 44	MR27	Techno Road to Van Reede Road intersections	Additional lanes	Provision of additional lanes to increase road link capacity and intersection stop line capacity	3.3	Class 2, Urban Major Arterials	Dual Carriageway		
SRMP019												Project removed
SRMP020	R44	PGWC	R 44	MR27	R 44	IRT infrastructure	Provision of intersection upgrades and/or dedicated lanes in congested sections	N/a	Class 2, Urban Major Arterials	Dual Carriageway & median IRT Lanes		Long-term planning
SRMP021	R310	PGWC	M12 & R310	MR177	Stellenbosch Arterial / Polkadraai Road	IRT infrastructure	Provision of intersection upgrades and/or dedicated lanes in congested sections	N/a	Class 2, Urban Major Arterials	Dual Carriageway & median IRT Lanes		Long-term planning
SRMP022	Western bypass	PGWC	-	-	Full length of Western Bypass	Road upgrade	Dualling of full length of Western Bypass	12.4	Class 2, Urban Major Arterials	Dual Carriageway		
SRMP023	Western bypass	PGWC	-	-	Western Bypass / R304 intersection	Interchange	Upgrade to grade-separated interchange	N/a	Class 2, Urban Major Arterials	-		
SRMP024	Western bypass	PGWC	-	-	Western Bypass / R310 intersection	Interchange	Upgrade to grade-separated interchange	N/a	Class 2, Urban Major Arterials	-		
SRMP025	Western bypass	PGWC	R 44	MR27	Western Bypass / R44 intersection	Intersection upgrade	Upgrade to grade-separated interchange. Possible roundabout to accommodate Techno Park access, proposed new east-west route, and possibly De Zalze access. Refer to SRMP003.	N/a	Class 2, Urban Major Arterials	-		
SRMP026												Project removed
SRMP027	R45	PGWC		MR191	Portion of R45 between N1 and Helshoogte Road	Road upgrade	Road upgrades and intersection improvements	9.8	Class 2, Urban Major Arterial	Single Carriageway		
SRMP028 (Full)	R304	PGWC	R304	MR174	Portion of R304 from N1 to R310/R44	Road upgrade	Upgrade to dual carriageway.	13.5	Class 2, Urban Major Arterial	Dual Carriageway		
SRMP028 (Partial)	R304	Stellenbosch	R304	MR174	Portion of R304 from R44 to Kyamandi	Road upgrade	Upgrade to dual carriageway.	0.75	Class 2, Urban Major Arterial	Dual Carriageway	High	
SRMP029	Vlaeberg Road	PGWC	-	DR1052	Vlaeberg Road	Road realignment	Realignment of road in accordance with the AMP for the R310 with a road over rail bridge	0.9	Class 3, Urban Minor Arterial	Single Carriageway		Completed
SRMP030	Welgevonden Boulevard	Stellenbosch	-	-	New road between Lang Road and R44	New road extension	Extension of Welgevonden Boulevard to bypass north of Welgevonden residential area, follow a new alignment and link to the R44 with a signalised intersection. A new entrance to Welgevonden will be required.	1.4	Class 3, Urban Minor Arterial	Single Carriageway		
SRMP031												Project removed
SRMP033	Robertsvlei Road	PGWC	-	DR1351	DR1343 / DR1351 / MR191	Road upgrade	Upgrade of Robertsvlei Road to accommodate Heavy Vehicles which will allow bypassing of Franschhoek town centre.	10.3	Class 3, Rural Minor Arterials	Single Carriageway	High	
SRMP034	Groenfontein Road	Stellenbosch	-	DR1104	Groenfontein Road from R44 to Protea Road	New road extension	Upgrade of Groenfontein Road to serve proposed new developments in Klapmuts (north and south of the N1).	5.3	Class 3, Urban Minor Arterials	Single Carriageway		
SRMP035	George Balke Road	Stellenbosch	R44	MR27	R44 / George Blake Road / Merriman Avenue	Intersection upgrade	Grade separation of George Blake Road over railway line and R44 to link directly to Merriman Avenue. New slips off/onto R44 from new overpass. Signalised.	N/a	Class 3, Urban Minor Arterials	-		
SRMP036												Project completed
SRMP037	tbc	PGWC	-	MR166	Road and intersection upgrades	Road upgrade	Road rehabilitation and provision of new intersections with Eikendal Road, Bredell Road and the R44.	-	tbc	Single Carriageway		Long-term planning
SRMP038	Old Paarl Road	PGWC	R101	MR189	Portion of Old Paarl Road from the R304 to Bloekombos	Road rehabilitation	Road rehabilitation of the R101.	-	Class 3, Urban Minor Arterial	Single Carriageway		
SRMP039	Stellenbosch Arterial	PGWC	M12	MR177	Portion of M12 from existing dualling to R102	Road rehabilitation	Road rehabilitation of the M12.	-	Class 3, Urban Minor Arterial	Single Carriageway		
SRMP040	Annandale Road	PGWC	-	DR1050	Annandale Road and a portion of Baden Powell Drive	Road rehabilitation	Road rehabilitation of Annandale Road.	-	Class 3, Urban Minor Arterial	Single Carriageway	High	In Progress
SRMP041	Groenfontein Road	PGWC	-	DR1104	Groenfontein Road from Klapmuts to north of the N1	Road regravel	Regravel Groenfontein Road	-	Class 3, Urban Minor Arterial	Single Carriageway		Refer to SRMP034

PROJECT REFERENCE NUMBER	ROAD NAME	ROAD AUTHORITY	ROAD NUMBER	PROVINCIAL ROAD NUMBER	ROAD SECTION / INTERSECTION NAMES	IMPROVEMENT TYPE	IMPROVEMENT DESCRIPTION	LENGTH (+/- km)	PROPOSED CLASSIFICATION	CROSS SECTION	PRIORITY *	COMMENTS/STATUS
SRMP042	Sandringham Road	PGWC	-	DR1094	Sandringham Road	Upgrade to surfaced	Road improvement	-	Class 3, Urban Minor Arterial	Single Carriageway		Project completed
SRMP043	Baden Powell Drive	PGWC	R310	MR168	Baden Powell Drive between the M12 Polkadraai and N2.	Road rehabilitation	Rehabilitation and upgrade of Baden Powell between the N2 and Vlaeberg Road. Section between Polkadraai and Annandale Road is planned.	-	Class 3, Rural Minor Arterials	Single Carriageway	High	In-Progress
SRMP044	Robertsvlei Road	PGWC	-	DR1351	Portion of Robertsvlei Road	Road regravel	Regravelling of existing road	-	Class 3, Rural Minor Arterials	Single Carriageway		Refer to SRMP033
SRMP045	Winery Road / Main Street	PGWC	M9	MR165/MR166	Macassar Road to Winery Road, extension of Main Road	New road & intersection	Realignment of Macassar Road to connect with Winery Road to create improved mobility from south of the N1. Existing portion of Winery Road to be maintained for local farm access only. Main Road to be extended to meet with new road as a priority intersection.	1.3	Class 3, Urban Minor Arterials	Single Carriageway		Upgrade located outside SM
SRMP046												Removed - duplicate in 2012 RMP
SRMP047	R44 / Stellenbosch Airport Service Road	Stellenbosch	-	-	New road link to the R44	New road	New road between the existing service road and tieing into proposed intersection on the R44 - required as part of the Stellenrust Road realignment. Allows closure of several private driveways along the R44 with a consolidated access road. May require upgrading of the existing gravel service road. Closure of existing unsafe Aerodrome access off the R44	0.2	Class 4, Urban Collector Streets	Single Carriageway		Refer to SRMP048
SRMP048	R44 link / Stellenrust Rd link	Stellenbosch	-		New road link to the R44	New road	Realignment of Stellenrust Road over the R44 to link onto proposed new road and the closure of the existing unsafe access on the R44.	0.7	Class 4, Urban Collector Streets	Single Carriageway		Refer to SRMP047
SRMP049	New Jamestown Road	Stellenbosch	-	-	New Jamestown access road	New road extension	New Jamestown access road linking existing and proposed residential developments south to new Stellenrust Road realignment and north to Blauwklippen road / Proposed Eastern Link.	3	Class 4, Urban Collector Streets	Dual Carriageway		Long-term planning
SRMP050	School Road	Stellenbosch	-	-	Upgrade of School Road		School Road upgrade from R44 - pending finalisation of PGWC planned U-turn facility near the R44/School Road intersection	1.5	Class 4, Urban Collector Streets	Single Carriageway		Long-term planning
SRMP051	Pajaro Avenue	Stellenbosch	-	-	Pajaro Avenue extension north and south to connect Stellenrust Road to Blaauwklippen Road	New road extension	Extend Pajaro Avenue northwards to intersect with Blaauwklippen Road and south to Stellenrust Road. Provides link between Jamestown and Paradyskloof.	2.3	Class 4, Urban Collector Streets	Single Carriageway		
SRMP052	Eastern Link Rd (Wildebosch South)	Stellenbosch	-	MR169	Wildebosch Road between R44 and Blaauwklippen Road	New road	The extension of Wildebosch Road to link onto Techno Avenue at the R44 (Portion of Eastern link)	0.95	Class 4, Urban Collector Streets	Single Carriageway	TBC	Extent and intensity of developments as well as Provincial R44 access conditions would determine priority and timeing for implementation
SRMP053	Eastern Link Rd (Wildebosch North)	Stellenbosch	-	MR169	Wildebosch Road between Paradyskloof Road and the extension of Van Reede Road	New road	The extension of Wildebosch Road to the north over Trumali Road and in future liniking onto Brandwacht, the extension of Van Reede Road and the CBD (Portion of Eastern link)	2.5	Class 4, Urban Collector Streets	Single Carriageway	TBC	Extent and intensity of developments as well as Provincial R44 access conditions would determine priority and timeing for implementation
SRMP054	Van Reede Road	Stellenbosch	-	MR171	Van Reede Road	Upgrade & new road extension	Portion of Van Reede Road to be upgraded/widened and extended to link with Neutron Road that will provide second access to Techno Park.	2.3	Class 4, Urban Collector Streets	Single Carriageway		
SRMP055	Van Reede Road	Stellenbosch	-	MR171	Van Reede Road	New road extension	Extension of Van Reede Road to link with proposed new eastern extension of Wildebosch Road. Route runs through potentially sensitive farmlands and although a proclaimed provincial servitude is present, further investigations will be required.	0.6	Class 4, Urban Collector Streets	Single Carriageway		
SRMP056	Suidwal Road	Stellenbosch	-	-	Suidwal Road	New road	Extension of Suidwal Road between Doornbosch Road to Koch Road. The route is near sensitive areas and requires changes to Bloemhof Girls High School parking area.	0.4	Class 4, Urban Local Streets	Single Carriageway		
SRMP057	Stellentia Road	Stellenbosch	-	-	Rokewood Road / Stellentia Road	New road	Extension of Stellentia Road over the Eerste Rive (new bridge) to link onto Rokewood Road at the eastern Culemborg Crescent intersection. Provides an alternative access from Die Boord to the R310, without using the R44.	0.2	Class 4, Urban Collector Streets	Single Carriageway		

PROJECT REFERENCE NUMBER	ROAD NAME	ROAD AUTHORITY	ROAD NUMBER	PROVINCIAL ROAD NUMBER	ROAD SECTION / INTERSECTION NAMES	IMPROVEMENT TYPE	IMPROVEMENT DESCRIPTION	LENGTH (+/- km)	PROPOSED CLASSIFICATION	CROSS SECTION	PRIORITY *	COMMENTS/STATUS
SRMP058	Pastorie Street	Stellenbosch	-	-	Pastorie Road (Noordwal Wes Rd) link to Suidwal Street	New road	Pastorie Street link with Suidwal Road over the Eerste River (new bridge required)	0.2	Class 4, Urban Collector Streets	Single Carriageway		
SRMP059												Project removed
SRMP060												Project removed
SRMP061												Project completed
SRMP062	-	Stellenbosch	-	MR27/MR189	R44 / Sandringham Road (R101)	New road	New Class 4 road between the R44 and R101, Klapmuts	3.7	Class 4, Urban Collector Streets	Single Carriageway		
SRMP063	Simonsberg Street	Stellenbosch	-	MR172	Helshoogte Road / Simonsberg Street	Road upgrade & extension	Simonsberg St extension over the R310 to Main Rd Ext, Johannesdal.	2.1	Class 4, Urban Collector Streets	Single Carriageway		
SRMP064	Sonnestraal Street	Stellenbosch	-	MR172	Helshoogte Road / Sonnestraal Street	Road upgrade & extension	1. Western extension of Sonnestraal Street from the R310 to future Simonsberg Street Ext. 2. Eastern extension of Sonnestraal Street from the R310 to Main Rd Lanquedoc. Eastern extension's access intersections with the R310 LILO only	1	Class 4, Urban Collector Streets	Single Carriageway		
SRMP065												Project removed
SRMP066	Main Road	Stellenbosch	-	-	Main Road / Simonsberg Ext	New road	Establish the road reserve for Main Road (Lanquedoc) extension to the south to link to Simonsberg St Extension and Kylemore	3	Class 4, Urban Collector Streets	Single Carriageway		
SRMP067	Dirkie Uys Street	Stellenbosch	-	-	Dirkie Uys Street	New road extension	Extension of Dirkie Uys Street to connect with La Provence Street - connecting Groendal with Franschhoek.	1.4	Class 4, Urban Collector Streets	Single Carriageway	Medium	
SRMP068	Nerina Street	Stellenbosch	-	-	New access road from the R45 to existing local access road (OP5618)	Road upgrade & extension	Extension of Nerina Road from the R45 to Middagkrans Road, Franschhoek.	1.1	Class 4, Urban Collector Streets	Single Carriageway		
SRMP069	The Avenue	Stellenbosch	-	-	The Avenue / Suidwal Street	Bridge Widening	Widening of the existing bridge over the Eerste River to allow two-way traffic	0.1	Class 4, Urban Collector Streets	Single Carriageway		
SRMP070	Vlottenburg Road	Stellenbosch	-	DR1065	Vlottenburg Road	Road realignment	Realignment of Vlottenburg Road to intersect with existing Stellenbosch Kloof Road intersection. This improves safety and reduces the number of intersections and level crossings along Baden Powel. Existing intersection along Baden Powell Drive to be closed.	0.3	Class 4, Urban Collector Streets	Single Carriageway		Completed
SRMP071	Trumali Street	Stellenbosch	-	-	Trumali Street	Road upgrade	Upgrade of Trumali Street to surfaced carriageway to link with proposed Stern link road road. Provides additional linkages for proposed future developments.	0.6	Class 4, Urban Collector Streets	Single Carriageway		In progress
SRMP072	-	Stellenbosch	-	MR172	-	New road	Future Eastern Link Road (Johannesdal).	2.2	Class 4, Urban Collector Streets	Single Carriageway		
SRMP073	Stellenrust Road	PGWC	-	DR1053	Stellenrust Road	Road upgrade	Upgrading of Stellenrust Road	3	Class 4, Urban Collector Streets	Single Carriageway		In progress
SRMP074												Removed - duplicate in 2012 RMP
SRMP075												Removed - duplicate in 2012 RMP
SRMP076	Dorp Street	Stellenbosch	-	-	R44 / Adam Ras	Road upgrade	Upgrade to dual carriageway. Increased capacity from CBD to Adam Tas and northbound traffic on the R44 can access Adam Tas without using the Adam Tas/R44 intersection	0.3	Class 4, Urban Collector Streets	Dual Carriageway		
SRMP077	Schuilplaats Rd	Stellenbosch	-	-	Trumali Street / Paradyskloof Road	New road	Extension of Schuilplaats Rd. to link Paradyskloof Rd to Trumali Street. The link will provide a safer alternative access for residents of Paradyskloof to the R44 via the signalised intersection of the R44/Trumali Street. This will also improve overall LOS and safety along this section of the R44.	0.3	Class 4, Urban Collector Streets	Single Carriageway	High	
SRMP078	Lanquedoc access Rd	Stellenbosch			Lanquedoc	New roads	Upgrade Lanquedoc access road between R310 & Main Road, including a new bridge adjacent to the existing single carriageway bridge	0.25	Class 4, Urban Collector Streets	Single Carriageway		Planning and design underway
tbc	Ben du Toit Extension	Stellenbosch	-	-	Trumali Street / Paradyskloof Road	New road	Potential extension of Ben du Toit Street to link Paradyskloof Rd to Trumali St	0.6	Class 4, Urban Collector Streets	Single Carriageway		Possible future link to be assessed.
tbc		Stellenbosch			Jamestown (South) road network	New roads	Connect Jamestown (southern areas) to housing developments and Stellenrust Road	tbc	Class 4 and/or Class 5	tbc	High	Planning to commence to assess impact on local and regional transport.

PROJECT REFERENCE NUMBER	ROAD NAME	ROAD AUTHORITY	ROAD NUMBER	PROVINCIAL ROAD NUMBER	ROAD SECTION / INTERSECTION NAMES	IMPROVEMENT TYPE	IMPROVEMENT DESCRIPTION	LENGTH (+/- km)	PROPOSED CLASSIFICATION	CROSS SECTION	PRIORITY *	COMMENTS/STATUS
tbc		Stellenbosch			Kyamandi (Northern area) road network	New roads	Road network planning and development to accommodate new housing developments	tbc	Class 4 and/or Class 5	tbc	High	Planning to commence to assess impact on local and regional transport.
tbc		Stellenbosch			Botmanskop Road network	New roads	Road network planning and development to accommodate new housing developments	tbc	Class 4 and/or Class 5	tbc	High	Planning to commence to assess impact on local and regional transport.
tbc		Stellenbosch			Droedyke road network	New roads	Road network planning and development to accommodate new housing developments	tbc	Class 4 and/or Class 5	tbc	High	Planning to commence to assess impact on local and regional transport.
tbc		Stellenbosch			Klapmuts road network	New roads	Road network planning and development to accommodate new housing developments	tbc	Class 4 and/or Class 5	tbc	High	Planning to commence to assess impact on local and regional transport.

* The prioritisation of a road project that falls under the authority of the PGWC will be determined in conjunction with the PGWC

8.3 IMPLEMENTATION AND PHASING OF PROPOSALS

A number of road infrastructure projects have been identified as part of the development of the Roads Master Plan. These prioritisation of these projects will require evaluation based on the following:

- **Western Cape Government (WCG) Construction Projects**

  WCG has an on-going programme for road infrastructure projects, refer to Section 8.3.1.

  Note, projects listed in Table 8.1 where the roads authority is the PGWC, will be prioritised in conjunction with the Provincial authority.
- **Private Development Driven Projects**

  Road infrastructure partly or fully financed by private developer contributions.
- **Local Improvement Projects**

  Local intersection/road improvement projects identified in this and previous studies.
- **Short Term Projects (0 to 5 Years)**

  Projects already on capex budget or for which funds would be negotiated in the next 5 years. These projects carry the highest priority based on demand outputs from the EMME/4 model together with working knowledge. The majority of these projects have already had engineering design input (i.e. preliminary drawings prepared, public consultation, etc.) and merely need to go out to tender and constructed.
- **Medium Term Projects (5 to 10 Years)**

  Projects which form part of the future RMP for SMA, but are only required once other more urgent projects are implemented. Planning for these projects can only start once the 1-5 year projects have been constructed. They also include projects which might require extensive environmental assessments and/or public participation.
- **Long Term Project (>10 years)**

  This timeframe includes projects which are needed in the future according to the model, but are not essential. These projects could be linked to future developments.
- **Capital budget**

  The available capital budget of the municipality will lastly inform the prioritisation of future projects.

Prioritisation of projects were not undertaken as part of this RMP update. High and medium priority projects are however noted.

8.4 COST ESTIMATES

Refer to Table 8-2 for the high-level cost estimates of the various road infrastructure projects. It must be noted that these values should be used with caution. The cost estimates should be revised as and when a project develops further. The projects costs were estimated as follows:

- Construction rates of the ongoing Annandale Road upgrade were used
- Prelim & general: 15%
- Services: 5%
- Contingencies: 15%

The high-level cost estimates does not include the following:

- Engineering design incl. contract management
- Specialist studies, e/g. Environmental Impact Assessment, Heritage, etc.
- Relocation, placement or replacement of service (major or minor) or drainage structures.
- Land expropriation.
- Escalation.

Table 8-2: High-level costing of 2018 RMP road upgrade proposals

PROJECT REFERENCE NUMBER	ROAD NAME	ROAD AUTHORITY	LENGTH (+/- km)	PROPOSED CLASSIFICATION	CROSS SECTION	2018 COST ESTIMATE (ROADWORKS)	2018 COST ESTIMATE (ROADWORKS)	2018 COST ESTIMATE (P&G)	2018 COST ESTIMATE (SERVICES)	2018 COST ESTIMATE (CONTINGENCIES)	2018 COST ESTIMATE (SUBTOTAL)	2018 COST ESTIMATE (VAT)	2018 COST ESTIMATE (TOTAL)
						ROADWORKS	BRIDGES						
SRMP001	Western bypass	PGWC	6.0	Class 2, Urban Major Arterial	Dual Carriageway	R 47 319 240	R 27 000 000	R 11 147 886	R 3 715 962	R 11 147 886	R 100 330 974	R 15 049 646	R 115 400 000
SRMP002	Western bypass	PGWC	4.0	Class 2, Urban Major Arterial	Single Carriageway	R 25 245 040	R 36 000 000	R 9 186 756	R 3 062 252	R 9 186 756	R 82 680 804	R 12 402 121	R 95 100 000
SRMP003	Western bypass	PGWC	6.4	Class 2, Urban Major Arterial	Single Carriageway	R 40 392 064	R 54 000 000	R 14 158 810	R 4 719 603	R 14 158 810	R 127 429 287	R 19 114 393	R 146 600 000
SRMP004	Kromme Rhee Road	PGWC	3.5	Class 2, Urban Major Arterial	Dual Carriageway	R 14 337 164	R 18 000 000	R 4 850 575	R 1 616 858	R 4 850 575	R 43 655 172	R 6 548 276	R 50 300 000
SRMP005	R44	Stellenbosch	N/a	Class 2, Urban Major Arterials	-	tbc		tbc	tbc	tbc	tbc	tbc	tbc
SRMP006	R44	Stellenbosch	N/a	Class 2, Urban Major Arterials	-	R 2 778 117		R 416 718	R 138 906	R 416 718	R 3 750 459	R 562 569	R 4 400 000
SRMP007	Bottelary Road	PGWC	1.0	Class 2, Urban Major Arterials	Dual Carriageway	R 21 354 610		R 3 203 192	R 1 067 731	R 3 203 192	R 28 828 725	R 4 324 309	R 33 200 000
SRMP008	R44/R310	Stellenbosch	N/a	Class 2, Urban Major Arterials	-	R 1 115 895		R 167 384	R 55 795	R 167 384	R 1 506 458	R 225 969	R 1 800 000
SRMP009	Adam Tas	Stellenbosch	N/a	Class 2, Urban Major Arterials	-	R 1 727 618		R 259 143	R 86 381	R 259 143	R 2 332 285	R 349 843	R 2 700 000
SRMP010	R44	PGWC	N/a	Class 2, Urban Major Arterials	Dual Carriageway	R 21 943 270		R 3 291 491	R 1 097 164	R 3 291 491	R 29 623 416	R 4 443 512	R 34 100 000
SRMP011	R44	PGWC	N/a	Class 2, Urban Major Arterials	Dual Carriageway	R 21 943 270		R 3 291 491	R 1 097 164	R 3 291 491	R 29 623 416	R 4 443 512	R 34 100 000
SRMP012	Huguenot Road	Stellenbosch	N/a	Class 2, Urban Major Arterials	-	tbc		tbc	tbc	tbc	tbc	tbc	tbc
SRMP013	Huguenot Road	Stellenbosch	N/a	Class 2, Urban Major Arterials	-	tbc		tbc	tbc	tbc	tbc	tbc	tbc
SRMP014	Huguenot Road	Stellenbosch	N/a	Class 2, Urban Major Arterials	-	tbc		tbc	tbc	tbc	tbc	tbc	tbc
SRMP015	Huguenot Road	Stellenbosch	N/a	Class 2, Urban Major Arterials	-	tbc		tbc	tbc	tbc	tbc	tbc	tbc
SRMP016	Huguenot Road	Stellenbosch	N/a	Class 2, Urban Major Arterials	-	tbc		tbc	tbc	tbc	tbc	tbc	tbc
SRMP017	Lambrechts Road	Stellenbosch	N/a	Class 2, Urban Major Arterials	-	tbc		tbc	tbc	tbc	tbc	tbc	tbc
SRMP018	R44	PGWC	3.3	Class 2, Urban Major Arterials	Dual Carriageway	R 10 120 506		R 1 518 076	R 506 025	R 1 518 076	R 13 662 683	R 2 049 402	R 15 800 000
SRMP020	R44	PGWC	N/a	Class 2, Urban Major Arterials	Dual Carriageway & median IRT Lanes	tbc		tbc	tbc	tbc	tbc	tbc	tbc
SRMP021	R310	PGWC	N/a	Class 2, Urban Major Arterials	Dual Carriageway & median IRT Lanes	tbc		tbc	tbc	tbc	tbc	tbc	tbc
SRMP022	Western bypass	PGWC	12.4	Class 2, Urban Major Arterials	Dual Carriageway	R 40 392 064	R 40 500 000	R 12 133 810	R 4 044 603	R 12 133 810	R 109 204 287	R 16 380 643	R 125 600 000
SRMP023	Western bypass	PGWC	N/a	Class 2, Urban Major Arterials	-	R 1 659 125	R 22 500 000	R 3 623 869	R 1 207 956	R 3 623 869	R 32 614 819	R 4 892 223	R 37 600 000
SRMP024	Western bypass	PGWC	N/a	Class 2, Urban Major Arterials	-	R 1 659 125	R 22 500 000	R 3 623 869	R 1 207 956	R 3 623 869	R 32 614 819	R 4 892 223	R 37 600 000
SRMP025	Western bypass	PGWC	N/a	Class 2, Urban Major Arterials	-	R 1 659 125	R 45 000 000	R 6 998 869	R 2 332 956	R 6 998 869	R 62 989 819	R 9 448 473	R 72 500 000
SRMP027	R45	PGWC	9.8	Class 2, Urban Major Arterial	Single Carriageway	R 61 850 348		R 9 277 552	R 3 092 517	R 9 277 552	R 83 497 969	R 12 524 695	R 96 100 000
SRMP028 (Full)	R304	PGWC	13.5	Class 2, Urban Major Arterial	Dual Carriageway	R 106 468 290		R 15 970 244	R 5 323 415	R 15 970 244	R 143 732 193	R 21 559 829	R 165 300 000
SRMP028 (Partial)	R304	Stellenbosch	0.75	Class 2, Urban Major Arterial	Dual Carriageway	R 5 914 905		R 887 236	R 295 745	R 887 236	R 7 985 122	R 1 197 768	R 9 200 000
SRMP029	Vlaeberg Road	PGWC	0.9	Class 3, Urban Minor Arterial	Single Carriageway	N/a		N/a	N/a	N/a	N/a	N/a	N/a
SRMP030	Welgevonden Boulevard	Stellenbosch	1.4	Class 3, Urban Minor Arterial	Single Carriageway	R 7 863 912		R 1 179 587	R 393 196	R 1 179 587	R 10 616 282	R 1 592 442	R 12 300 000

PROJECT REFERENCE NUMBER	ROAD NAME	ROAD AUTHORITY	LENGTH (+/- km)	PROPOSED CLASSIFICATION	CROSS SECTION	2018 COST ESTIMATE (ROADWORKS)	2018 COST ESTIMATE (ROADWORKS)	2018 COST ESTIMATE (P&G)	2018 COST ESTIMATE (SERVICES)	2018 COST ESTIMATE (CONTINGENCIES)	2018 COST ESTIMATE (SUBTOTAL)	2018 COST ESTIMATE (VAT)	2018 COST ESTIMATE (TOTAL)
						ROADWORKS	BRIDGES						
SRMP033	Robertsvlei Road	PGWC	10.3	Class 3, Rural Minor Arterials	Single Carriageway	R 42 288 298		R 6 343 245	R 2 114 415	R 6 343 245	R 57 089 203	R 8 563 380	R 65 700 000
SRMP034	Groenfontein Road	Stellenbosch	5.3	Class 3, Urban Minor Arterials	Single Carriageway	R 29 770 524	R 18 000 000	R 7 165 579	R 2 388 526	R 7 165 579	R 64 490 208	R 9 673 531	R 74 200 000
SRMP035	George Balke Road	Stellenbosch	N/a	Class 3, Urban Minor Arterials	-	R 1 659 125	R 18 000 000	R 2 948 869	R 982 956	R 2 948 869	R 26 539 819	R 3 980 973	R 30 600 000
SRMP037	tbc	PGWC	-	tbc	Single Carriageway	N/a		N/a	N/a	N/a	N/a	N/a	N/a
SRMP038	Old Paarl Road	PGWC	-	Class 3, Urban Minor Arterial	Single Carriageway	R 6 308 292		R 946 244	R 315 415	R 946 244	R 8 516 195	R 1 277 429	R 9 800 000
SRMP039	Stellenbosch Arterial	PGWC	-	Class 3, Urban Minor Arterial	Single Carriageway	R 6 308 292		R 946 244	R 315 415	R 946 244	R 8 516 195	R 1 277 429	R 9 800 000
SRMP040	Annandale Road	PGWC	-	Class 3, Urban Minor Arterial	Single Carriageway	N/a		N/a	N/a	N/a	N/a	N/a	N/a
SRMP041	Groenfontein Road	PGWC	-	Class 3, Urban Minor Arterial	Single Carriageway	R 9 462 438		R 1 419 366	R 473 122	R 1 419 366	R 12 774 292	R 1 916 144	R 14 700 000
SRMP042	Sandringham Road	PGWC	-	Class 3, Urban Minor Arterial	Single Carriageway	N/a		N/a	N/a	N/a	N/a	N/a	N/a
SRMP043	Baden Powell Drive	PGWC	-	Class 3, Rural Minor Arterials	Single Carriageway	N/a		N/a	N/a	N/a	N/a	N/a	N/a
SRMP044	Robertsvlei Road	PGWC	-	Class 3, Rural Minor arterials	Single Carriageway	R 6 864 906		R 1 029 736	R 343 245	R 1 029 736	R 9 267 623	R 1 390 143	R 10 700 000
SRMP045	Winery Road / Main Street	PGWC	1.3	Class 3, Urban Minor Arterials	Single Carriageway	R 7 302 204		R 1 095 331	R 365 110	R 1 095 331	R 9 857 976	R 1 478 696	R 11 400 000
SRMP047	R44 / Stellenbosch Airport Service Road	Stellenbosch	0.2	Class 4, Urban Collector Streets	Single Carriageway	R 1 233 972		R 185 096	R 61 699	R 185 096	R 1 665 863	R 249 879	R 2 000 000
SRMP048	R44 link / Stellenrust Rd link	Stellenbosch	0.7	Class 4, Urban Collector Streets	Single Carriageway	R 4 318 902		R 647 835	R 215 945	R 647 835	R 5 830 517	R 874 578	R 6 800 000
SRMP049	New Jamestown Road	Stellenbosch	3	Class 4, Urban Collector Streets	Dual Carriageway	R 22 881 090	R 18 000 000	R 6 132 164	R 2 044 055	R 6 132 164	R 55 189 473	R 8 278 421	R 63 500 000
SRMP050	School Road	Stellenbosch	1.5	Class 4, Urban Collector Streets	Single Carriageway	R 9 254 790		R 1 388 219	R 462 740	R 1 388 219	R 12 493 968	R 1 874 095	R 14 400 000
SRMP051	Pajaro Avenue	Stellenbosch	2.3	Class 4, Urban Collector Streets	Single Carriageway	R 14 190 678	R 18 000 000	R 4 828 602	R 1 609 534	R 4 828 602	R 43 457 416	R 6 518 612	R 50 000 000
SRMP052	Eastern Link Rd (Wildebosch South)	Stellenbosch	0.95	Class 4, Urban Collector Streets	Single Carriageway	R 5 861 367		R 879 205	R 293 068	R 879 205	R 7 912 845	R 1 186 927	R 9 100 000
SRMP053	Eastern Link Rd (Wildebosch North)	Stellenbosch	2.5	Class 4, Urban Collector Streets	Single Carriageway	R 15 424 650		R 2 313 698	R 771 233	R 2 313 698	R 20 823 279	R 3 123 492	R 24 000 000
SRMP054	Van Reede Road	Stellenbosch	2.3	Class 4, Urban Collector Streets	Single Carriageway	R 14 190 678		R 2 128 602	R 709 534	R 2 128 602	R 19 157 416	R 2 873 612	R 22 100 000
SRMP055	Van Reede Road	Stellenbosch	0.6	Class 4, Urban Collector Streets	Single Carriageway	R 3 701 916		R 555 287	R 185 096	R 555 287	R 4 997 586	R 749 638	R 5 800 000
SRMP056	Suidwal Road	Stellenbosch	0.4	Class 4, Urban Local Streets	Single Carriageway	R 1 596 812		R 239 522	R 79 841	R 239 522	R 2 155 697	R 323 355	R 2 500 000
SRMP057	Stellentia Road	Stellenbosch	0.2	Class 4, Urban Collector Streets	Single Carriageway	R 1 233 972		R 185 096	R 61 699	R 185 096	R 1 665 863	R 249 879	R 2 000 000
SRMP058	Pastorie Street	Stellenbosch	0.2	Class 4, Urban Collector Streets	Single Carriageway	R 1 233 972	R 18 000 000	R 2 885 096	R 961 699	R 2 885 096	R 25 965 863	R 3 894 879	R 29 900 000
SRMP062	-	Stellenbosch	3.7	Class 4, Urban Collector Streets	Single Carriageway	R 22 828 482	R 18 000 000	R 6 124 272	R 2 041 424	R 6 124 272	R 55 118 450	R 8 267 768	R 63 400 000

PROJECT REFERENCE NUMBER	ROAD NAME	ROAD AUTHORITY	LENGTH (+/- km)	PROPOSED CLASSIFICATION	CROSS SECTION	2018 COST ESTIMATE (ROADWORKS)	2018 COST ESTIMATE (ROADWORKS)	2018 COST ESTIMATE (P&G)	2018 COST ESTIMATE (SERVICES)	2018 COST ESTIMATE (CONTINGENCIES)	2018 COST ESTIMATE (SUBTOTAL)	2018 COST ESTIMATE (VAT)	2018 COST ESTIMATE (TOTAL)
						ROADWORKS	BRIDGES						
SRMP063	Simonsberg Street	Stellenbosch	2.1	Class 4, Urban Collector Streets	Single Carriageway	R 12 956 706		R 1 943 506	R 647 835	R 1 943 506	R 17 491 553	R 2 623 733	R 20 200 000
SRMP064	Sonnestraal Street	Stellenbosch	1	Class 4, Urban Collector Streets	Single Carriageway	R 6 169 860	R 18 000 000	R 3 625 479	R 1 208 493	R 3 625 479	R 32 629 311	R 4 894 397	R 37 600 000
SRMP066	Main Road	Stellenbosch	3	Class 4, Urban Collector Streets	Single Carriageway	R 18 509 580		R 2 776 437	R 925 479	R 2 776 437	R 24 987 933	R 3 748 190	R 28 800 000
SRMP067	Dirkie Uys Street	Stellenbosch	1.4	Class 4, Urban Collector Streets	Single Carriageway	R 8 637 804		R 1 295 671	R 431 890	R 1 295 671	R 11 661 036	R 1 749 155	R 13 500 000
SRMP068	Nerina Street	Stellenbosch	1.1	Class 4, Urban Collector Streets	Single Carriageway	R 6 786 846		R 1 018 027	R 339 342	R 1 018 027	R 9 162 242	R 1 374 336	R 10 600 000
SRMP069	The Avenue	Stellenbosch	0.1	Class 4, Urban Collector Streets	Single Carriageway	R 616 986	R 9 000 000	R 1 442 548	R 480 849	R 1 442 548	R 12 982 931	R 1 947 440	R 15 000 000
SRMP070	Vlottenburg Road	Stellenbosch	0.3	Class 4, Urban Collector Streets	Single Carriageway	N/a		N/a	N/a	N/a	N/a	N/a	N/a
SRMP071	Trumali Street	Stellenbosch	0.6	Class 4, Urban Collector Streets	Single Carriageway	R 3 701 916		R 555 287	R 185 096	R 555 287	R 4 997 586	R 749 638	R 5 800 000
SRMP072	-	Stellenbosch	2.2	Class 4, Urban Collector Streets	Single Carriageway	R 13 573 692		R 2 036 054	R 678 685	R 2 036 054	R 18 324 485	R 2 748 673	R 21 100 000
SRMP073	Stellenrust Road	PGWC	3	Class 4, Urban Collector Streets	Single Carriageway	R 18 509 580		R 2 776 437	R 925 479	R 2 776 437	R 24 987 933	R 3 748 190	R 28 800 000
SRMP076	Dorp Street	Stellenbosch	0.3	Class 4, Urban Collector Streets	Dual Carriageway	R 2 288 109		R 343 216	R 114 405	R 343 216	R 3 088 946	R 463 342	R 3 600 000
SRMP077	Schuilplaats Rd	Stellenbosch	0.3	Class 4, Urban Collector Streets	Single Carriageway	R 1 850 958		R 277 644	R 92 548	R 277 644	R 2 498 794	R 374 819	R 2 900 000
SRMP078	Lanquedoc access Rd	Stellenbosch	0.25	Class 4, Urban Collector Streets	Single Carriageway	R 1 542 465	R 18 000 000	R 2 931 370	R 977 123	R 2 931 370	R 26 382 328	R 3 957 349	R 30 400 000
tbc	Ben du Toit Extension	Stellenbosch	0.6	Class 4, Urban Collector Streets	Single Carriageway	R 3 701 916		R 555 287	R 185 096	R 555 287	R 4 997 586	R 749 638	R 5 800 000
tbc		Stellenbosch	tbc	Class 4 and/or Class 5	tbc	tbc		tbc	tbc	tbc	tbc	tbc	tbc
tbc		Stellenbosch	tbc	Class 4 and/or Class 5	tbc	tbc		tbc	tbc	tbc	tbc	tbc	tbc
tbc		Stellenbosch	tbc	Class 4 and/or Class 5	tbc	tbc		tbc	tbc	tbc	tbc	tbc	tbc
tbc		Stellenbosch	tbc	Class 4 and/or Class 5	tbc	tbc		tbc	tbc	tbc	tbc	tbc	tbc
tbc		Stellenbosch	tbc	Class 4 and/or Class 5	tbc	tbc		tbc	tbc	tbc	tbc	tbc	tbc

8.5 PROVINCIAL GOVERNMENT WESTERN CAPE PROJECTS

The Provincial Government Western Cape road projects within SM are described in this section. All information was sourced from the Provincial Road Network Information System: https://rnis.westerncape.gov.za/rnis/

Project are categorised as follows:

- Rehabilitation
- Reseal
- Upgrade
- Regravel

The phasing of the projects are categorised as:

- Under construction
- Scheduled (1-5 years)
- Planned (5-10 years)

Refer to Table 8-3 for the list of PGWC projects per type, currently being constructed, and Figure 8-2 to Figure 8-4 for their locations.

Table 8-3: PGWC Projects under construction

Project Ref. No.	No. on figure	Project Name	Approximate Sections	Type
SRMP043	1	C0914.02 : Baden Powell Dr	Rehabilitation and dualling of Baden Powell Road between N2 and Vlaeberg Road, including realigned quarter-link with R102	Rehab/Upgrade
	1	C1087 : R44 – 6 Sections	Stellenbosch to Klapmuts	Reseal
	2	Devon Valley Road	Polkadraai – Devon Valley Hotel	Reseal
	3	Stellenbosch Kloof Rd	Polkadraai – Jordan Wine Estate	Reseal
	4	Jonkershoek Rd	Omega Road to +/- 4.1 km to east	Reseal
SRMP040	1	C0921 : Annandale Rd	R310 to 1.8 km east of R44	Upgrade
	2	C1080 : Stellenrust Rd	R44 to +/- 3.7 km to east	Upgrade

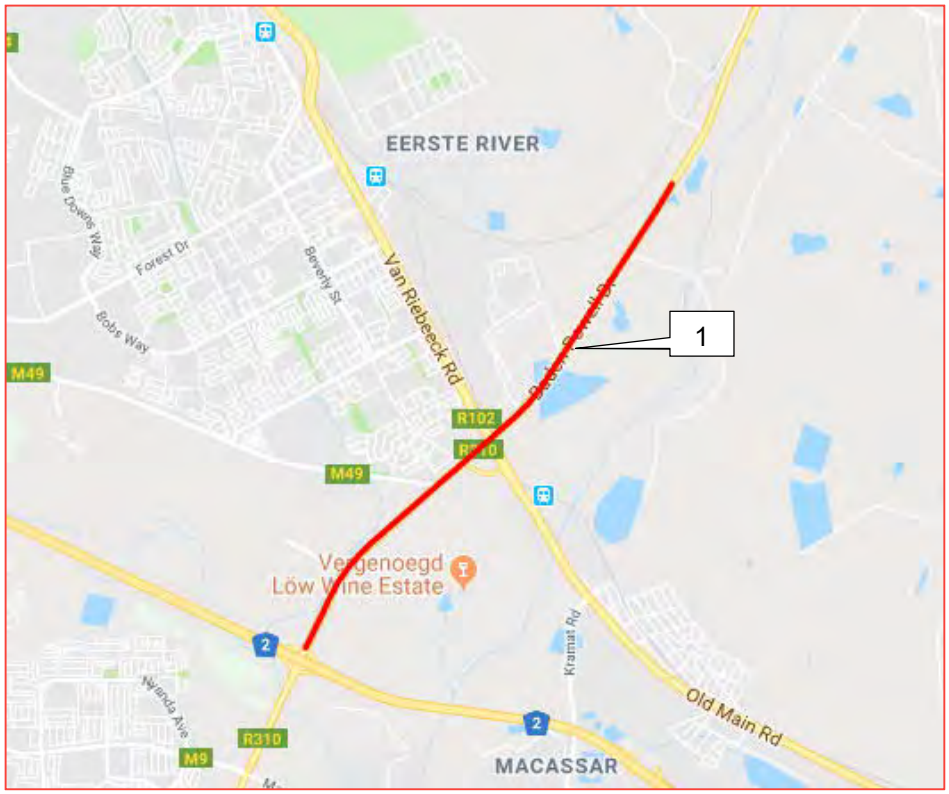


Figure 8-2: PGWC Projects under construction – Rehabilitation

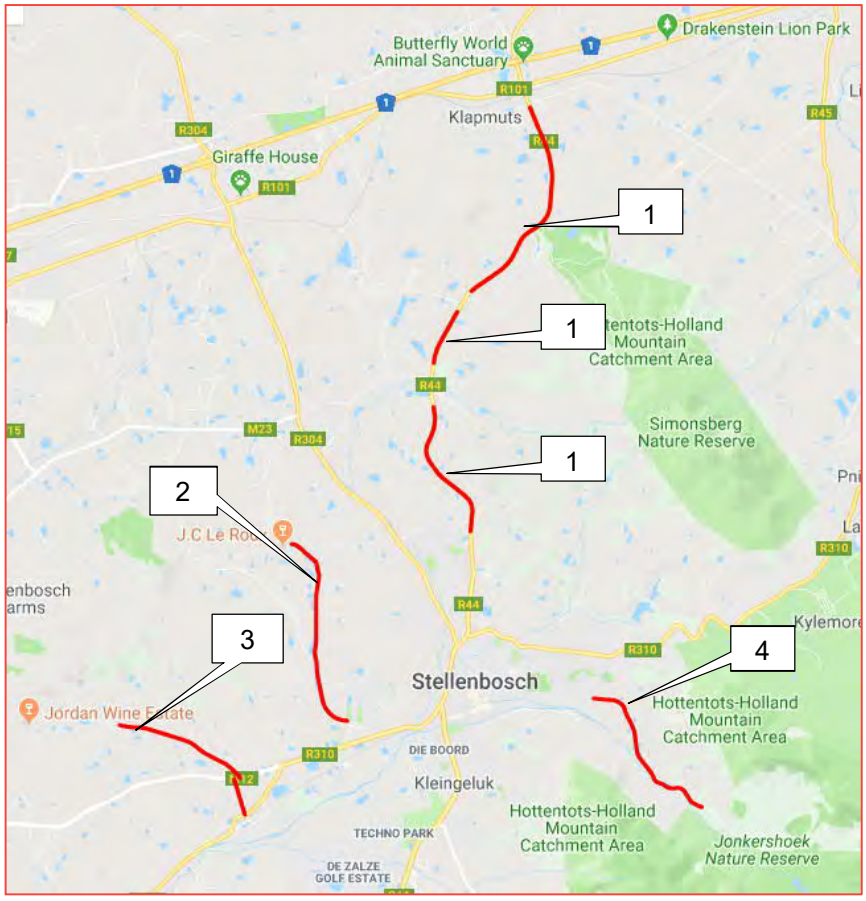


Figure 8-3: PGWC Projects under construction – Reseal

Figure 8-4: PGWC Projects under construction – Upgrade

Refer to Table 8-4 for the list of PGWC scheduled (1-5 years) projects, per type. Refer to Figure 8-5 to 8-7 for their locations.

Table 8-4: PGWC Scheduled projects (1-5 years)

Project Ref. No.	No. on figure	Project Name	Section	Type
SRMP004	1	C1049 : Kromme Rhee Rd	R304 – R310	Reseal
	1	C1120 : R301	R45 – N1	Upgrade
SRMP027	2	C0749.02 : R45	R310 – R101	Upgrade
	3	C0850.01: Simonsvlei Road	R101 - Klapmuts-Simondium RD	Upgrade
	4	C1049 : Prote Rd / Hercules Pilaar Rd / Hoopenberg Rd	R44 – R304	Upgrade
SRMP044	1	Robertsvlei Rd	tbc	Regravel

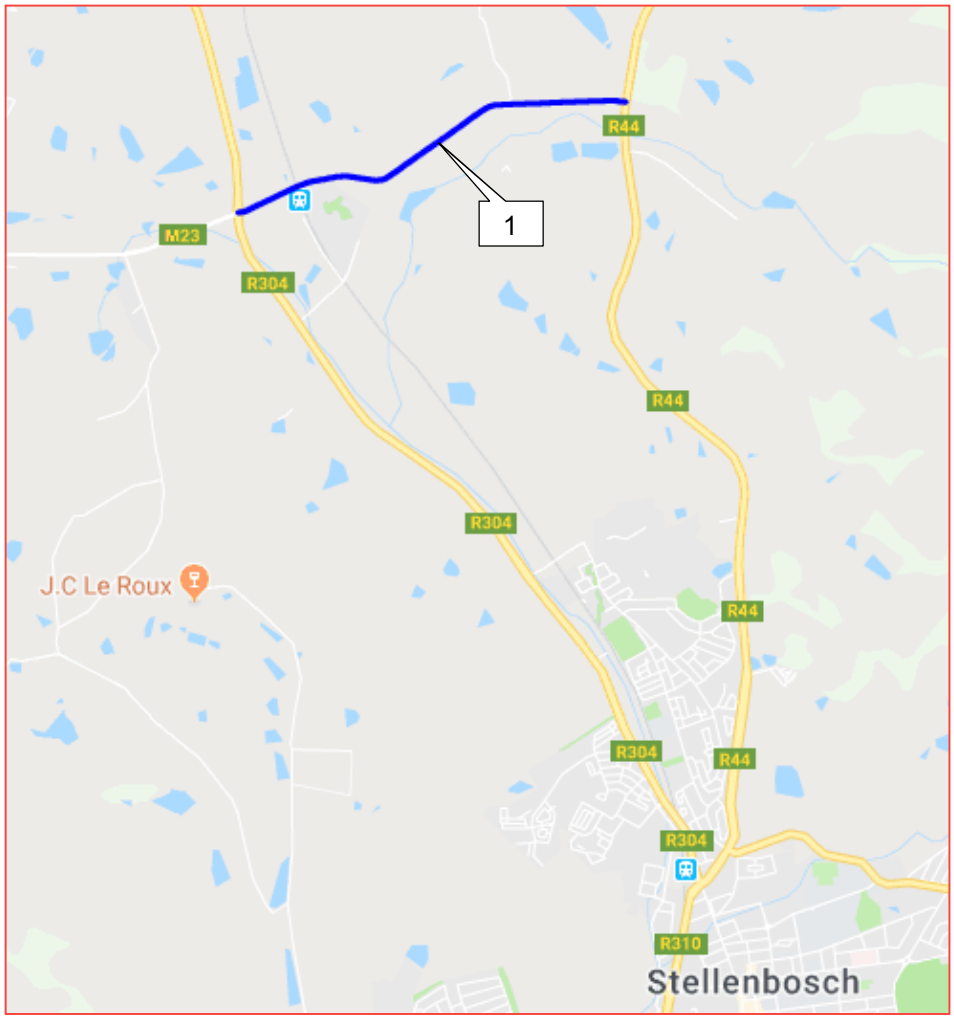


Figure 8-5: PGWC Scheduled Projects – Reseal

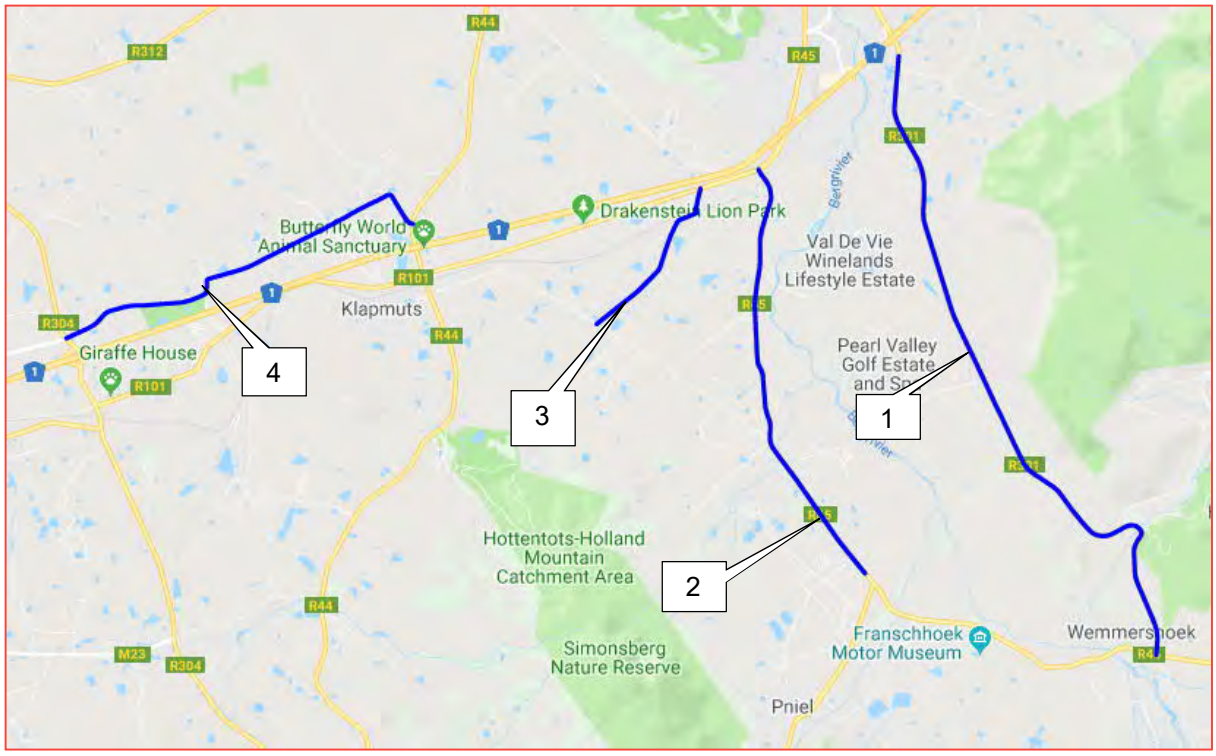


Figure 8-6: PGWC Scheduled Projects – Upgrade

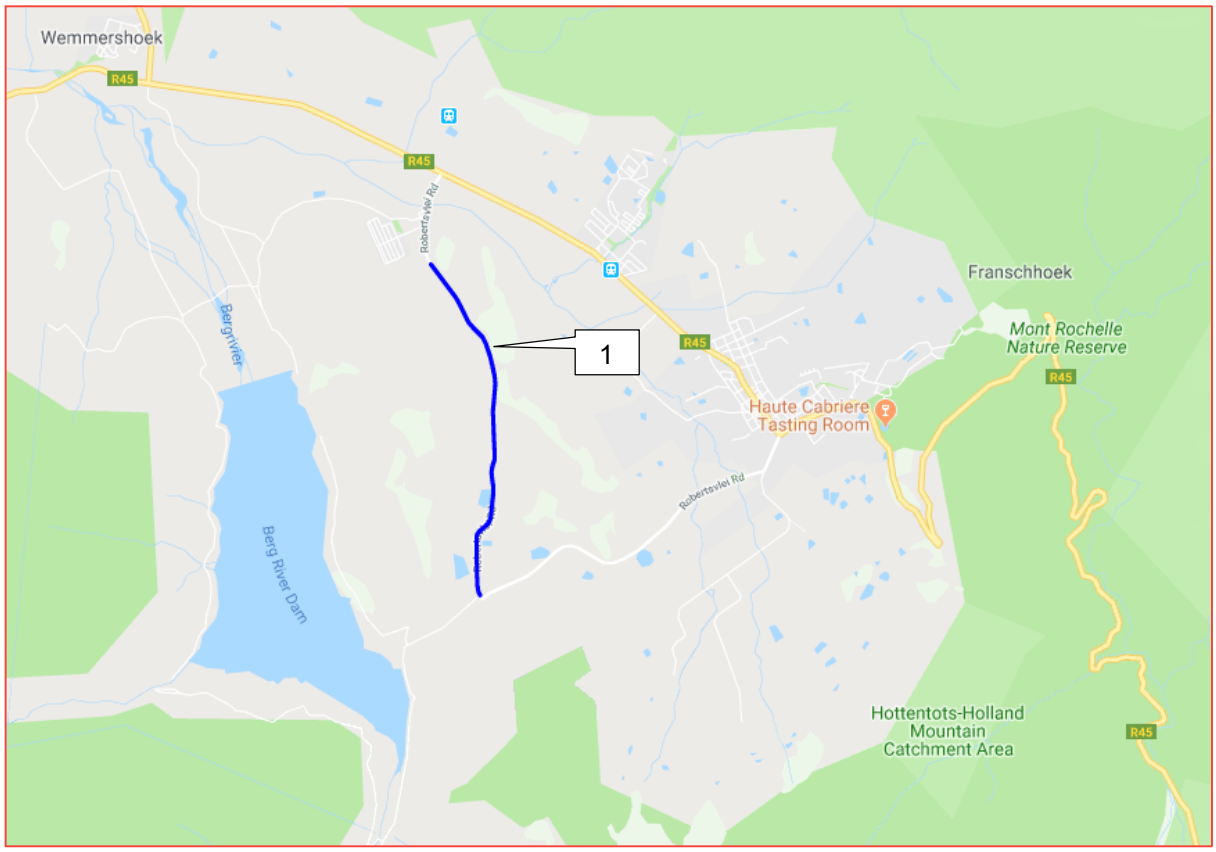


Figure 8-7: PGWC Scheduled Projects – Regravel

Refer to Table 8-5 for the f PGWC planned (5-10 years) projects, per type, and Figure 8-8 and 8-9 for their locations.

Table 8-5: PGWC Planned (5-10 years) projects

Project Ref. No.	Project Name	Section	Type
SRMP043	C0914 : R310	Polkadraai Rd – Annandale Rd	Rehabilitation
	C1092 : R44	Main Rd – Blaauwklippen Rd	Reseal

Figure 8-8: PGWC Planned Projects – Rehabilitation

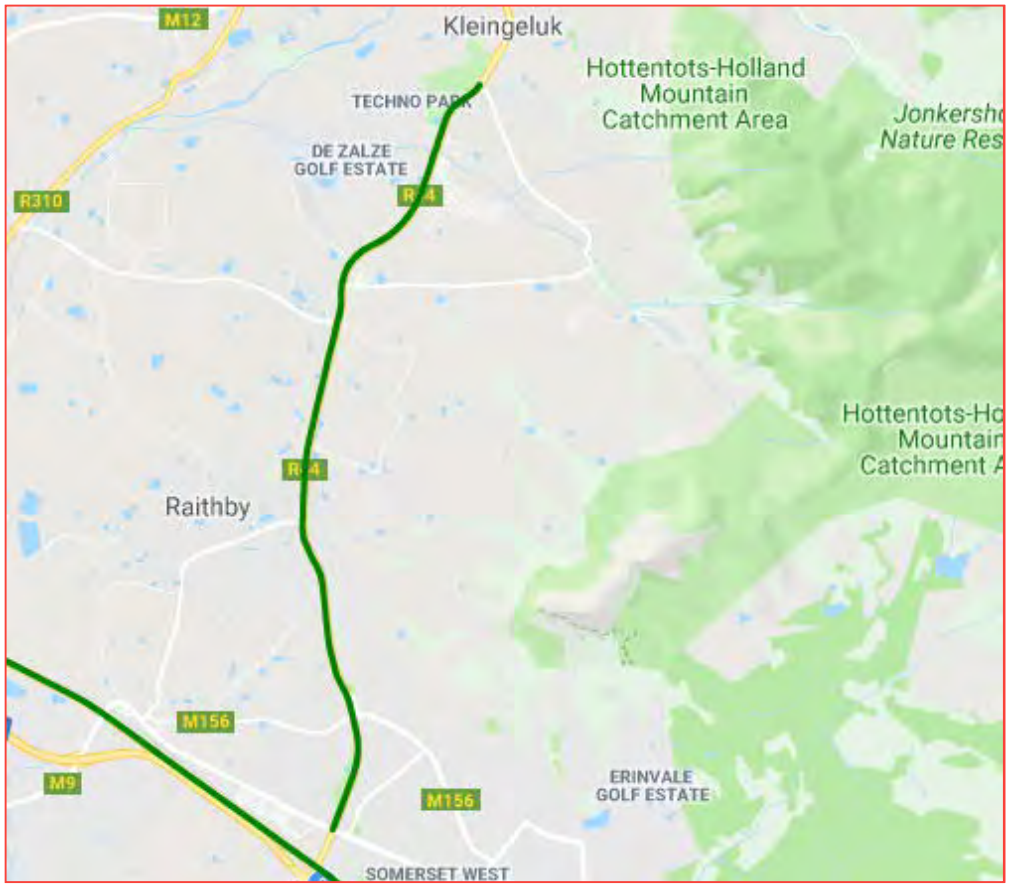


Figure 8-9: PGWC Planned Projects – Reseal

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 CONCLUSIONS

Stellenbosch Municipality has implemented minimal new or upgraded road infrastructure subsequent to the finalisation of the 2012 Road Master Plan due to various reasons. The population and economic opportunities are growing, placing an ever greater strain on the Municipality's road network and transport services.

This RMP attempts to address this shortfall. A number of critical planning studies are currently in process including the updated 2019 Stellenbosch SDF, which is currently in draft format, the Stellenbosch IDP, and various others. Existing information from drafts, where available, were used in this report. The next RMP update must incorporate the other related studies, critically the SDF.

This 2018 update of the 2012 RMP concludes the following:

- The previous CITP previously identified the core issues and problems within the Stellenbosch Municipal Area, highlighting the difficulties in preparing a "one size fits all" solution.
- Public Transport can play a major role in reducing private vehicle dependencies, and Stellenbosch needs to invest much more time and effort toward these solutions taking into account the existing poor rail services and public transport availability from neighbouring municipalities, such as the City of Cape Town's existing and planned MyCiTi IRT network.
- Approximately 7 km (2.5%) of the roads in SM are in a poor or very poor condition, and these are found throughout the SM.
- The latest EMME/4 transport model was recalibrated with 2018 and 2019 traffic volumes at critical intersections.
- The road classification system based on the principals set out in TRH26, utilised in the 2012 RMP, was retained. The classification of the Class 1 to Class 4 road network was retained unchanged.
- Stellenbosch Municipality provided high-level information of future land-use developments within the Stellenbosch Municipal Area. The land-use information has been included in the 2040 horizon-year EMME/4 model.
- Several key focus areas were identified in the 2012 RMP, based on previous studies and known constraints of the road network. The focus areas for this 2018 RMP update was moderated and limited to the following important areas:
    - General capacity improvements
    - Stellenbosch CBD
    - R44 north and south of Stellenbosch CBD
    - Western Bypass
    - Eastern Link Road - Brandwacht/Paradyskloof
    - Technopark access
    - 2040 Densification analysis
    - Krigeville schools precinct
- The proposals put forward within these key areas have been included into the EMME/4 model for the 2040 horizon-year scenario.
- Specific attention was given to the following projects due to their future impact on the Stellenbosch Municipal Area road network.
    - Eastern Link Road – a proposed class 4 road from Technopark running through Paradyskloof and Brandwacht into the CBD, thereby removing some local traffic from the R44.

  - Western Bypass – a proposed class 2 road linking the R44 south of Stellenbosch with the R304 north. Two options from the 2012 RMP were tested:
    - Technopark/R44 southern starting point
    - Annandale/R44 southern starting point
  - R44 Upgrade and reclassification – Significant upgrades to the R44 and the grade separating of some intersections to improve safety, mobility and capacity.
- The 2012 priority list of future road improvement projects were updated. The priority list identifies the key projects for implementation, and a high-level cost per project was determined form 2018 construction rates.
- The scope of this study did not include the prioritisation of these projects per planning period (short/medium/long-term).
- The existing road network and modal split will not be able to support the longer-term growth needs of the Stellenbosch area at acceptable Levels of Services. It is therefore acknowledged that some roads, particularly in the historic town area, will continue to operate at or over capacity during peak periods, unless substantial modal shift occurs. It is also expected that weekday AM and PM peak period congestion will increase, thereby worsening the Level of Service and increasing the peak hours.

9.2 RECOMMENDATIONS

- Refer to the Project list in Section 8.2 for the full list of road upgrade proposals. It is recommended that the prioritisation of the projects are determined in conjunction with the relevant Municipal Departments (land-use planning etc.), and revised on an at least annual basis, or as development needs requires. The planning of these proposals should then commence, with a focus on the short to medium-term projects.
- It is recommended that the following general capacity improvements should be investigated and analysed further, for inclusion in the next RMP update. Note that some of these projects fall under the jurisdiction of the Provincial Government.
  - Polkadraai Road: It was assumed that the last remaining single carriageway sections will be dualled well before 2035, in accordance with the Provincial roads infrastructure programme.
  - R44 North: This road requires a dual carriageway from Stellenbosch to Welgevonden. The R44 in the vicinity of Klapmuts also requires additional road capacity due to the proposed future residential and employment concentration in this area.
  - Adam Tas Road: This could become the busiest section of road in Stellenbosch, requiring 3 lanes per direction between the R44 and Merriman. In addition, the R44, Alexander, George Blake and Merriman intersections also need to be improved or reconfigured to provide additional capacity.
  - R304 (Koelenhof Road): The model results indicated that this road should be dualled between the R44 and Bottelary Road.
  - Merriman and Cluver Street link: Upgrade to dual carriageway or minimum 2-lanes per direction required between Bosman Street and Banghoek Road.
  - Dorp Street: Capacity improvements required between the R44 and Adam Tas Road. Conceptual planning has been undertaken for the dualling of this section.
  - Van Reede / Vrede Streets: These roads required dualling between the R44 and Piet Retief Street, with further improvements at the R44 / Van Reede intersection.
  - Van Reede Street westbound extension to Technopark: The extension of this road to provide a second access to Technopark linking into Electron road.
  - Technopark, De Zalze, Brandwacht and Welgevonden access roads: Dualling and/or intersection improvements are required.
  - Jamestown Road: Road Network development required due to major residential developments planned for this area.
  - Baden Powell Drive: Dualling of remaining sections between the N2 and Polkadraai Road.
- The conceptual planning of the following intersections upgrades has been undertaken, the detail design and construction should be implemented as soon as possible:

  - Adam Tas and Merriman Avenue.
  - Adam Tas and Helshoogte Road (including the closure and relocation of the Helshoogte Rd/La Colline Road T-junction further east).

- Stellenbosch Municipality should discuss this report in more detail with other interested and affected parties and start a public participation process to discuss the outcome of the RMP.
- Stellenbosch Municipality should adopt the RMP, giving it legal status. The RMP should be distributed privately and publically, informing planners/developers as well as the public of future road schemes within the municipal area. The RMP should be incorporated into future reviews of the CITP.
- Stellenbosch Municipality should continue discussions/workshops with CoCT's IRT department to explore opportunities to extend their future MyCiTi bus services to include Stellenbosch.
- Stellenbosch Municipality should start the process to expropriate and purchase the land required to construct future roads, specifically the implementation of portions of the Western Bypass and Eastern Link Road, and other roads associated with proposed housing developments and catalytic projects as defined in the draft 2019 MSDF. Future road reserves should be formally registered with the Surveyor General to protect them.
- The planning of the western bypass and/or a combination of substantial upgrading of the R44 must commence in conjunction with the PWCG. This should ideally occur prior to the construction of the proposed intersection upgrades along the R44 to prevent abortive work.
- The RMP should be incorporated into Stellenbosch Municipality's asset management database, (IMQS). IMQS is an Infrastructure Management System software. The priority list should also be incorporated.
- Planning for the funding of the road projects must commence to ensure that the short and medium term priority listing can be achieved.
- The planning and commissioning of each project should ideally be retested using the 2018 EMME/4 model and detailed intersection capacity analysis to ensure that each project will achieve its objectives.
- Future revision and amendments to the RMP should be coordinated to ensure that other parallel planning processes are undertaken in an integrated manner, such as land-use planning and public transport planning.
- This updated RMP should assist to plan future land-use developments within the Stellenbosch Municipal area. Future planning processes such at the SDF and IDP should complement this RMP, and vice-versa.
- Future revision of and amendments to the RMP should be coordinated to ensure that other parallel planning processes are undertaken in an integrated manner.

BIBLIOGRAPHY

1. Stellenbosch Municipality 2012 Roads Masterplan.
2. Stellenbosch Municipality NMT Network Plan (Vol 1 & 2), June 2015.
3. Stellenbosch Transport Model: Transport Modelling Report, 2010.
4. Stellenbosch Municipality Comprehensive Integrated Transport Plan (CITP) 2016 – 2020.
5. Update Stellenbosch Comprehensive Integrated Transport Plan, October 2018.
6. Stellenbosch Municipality Draft Strategic Development Framework (SDF), May 2018.
7. Stellenbosch Municipality Draft Strategic Development Framework (SDF), January 2019.
8. Stellenbosch Municipality Final Draft Strategic Development Framework (SDF), June 2019.
9. Transit Oriented Development Policy.
10. Integrated Public Transport Network Policy.
11. Public Transport Service Network: Initial Operations and Business Plans, 2016.
12. Stellenbosch Municipality Urban Development Strategy Status Que Report, Draft 1, May 2017.
13. Stellenbosch Western Bypass Status Report, April 2017.
14. The Development of a Transport Management Plan around the various schools located off the intersection of the R44 and Van Reede Street, Stellenbosch. Pendulum Consulting, June 2011.
15. A new gateway for Stellenbosch, Conceptual Study for TOD in Stellenbosch. Royal Haskoning DHV, May 2018.
16. Stellenbosch Municipality, Pavement Management System, Network / Strategic Level Assessment, Paved Roads, V&V Consulting Engineers, 2015.
17. Stellenbosch Municipality, Pavement Management System, Network / Strategic Level Assessment, Unpaved Roads, V&V Consulting Engineers, 2015.
18. Stellenbosch Municipality Upgrade of Intersections along R44 and Helshoogte Road, Stellenbosch. ICE Group, Revision 1, June 2015.
19. Stellenbosch Local Municipality, Road Asset Management Plan, Ver. 1.1, SMEC, April 2019.

APPENDIX

A EMME MODELLING RESULTS

APPENDIX

A-1 2018 MODELLING OUTPUTS

North

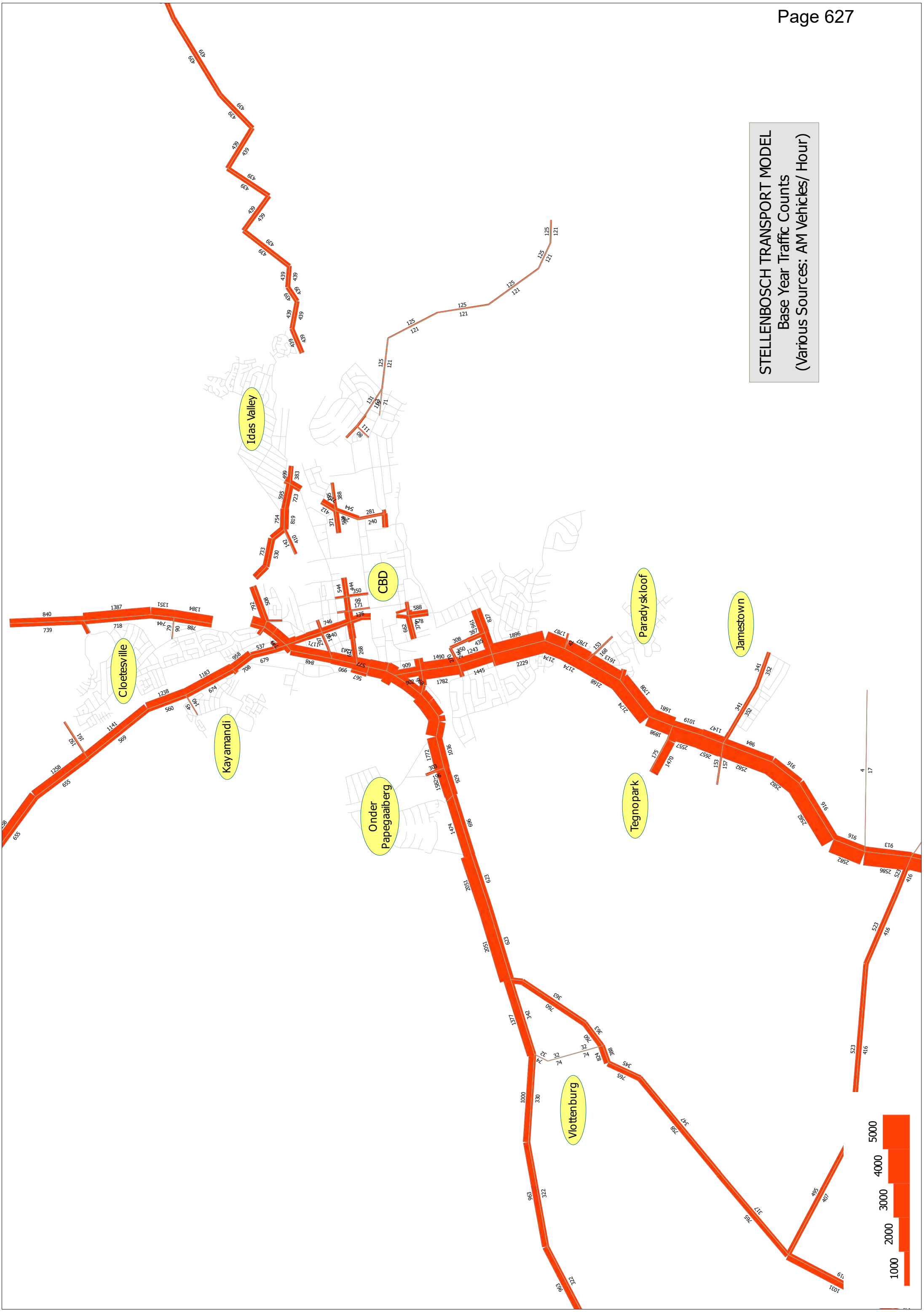
STELLENBOSCH TRANSPORT MODEL
Modelled Public & Private Transport Volumes
(Base Year AM Peak Period Commuters)

Cloetesville
Kayamandi
Idas Valley
Onder Papegaaiberg
Vlottenburg
Libertas
Tegnopark
Paradyskloof
Jamestown
STELLENBOSCH

1685 5
677 801
484 14
726 809
829 2938
391 457
68 2
498 10
467 9
82 464
39 1
210 4
210 4
290 5
18 0
9 0
167 4
686 3
73 2
108 2
152 5
151 4
183 1
178 1
24 1
73 1
86 1
101 0
404 1
319 1
195 3
338 1
229 1
698 792
365 426
135 159
129 1
550 3
571 2
531 3
120 1
108 0
500 2
400 1
182 0
453 557
510 1
16 1
9 0

Private Transport Commuters
Public Transport Commuters

STELLENBOSCH TRANSPORT MODEL
Base Year Traffic Counts
(Various Sources: AM Vehicles/ Hour)



North

STELLENBOSCH TRANSPORT MODEL
2018 Base Network with Present Land Use
Private Transport Variable Demand Assignment
(AM Vehicles/ Hour)

Cloetesville
Kayamandi
Idas Valley
Onder Papegaaiberg
Adam Tas
STELLENBOSCH
Vlottenburg
Tegnopark
Paradyskloof
Jamestown
R304
R44
R310

1 Lane
2 Lanes
3 Lanes
4 Lanes
5 Lanes

Length of Peak Period (hours)

- 0.00 - 1.00
- 1.00 - 2.00
- 2.00 - 3.00
- 3.00 - 4.00

STELLENBOSCH TRANSPORT MODEL
2018 Base Network with Present Land Use
Private Transport Variable Demand Assignment
(Total Vehicles: AM Peak Period)

Cloetesville
Kayamandi
Idas Valley
Onder Papegaaiberg
Adam Tas
STELLENBOSCH
Vlottenburg
Tegnopark
Paradyskloof
Jamestown
R304
R44
R310

North

STELLENBOSCH TRANSPORT MODEL
2018 Base Network with Present Land Use
AM Peak Hour Volume/ Capacity (Modelled)

Cloetesville
R304
R44
Kayamandi
Idas Valley
R310
Onder Papegaaiberg
Adam Tas
STELLENBOSCH
R310
Vlottenburg
Tegnopark
Paradyskloof
R44
Jamestown

- V/C Less than 0.4
- V/C 0.4 - 0.6
- V/C 0.6 - 0.8
- V/C 0.8 - 1.0
- V/C 1.0 - 1.2
- V/C Exceeding 1.2

APPENDIX

A-2 2040 MODELLING OUTPUTS

North

STELLENBOSCH TRANSPORT MODEL
2018 - 2040 Household Increments
(Trend Scenario)

Cloetesville
1244 368
1000 266
500 338
0 6383
1109 52
0 386
6300 2601
666 0
Kayamandi
0 736
70 0
1174 1140
500 0
533 80
0 421
0 283
42 0
230 0
534 0
452 90
700 110
50 0
0 286
26 0
184 0
85 0
119 0
155 0
168 0
203 0
66 0
184 0
218 0
203 0
121 0
450 0
Idas Valley
564 257
1131 0
0 51
200 380
0 86
314 60
300 495
224 0
101 40
345 123
Onder Papegaaiberg
575 381
0 119
STELLENBOSCH
0 1324
448 450
490 210
0 344
34 1196
Vlottenburg
0 1960
Libertas
88 593
94 50
0 957
417 280
319 92
Paradyskloof
213 0
Tegnopark
20 0
421 339
825 1740
Jamestown

2018 Households
2040 Household Increment

North

STELLENBOSCH TRANSPORT MODEL
2018 - 2040 Employment Increments
Trend Scenario

Cloetesville
Idas Valley
Kayamandi
Onder Papegaaiberg
Vlottenburg
Libertas
Tegnopark
Paradyskloof
Jamestown
STELLENBOSCH

2018 Employment
2040 Employment Increment

North

STELLENBOSCH TRANSPORT MODEL
2018 - 2040 Household Increments
(20% Densification Scenario)

Cloetesville
1244 368
1000 266
500 338
0 6383
1109 52
0 386
6300 2601
666 0
0 736
Kayamandi
70 14
1174 1140
533 80
500 100
0 421
0 51
Idas Valley
1131 0
564 257
200 380
0 86
0 283
42 8
230 46
314 60
452 90
534 107
700 110
300 495
224 45
50 10
0 286
26 6
101 40
345 123
184 37
203 41
66 13
184 37
85 17
119 24
218 44
155 31
168 34
203 41
Onder Papegaaiberg
575 381
0 119
121 24
450 80
0 1324
490 210
448 450
34 1196
0 344
Vlottenburg
88 593
94 50
0 1960
Libertas
0 957
417 280
213 0
319 92
Paradyskloof
Tegnopark
20 0
421 339
825 1740
Jamestown
STELLENBOSCH

2018 Households
2040 Household Increment

North

STELLENBOSCH TRANSPORT MODEL
2040 Network with Future Land Use
Private Transport Variable Demand Assignment
(AM Vehicles/ Hour)

Cloetesville
R304
R44
Kayamandi
Idas Valley
R310
Onder Papegaaiberg
Adam Tas
STELLENBOSCH
R310
Vlottenburg
Libertas
Tegnopark
Paradyskloof
R44
Jamestown

1 Lane
2 Lanes
3 Lanes
4 Lanes
5 Lanes

Length of Peak Period (hours)

- 0.00 - 1.00
- 1.00 - 2.00
- 2.00 - 3.00
- 3.00 - 4.00

STELLENBOSCH TRANSPORT MODEL
2040 Network with Future Land Use
Private Transport Variable Demand Assignment
(Total Vehicles: AM Peak Period)

Cloetesville
Kayamandi
Idas Valley
Onder Papegaaiberg
Adam Tas
STELLENBOSCH
Libertas
Vlottenburg
Tegnopark
Paradyskloof
Jamestown
R304
R44
R310

North

STELLENBOSCH TRANSPORT MODEL
2040 Network with Future Land Use
AM Peak Hour Volume/ Capacity (Modelled)

Cloetesville
Kayamandi
Idas Valley
Onder Papegaaiberg
Adam Tas
STELLENBOSCH
Vlottenburg
Libertas
Tegnopark
Paradyskloof
Jamestown

R304
R44
R310
R310
R44

- V/C Less than 0.4
- V/C 0.4 - 0.6
- V/C 0.6 - 0.8
- V/C 0.8 - 1.0
- V/C 1.0 - 1.2
- V/C Exceeding 1.2

STELLENBOSCH TRANSPORT MODEL
Fuuture Network with Eastern Link Road
2040 Land Use
Private Transport Variable Demand Assignment
(AM Vehicles/ Hour)

STELLENBOSCH

Link with Pastorie Road

Van Reede Extension

Eastern Link Road

Eastern Link Road

Paradyskloof

Libertas (proposed)

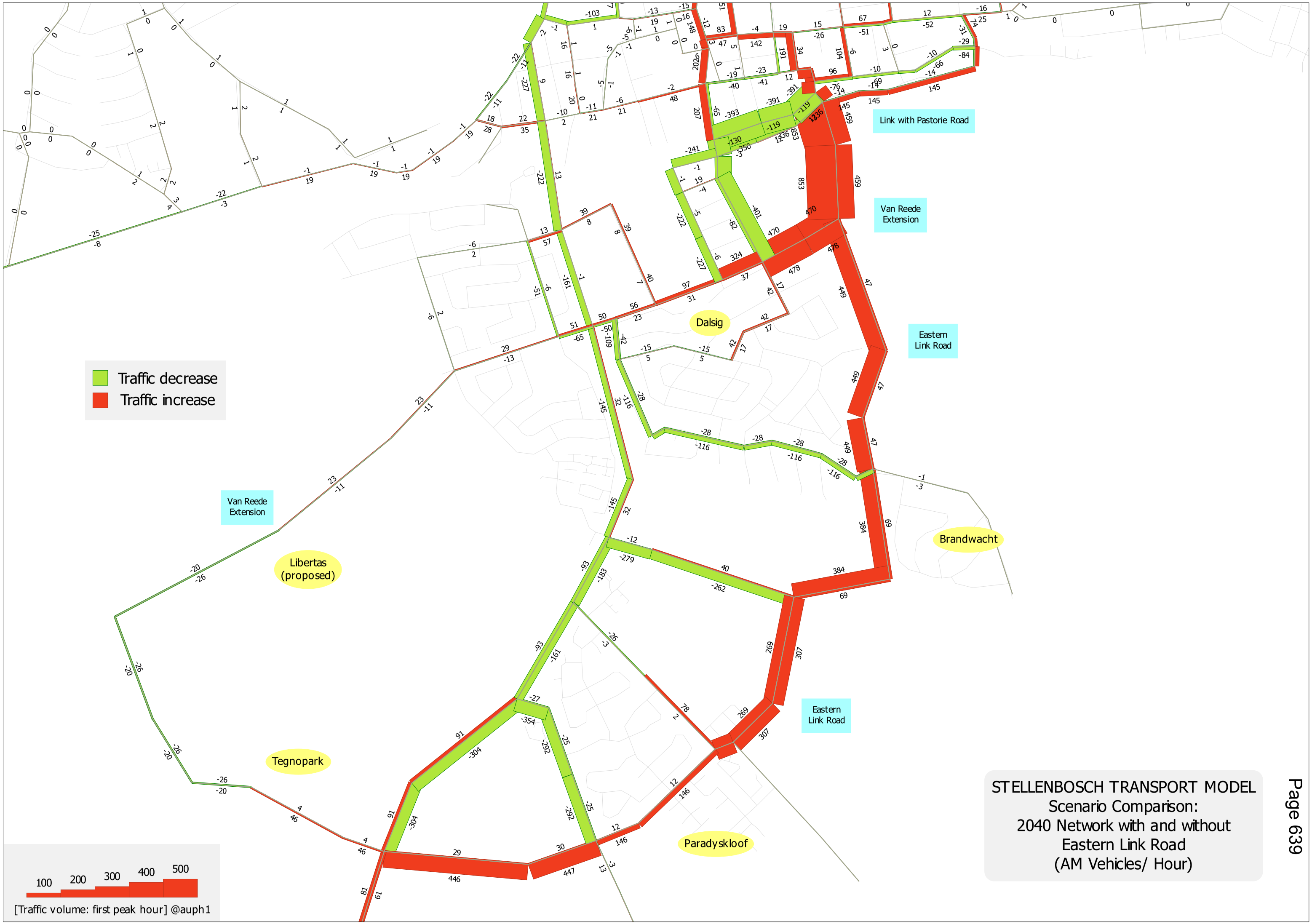
Van Reede Extension

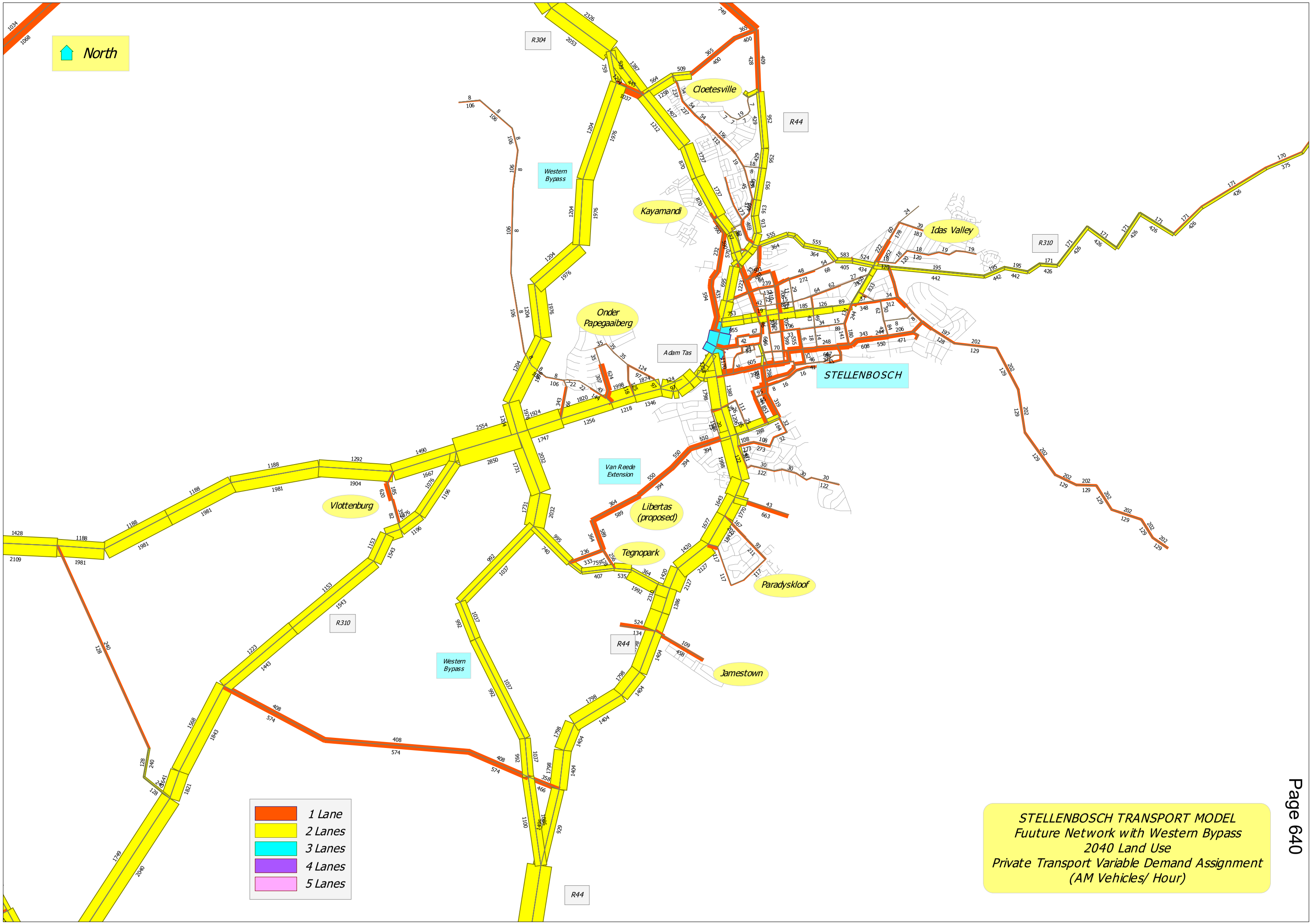
Tegnopark

Adam Tas

North

1 Lane
2 Lanes
3 Lanes
4 Lanes
5 Lanes


Traffic decrease
Traffic increase
100
200
300
400
500
[Traffic volume: first peak hour] @auph1
Link with Pastorie Road
Van Reede Extension
Eastern Link Road
Dalsig
Van Reede Extension
Libertas (proposed)
Brandwacht
Tegnopark
Eastern Link Road
Paradyskloof
STELLENBOSCH TRANSPORT MODEL
Scenario Comparison:
2040 Network with and without
Eastern Link Road
(AM Vehicles/ Hour)


North
R304
Cloetesville
R44
Western Bypass
Kayamandi
Idas Valley
R310
Onder Papegaaiberg
Adam Tas
STELLENBOSCH
Van Reede Extension
Vlottenburg
Libertas (proposed)
Tegnopark
Paradyskloof
Jamestown
1 Lane
2 Lanes
3 Lanes
4 Lanes
5 Lanes
STELLENBOSCH TRANSPORT MODEL
Fuuture Network with Western Bypass
2040 Land Use
Private Transport Variable Demand Assignment
(AM Vehicles/ Hour)

Traffic decrease
Traffic increase

R304
R44
Western Bypass
Kayamandi
Onder Papegaaiberg
Adam Tas
STELLENBOSCH
Van Reede Extension
Libertas (proposed)
Tegnopark
Paradyskloof
Jamestoen
Vlottenburg
R310
Western Bypass
R44

500 1000 1500 2000 2500
[Traffic volume: first peak hour] @auph1

STELLENBOSCH TRANSPORT MODEL
Scenario Comparison:
2040 Network with and without Western Bypass
(AM Vehicles/ Hour)


North
1 Lane
2 Lanes
3 Lanes
4 Lanes
5 Lanes
R304
R44
R310
Western Bypass
Cloetesville
Kayamandi
Idas Valley
Onder Papegaaiberg
Adam Tas
STELLENBOSCH
Dalsig
Van Reede Extension
Libertas (proposed)
North-South Link Road
Tegnopark
Paradyskloof
Vlottenburg
STELLENBOSCH TRANSPORT MODEL
Fuuture Network with Lower Speed Partial Western Bypass
2040 Land Use
Private Transport Variable Demand Assignment
(AM Vehicles/ Hour)

Traffic decrease
Traffic increase

R304
R44
R310
Cloetesville
Western Bypass
Kayamandi
Idas Valley
Onder Papegaaiberg
Adam Tas
STELLENBOSCH
Dalsig
Van Reede Extension
Libertas (proposed)
Vlottenburg
North-South Link Road
Tegnopark
Paradyskloof

500 1000 1500 2000 2500
[Traffic volume: first peak hour] @auph1

STELLENBOSCH TRANSPORT MODEL
Scenario Comparison:
2040 Network with and without
Partial Western Bypass
(AM Vehicles/ Hour)

STELLENBOSCH TRANSPORT MODEL
Future Network with North-South Link Road
2040 Land Use
Private Transport Variable Demand Assignment
(AM Vehicles/ Hour)

1 Lane
2 Lanes
3 Lanes
4 Lanes
5 Lanes

R44
Paradyskloof
Tegnopark
Libertas (proposed)
North-South Link Road
R310
Van Reede Extension
Adam Tas
Dalsig
STELLENBOSCH
North

Traffic decrease
Traffic increase

Adam Tas

Van Reede Extension

Libertas (proposed)

North-South Link Road

Tegnopark

Dalsig

Paradyskloof

R310

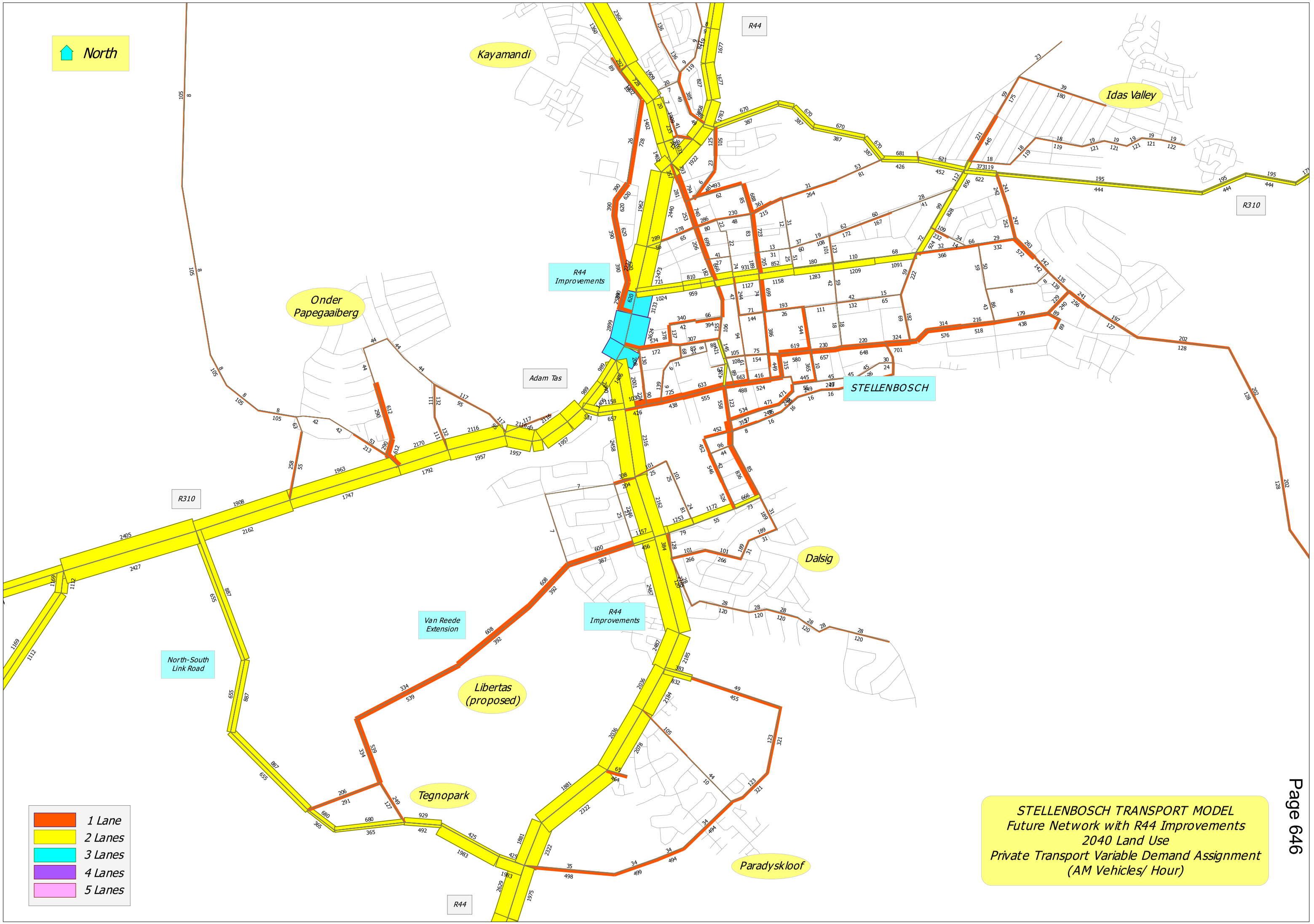
R44

R44

300 600 900 1200 1500

[Traffic volume: first peak hour] @auph1

STELLENBOSCH TRANSPORT MODEL
Scenario Comparison:
2040 Network with and without
North-South Link Road
(AM Vehicles/ Hour)


North
Kayamandi
R44
Idas Valley
R310
R44 Improvements
Onder Papegaaiberg
Adam Tas
STELLENBOSCH
R310
Van Reede Extension
R44 Improvements
Dalsig
North-South Link Road
Libertas (proposed)
Tegnopark
Paradyskloof
R44
1 Lane
2 Lanes
3 Lanes
4 Lanes
5 Lanes
STELLENBOSCH TRANSPORT MODEL
Future Network with R44 Improvements
2040 Land Use
Private Transport Variable Demand Assignment
(AM Vehicles/ Hour)

North

Kayamandi

R44

Idas Valley

R310

R44 Improvements

Onder Papegaaiberg

Adam Tas

STELLENBOSCH

R310

Van Reede Extension

R44 Improvements

North-South Link Road

Libertas (proposed)

Dalsig

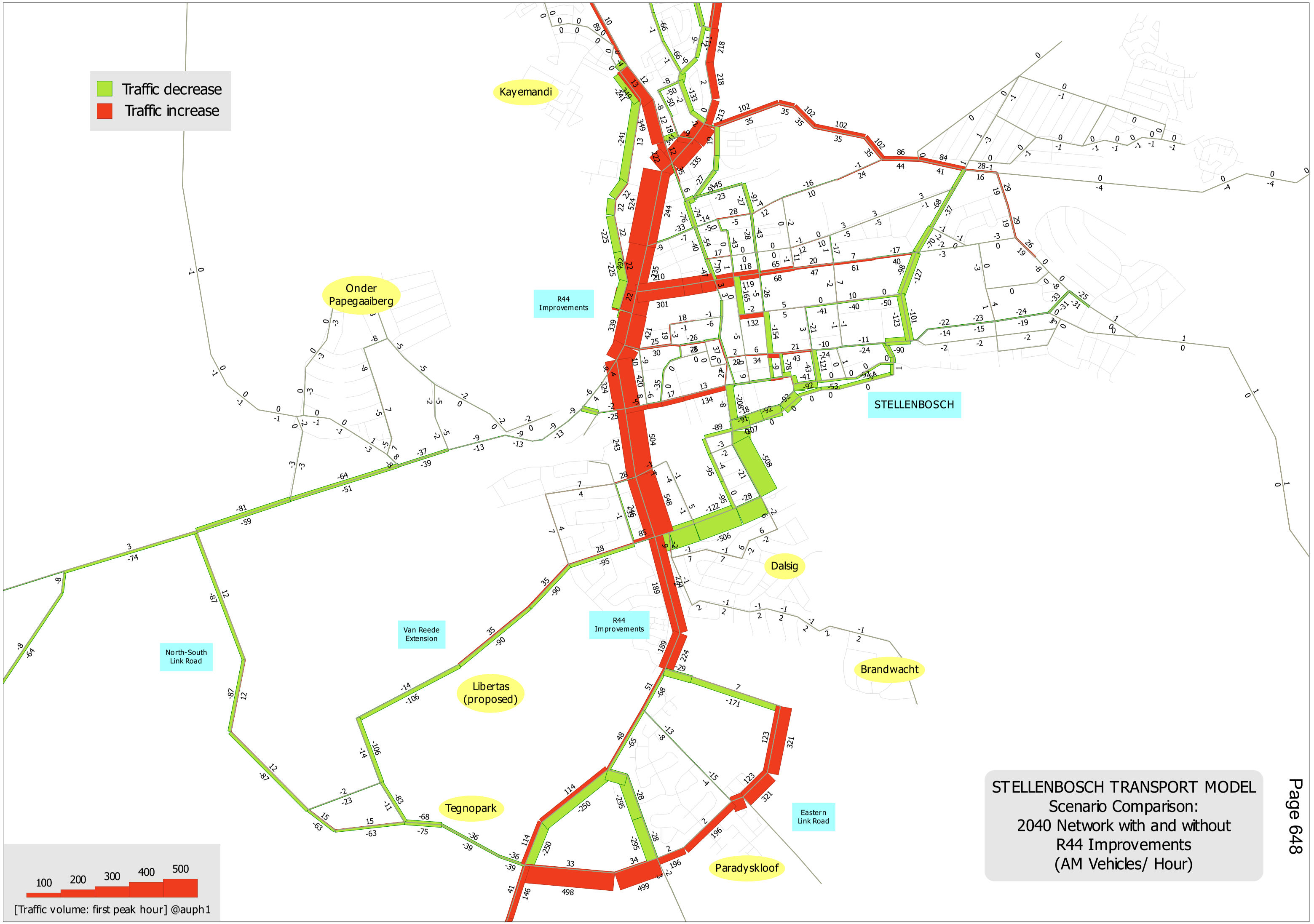
Tegnopark

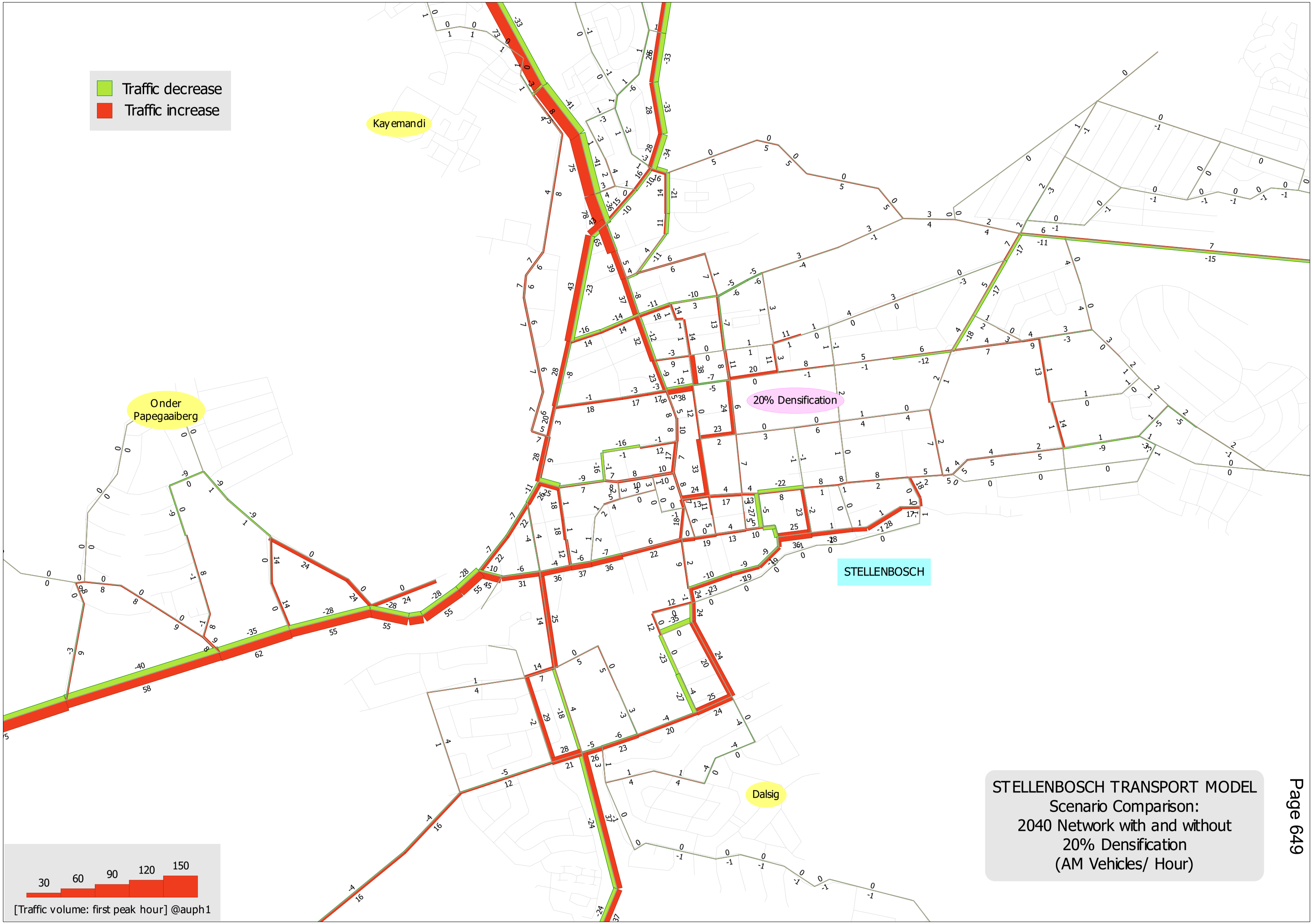
Paradyskloof

R44

V/C Less than 0.4
V/C 0.4 - 0.6
V/C 0.6 - 0.8
V/C 0.8 - 1.0
V/C 1.0 - 1.2
V/C Exceeding 1.2

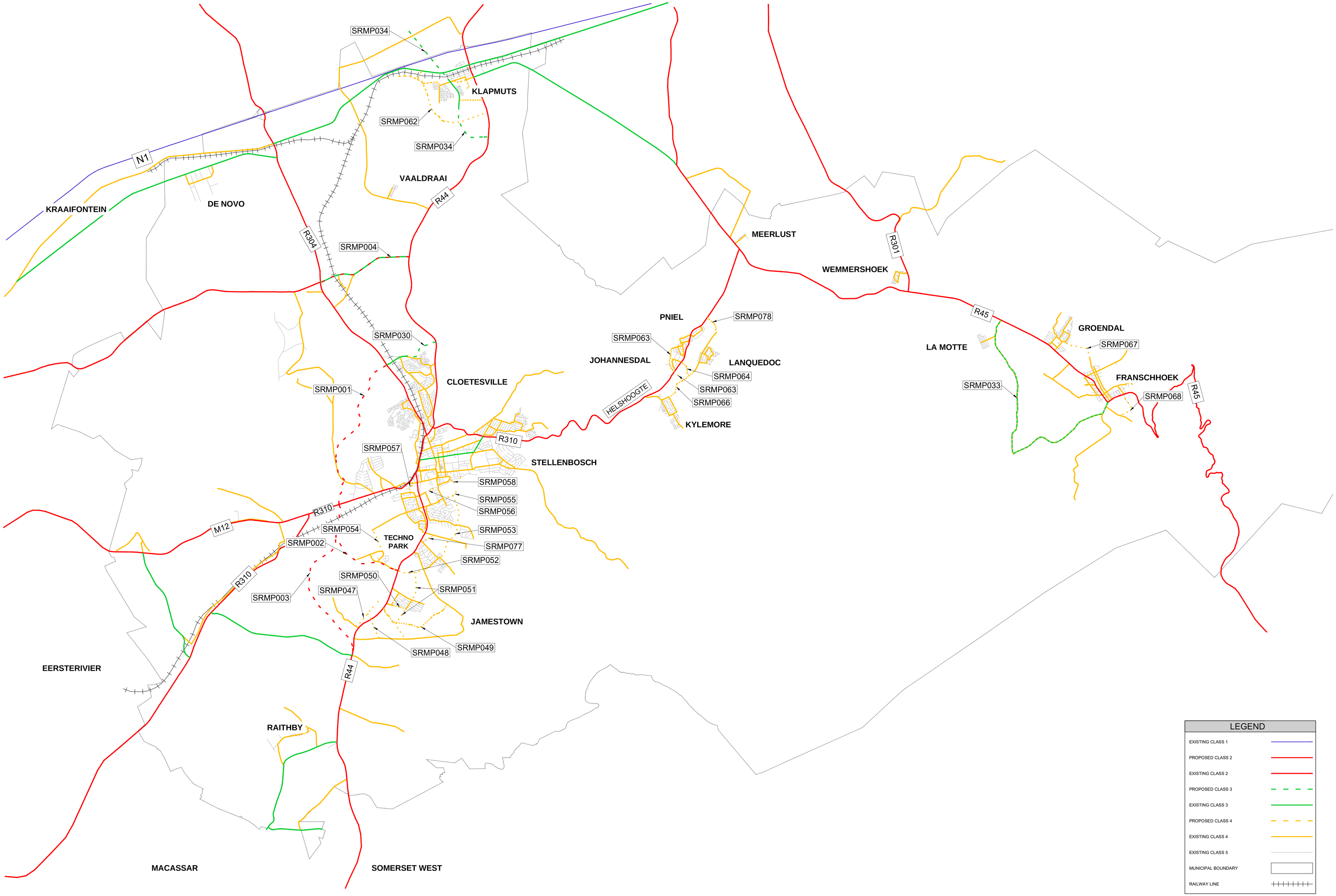
STELLENBOSCH TRANSPORT MODEL
Future Network with R44 Improvements
2040 Land Use
AM Peak Hour Volume/ Capacity (Modelled)


Traffic decrease
Traffic increase
Kayemandi
Onder Papegaaiberg
R44 Improvements
STELLENBOSCH
Dalsig
Brandwacht
Van Reede Extension
R44 Improvements
North-South Link Road
Libertas (proposed)
Tegnopark
Eastern Link Road
Paradyskloof
100
200
300
400
500
[Traffic volume: first peak hour] @auph1
STELLENBOSCH TRANSPORT MODEL
Scenario Comparison:
2040 Network with and without
R44 Improvements
(AM Vehicles/ Hour)


Traffic decrease
Traffic increase
Kayemandi
Onder Papegaaiberg
20% Densification
STELLENBOSCH
Dalsig
30
60
90
120
150
[Traffic volume: first peak hour] @auph1
STELLENBOSCH TRANSPORT MODEL
Scenario Comparison:
2040 Network with and without
20% Densification
(AM Vehicles/ Hour)

APPENDIX

B 2018 RMP PROJECTS



STELLENBOSCH MUNICIPALITY
2018 ROAD MASTER PLAN - ROAD INFRASTRUCTURE PROJECTS

SCALE 1:1000

WSP Group Africa (Pty) Ltd
Transportation and Infrastructure
The Pavilion, 1st Floor, Corner Portswood and Beach Road, Waterfront
Cape Town 8001, South Africa
PO Box 2613 Cape Town 8000
Tel: +27(0)21-481-8700 Fax: +27(0)21-481-8799 www.wsp.com

AUGUST 2019
FIGURE 8.1