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CHAPTER 7: TRAFFIC

This chapter describes the current condition of the Cape Town road network, the potential impacts of the proposed road on existing alternative routes of the R300 as well as the combined impact on the R300 and the N1/N2 Winelands Toll Project. Alignment alternatives for the R300 between Vanguard Drive and Muizenberg and other network alternatives in the southern section are also discussed.

7.1 EXISTING CHARACTERISTICS OF THE CAPE TOWN ROAD NETWORK

7.1.1 Methodology For Determining The Current Situation

Comprehensive traffic data for the existing study network was obtained. This included collating available traffic count data from a variety of sources such as the CCT and other consultants, collating data from new traffic counts and also collating trip origin/destination, trip purpose, trip frequency data etc. collected during roadside interview surveys especially undertaken for the R300 project. The network was also extensively travelled during the different peak hours of the day. Data was collected on existing cross-sections, lane configurations and operational conditions. Traffic data was collected on both a daily basis as well as a peak hour basis. Using this information and also that contained within the ambit of the CCT EMME/2 Transport Model, and with the permission of the CCT, a SATURN Traffic Model, which models traffic patterns over the whole area of influence of the R300 was also developed.

Salient results with respect to the current traffic situation are summarised below, both in terms of the Annual Average Daily traffic volumes (AADT) and morning peak conditions.

a. Daily Traffic Volumes (AADT):

- The R300 and the National Freeways which cross the R300, namely the N1 and the N2, typically carry more than 40 000 vehicles per day.
- Volumes between 30 000 and 40 000 vehicles per day are currently experienced on arterial routes R102, the M12 and the R101 which cross the R300 as well as on the R302 which crosses the N1.

b. Morning Peak Hour Conditions:

- Many links in the study area are experiencing Level Of Service D operating conditions (refer to Table 7.1 below).
- Based on the current traffic growth rate, and if the R300 is not upgraded in the short term, then congestion levels on the alternative network and on the R300 during peak hours would reach unacceptable levels in terms of the queues and delays that would be experienced and the increased vehicle (driver) operating and time costs that would be incurred.

7.2 POTENTIAL IMPACT OF THE PROPOSED ROAD ON EXISTING ALTERNATIVE ROUTES

In order to assess the traffic impact of the proposed project on the existing road network, it is important to recognise that:

a. The northern (i.e. from the N1 to Bloubergstrand) and southern (i.e. from Vanguard Drive to the southern areas and Muizenberg) extensions of the proposed R300 would consist of new road sections. It should provide an overall benefit in terms of available roadway alternatives to road users, thereby reducing traffic volumes on existing routes. Bearing in mind that approximately 75% of the 76 kilometres of road incorporated in the R300 project, (i.e. 56 kilometres) comprises totally new road construction, it can be concluded that the construction of these new sections would have a positive impact on the existing road network (ITSC, 2002).

b. As a result of extending the R300 northwards and southwards, traffic would be attracted to these new road sections. The concentration of traffic on these new sections, which would provide direct access/egress to the existing section of the R300, would therefore also increase the traffic volumes on the existing section of the R300. (It is predicted that the existing traffic on the R300 could double on some sections.)

c. The fact that the existing R300 section is to be upgraded, initially to provide six lanes and thereafter eight lanes, would also result in traffic demands along the existing R300 progressively increasing, as this road would both initially and in the longer term provide a higher level of service than that prevailing on the surrounding road network.
d. Offsetting the above traffic increases, there would be traffic diversion resulting from the fact that the existing R300 is to be tolled.

From the above, it can be concluded that the tolled new sections of the R300 would bring about improved operating conditions on the alternative road network. This is illustrated in Figure 7.1 and 7.2. The only remaining issue that needs to be resolved, is how the positive traffic implications in a), b), and c) above, compare to the negative implications in d) above, with respect to the upgrading and tolling of the existing section of the R300 between the N1 and Vanguard Drive.

7.2.1 Impact Of Traffic Diversion Resulting From The Fact That The Existing R300 Is To Be Tolled

In order to provide more detailed information on the pros and cons of an upgraded/tolled existing R300, and its resulting effect on the alternative road network, it was deemed appropriate to perform transport model tests, using the SATURN Model. (SATURN is an internationally accepted and widely used transportation modeling package especially suited to road operating conditions).

The Years 2000 (base year) and 2015 (design year) were chosen as suitable modeling years since the former is the base year of the CCT EMME/2 Model, and consequently the SATURN model, whilst the latter represents an appropriate design year for the initial construction works programme (that is, it was concluded that all new road and road upgrading works should be capable of providing sufficient capacity up to Year 2015, thereby ensuring that further upgrading work need only be undertaken from Year 2016 onwards).

In terms of the model tests performed, the objective was to compare the prevailing traffic volumes on the entire road network for the case where the R300 was not developed, extended or upgraded with those where the R300 was developed, extended, upgraded and tolled. Salient results obtained from the tests were:

- In the period 2000 to 2015 and with the R300 upgraded, extended and tolled, 72% of the road network incorporated in the R300 transport model can be expected to experience lower traffic volumes than it would have done had the R300 not been upgraded, extended and tolled.
- In the period 2000 to 2015 and with the R300 upgraded, extended and tolled, 28% of the road network incorporated in the R300 transport model can be expected to experience higher traffic volumes than it would have done had the R300 not been upgraded, extended and tolled.

With respect to those roads which can be expected to experience higher traffic volumes, it is not unexpected that the existing section of the R300 is anticipated to experience the greatest traffic volume increase (i.e. for the reasons outlined above). In this regard it is therefore important to re-emphasise that in terms of any concession contract, it would be the responsibility of the Concessionaire not only to upgrade the existing R300, but at all times to ensure acceptable operating conditions/levels of service. Consequently, it can be concluded that the higher traffic volumes on the R300 do not have a negative connotation.

Of the remaining alternative routes which can be expected to experience higher traffic volumes, those which probably draw the most attention are the Nooiensfontein and Delft Main Belhar corridors which lie adjacent to the east and west respectively of the mainline toll plaza location proposed on the existing section of the R300. Detailed inspection of these higher volume increases does, however, reveal that the relative increase is not dramatic (i.e. < 150 veh/hr in the peak hour). As a result of examining the aspect further, it is concluded that this result stems from the fact that the diversion around the mainline is local in nature, and that those who choose not to use the R300 or who choose to deviate from the R300 because of the toll, do so at locations removed from the existing section (GMKS, 2002).

7.3 CUMULATIVE IMPACT OF TOLLING THE N1, N2 AND R300

In addition to evaluating the impact of the proposed project on the existing road network, the combined impact of the proposed tolling of the N1, N2 and R300 was also investigated. Similar to the Unsolicited Proposal submitted by the proponent to upgrade, extend and toll the R300, the Protea Parkways Consortium (PPC) has submitted a proposal for the upgrading and tolling of the N1 and N2 freeways. This section describes the combined impact on the alternative routes if both these toll projects proceed.

The traffic diversions as a result of the proposed toll strategies were estimated using the SATURN model. GMKS combined the model that was developed for the tolling strategy of the R300 with the model developed by PPC for the N1 and N2 freeways. The combined model was then applied to estimate the diversions onto the alternative routes, using a low-toll and a high-toll scenario, taken from the toll tariffs as published in the scoping reports for the two projects. Commensurate with the data inputs received from both the proponent and the PPC when this work was undertaken, and as subsequently agreed by these two parties, the required model tests were undertaken and hence traffic diversions derived, in terms of Year 2005 traffic demands (i.e. not 2000 and 2015, refer to sub-section 7.3.2).

A change in daily traffic volumes and specifically a change in heavy vehicle volumes, expressed in terms of equivalent 80kiloNewtons loads (E80's), would have an impact on road pavements and their service life. On the other hand, the change in peak hour volumes would specifically impact the available capacity along the alternative routes. These two parameters were therefore modeled to determine the impact.

The results of the combined impact of the tolling of the N1, N2 and R300 are summarised as follows:

7.3.1 Low – Toll Scenario

Daily E80-kilometres on the alternative network could reduce by nearly 4 %, (i.e. away from the alternative routes).

In terms of the above, it is estimated that 24.9 % of the study network would experience a positive impact in terms of a reduction in the daily E80-volumes, these impacts being rated as 'positive medium' (16.1%) and 'positive high' (8.8%).

Also, in terms of the above, it is estimated that 13.5 % of the study network would experience a negative impact in terms of a change in the daily E80-volumes, these impacts being rated as 'negative medium' (4.6%) and 'negative high' (8.9%).

Approximately 61.6 % of the length of the study network would experience zero or a "low" impact in terms of changes in daily traffic. A 'high' negative impact would occur on 2.3 % of the network with 1.1 % of the network incurring a 'high' positive impact.

7.3.2 High – Toll Scenario

Daily E80-kilometres on the alternative network could increase by 2.5%. In terms of the above, it is estimated that 21.1 % of the study network would experience a positive impact in terms of a reduction in the daily E80-volumes, these impacts being rated as "positive medium" (14.0%) and "positive high" (7.1%).

Also, in terms of the above, it is estimated that 29.3 % of the study network would experience a negative impact in terms of a change in the daily E80-volumes, these impacts being rated as "negative medium" (17.2%) and "negative high" (12.1%).

Approximately 49.6 % of the length of the study network would experience zero or a "low" impact in terms of changes in daily traffic. A "high" negative impact occur on 5.8 % of the network with 1.1 % of the network incurring a "high" positive impact.

The above findings are summarised in Table 7.2 below.

Table 7.2: *Impacts on Alternative Route Network (ITSC, 2002)*

	High Toll Scenario (% of network)	Low Toll Scenario (% of network)
Daily E80 Kilometres	+ 2.5 %	- 4.0 %
Medium to high positive impact	21.1%	24.9%
Medium to high negative impact	29.3%	13.5%
No to low impact	49.6%	61.6%
AM PEAK HOUR TRAFFIC		
High negative impact	5.8%	2.3%
High positive impact	1.1%	1.1%

Comparing the above findings with those in sub-section 7.3 and whilst not forgetting the different design years used (i.e. Year 2015 in the case of just the R300 project and Year 2005 in the case of the combined R300 and N1/N2 projects), it is apparent that the impact on alternative routes is increased in the combined project case or alternatively when the tolling of the N1/N2 is added into the picture. The fact that the N1/N2 project for the most part is related to the upgrading of existing routes whilst the major portion of the R300 project is concerned with the development of new roads or new road sections, logically explains this finding.

7.4 ALIGNMENT ALTERNATIVES FOR THE R300 BETWEEN VANGUARD DRIVE AND MUIZENBERG AND OTHER NETWORK ALTERNATIVES IN THE SOUTHERN SECTOR

There has been much discussion regarding the preferred/optimum alignment for the R300 between Vanguard Drive and Muizenberg or alternatively the preferred road development option in the southern sector area (i.e. the area bounded by Vanguard Drive in the east, Muizenberg in the west and the False Bay Coastline in the south).

Following discussions with SANRAL and CCT in this regard, the base year (Year 2000) SATURN model was used to test five alternative route options. In testing these five options, the modelled background road network comprised the current / existing network but with the following roads added/amended:

- The R300 northern section between the Stellenberg Interchange and Bloubergstrand, as a tolled facility.
- The existing R300 upgraded as a tolled facility.
- The Philippi Link (CFFE) between Vanguard Drive and Prince George Drive, as a tolled facility.

The five alternative route options tested (refer to Figure 7.3) were:

Option A	The alignment presented in this document.
Options B and C	Alignments X and Y which are variations of the above. For the greater part they follow the alignment of the original option, but in the area between Strandfontein and Sea Winds/Lavender Hill East, they follow more southerly alignments to the south of the CFWWTW, just north of Baden Powell Drive.
Option D	A CCT alternative promotes the development of an upgraded and realigned Baden Powell Drive. In entertaining this option, it is recognised that the development/improvement of access links to/from Baden Powell (e.g. the development of Princess Vlei Parkway and Vanguard Drive Extension) also forms part of this option.
Option E	A CCT alternative which comprises the FBCA which runs east-west just to the north of Strandfontein and which also requires the development of the access links referred to in Option D above.

In testing the above options, each was added individually and separately to the background network described above. In so doing, each option was modelled as an untolled facility, this being deemed appropriate in order to attain an equitable comparison between the five options.

Results from the above modelling work revealed the following:

- Even with the Philippi Link developed and carrying traffic between the existing R300 in the east and areas such as Elfindale, Southfield and Grassy Park in the west, there are two remaining dominant traffic demands in the southern sector area, namely:
  - An east-southwest demand between the existing R300 in the east and Muizenberg and the Main and Steenberg road corridors in the south west; and
  - An east-west demand along the coast primarily between Khayelitsha and Muizenberg.

The demands referred to above are such that the existence of two routes (which could separately and directly serve these demands) can be justified. In terms of accommodating the east-southwest demand, Option A and Option E are plausible options, whilst accommodation of the east-west can and is, currently fulfilled by the existing Baden Powell Drive.

- If the Option D were developed in preference to the Option A or Option E, the dominant east-southwest demand between the existing R300 and Muizenberg and the Main and Steenberg road corridors would, as is shown in the model tests, transfer to other route corridors, these being:
  - Philippi – Prince George Drive
  - Vanguard – Baden Powell (Baden Powell now upgraded as per part of Option D)

This re-distribution of the east-southwest demand does, however, have several negative implications, these being:

- The re-distributed traffic has longer to travel and hence would incur increased operating costs;
- The re-distributed traffic, particularly when super-imposed on the existing traffic along Prince George and Vanguard Drive, would not only increase the traffic demands along these two roads but would introduce potential congestion effects and/or further increases in operating costs;
- Attention (as a consequence of the above) would have to be given to upgrading Prince George Drive and Vanguard Drive (i.e. in terms of providing the access links referred to in Option D above) to accommodate the additional re-routed traffic or alternatively to undertake such upgrading in advance of the time that otherwise would have been appropriate;
- Whilst the Option D does entail the upgrading of Baden Powell Drive to four lanes, that portion of the re-distributed east-southwest demand which would use Baden Powell Drive, when superimposed on the existing traffic on this road, results in the outcome where the capacity of the upgraded four lane Baden Powell Drive would likely be reached in Year 2010. Consequently, Option D can only be viewed as being a short but not a medium or long-term option.

For the reasons cited above, it was concluded that there was little merit in adopting the Option D. Consequently, this option was not considered further in the analysis procedure.

In terms of comparing the pros and cons of the Option A and Option E, it was evident that development of the latter would have similar implications for Vanguard Drive as identified above for the Option D. For this reason, it was concluded that Option A represented the optimum alternative both in traffic and transport economic terms.

With respect to Options B and C, it is obvious that these two alignment variations of the proposed alignment, lengthen it considerably. These two alignment variations would therefore increase development and operating costs. Consequently it was concluded that Option B and Option C should only be entertained if they exhibit environmental advantages, which are deemed to outweigh their cost and traffic related disadvantages.

As a consequence of the information presented in this chapter, it was concluded that Option A, the proposed alignment should be retained as the preferred option since this option represented the optimum traffic and transport economic solution.