

## APPENDIX 6: SPECIALIST RESPONSES ON COMMENTS RECEIVED

### RESPONSE ON COMMENTS RECEIVED ON KNYSNA TOLL HIGHWAY FROM MR R BATSON ON 29 MAY 2009

The results of the BKS survey in December 2007 with respect to three questions are summarised on the attached table. The three questions were:

1. Stop-over in Knysna? (yes or no)
2. Origin and destination.
3. Will motorist use "bypass" if it is constructed? (yes or no)

All three of these questions should be used to determine the future expected usage of the proposed Toll Highway. After consideration, it was decided to use the approximate results of the origin/destination question to estimate the future traffic on the new road. As stated before these percentages seemed reasonable to us.

The sensitivity of increasing or decreasing the projected toll highway traffic can be determined, but in view of the very high positive results of the economic analysis, there can be no doubt about the economic feasibility of the new road. The occurrence of serious congestion for many hours during peak periods (for a number of years now) is considered further motivation that the new road is justified from a road capacity viewpoint and is probably the reason why the Municipality of Knysna requested SANRAL ten years ago to proceed with the Toll Highway.

For the record: A copy of the complete BKS traffic report was made available to Mr Batson (as he expressed difficulty in obtaining it from the internet) immediately after the public meetings in Knysna at the beginning of May 2009 (in order to assist his evaluation thereof) – it was checked that the document was received by him. The reference to an "unwillingness to provide information" is difficult to understand.

H J Stander

BKS (Pty) Ltd

5 June 2009.

**RESPONSE ON COMMENTS RECEIVED ON KNYSNA TOLL HIGHWAY (LAGOON ROAD) FROM MR R BATSON ON 23 JUNE 2009**

**Response of BKS – refer to numbering in 23 June 09 e-mail:**

**2.2 Comments on the Demand, Capacity and Future Traffic Growth Determinations made by BKS**

(a) It is international best practice, to use the 30<sup>th</sup> highest hour (in the year) for design purposes – refer to Transportation Research Board, Highway Capacity Manual (HCM 2000), Chapter 8. Whilst design demand equal to capacity has been used to justify upgrading, this can be considered conservative, as Level of Service D is typically being used for this purpose.

(b) The directional split of 60:40 in the east and westbound direction respectively is typical during normal unseasonal conditions. This directional split is unlikely during the peak season, like the day of the count on 28 December 2007 between 10:00 and 11:00, when most traffic was Knysna bound. The directional split during these special conditions (mid morning in the peak of the peak season) is likely to be around 80/20. Further, the counted westbound traffic flow of 1766 was only possible because of intervention by traffic officers (overriding the traffic signals through point duty) at the N2/Waterfront intersection. It is agreed that through the intervention of the traffic officers the capacity just east of the N2/Waterfront Road intersection was increased to about 2200 veh/h under the specific conditions of that day (including good, sunny weather). Note, there is also a chance that there is an error with the count – it has been accepted as correct from the temporary surveyor contracted for the purpose.

The important point here is though: **The traffic demand is exceeding the capacity of the N2/Waterfront intersection (the eastern boundary of Lagoon Road) for many hours during holiday periods (otherwise there would not be the four kilometre queues). What is measured (counted) on Lagoon Road is therefore not the actual demand – the real demand is higher than the counts (for numerous hours). The conclusion that the design demand will be reached by 2013 is therefore justified and even conservative.**

(c) Both BKS's and SSI's opinions of the capacity of a two-lane highway according to the HCM are in line (see page 20-3 of the HCM2000 document). As soon as traffic signals are introduced, this capacity is however reduced by the green time/cycle length ratio (in general terms).

Consultation with Christoff Krogscheepers indicated that the current upgrading of Lagoon Road does not include upgrading of the N2/Waterfront intersection. The capacity of Lagoon Road therefore remains limited by this bottleneck and the statements regarding the capacity of Lagoon Road in the TIA therefore are correct. The exceptional traffic volume of 1766 veh/h that was counted in one direction in December 2007, was only achieved for a short period due to manual overriding of the traffic signal.

(d) Table 2-10 was taken from the Final Scoping Report as mentioned and with the other information provided, is considered adequate motivation for the assumptions regarding traffic growth, which is considered reasonable.

Even the "better" data of Messrs SSI sourced by Mr Batson indicate an average negative growth rate of -0.76% p.a. (during peak season) between 2001/02 and 2007/08 and an average positive rate of 6.75% during the off peak season (same time period). Should the P:\\_VH5000\5245\PROJ\Cor\Response comments R Batson 23 Jun 09.doc peak season be valid for 50 days/year (economic analysis) and the off peak period for 314 days, then the resultant average annual growth rate would still be more than 5% p.a. The historic traffic data undoubtedly supports the proposed traffic growth assumptions of the TIA.

**Mr Batson acknowledged (his Section 4) that "congestion and queuing ...lasts for only a few hours during the 3 to 4 weeks of the Peak Christmas Holiday Period". This is factual and can be confirmed by all reasonable people. Queuing only occurs because the traffic demand exceeds the capacity of the N2. Should a few hours be taken as three hours/day and a 28 day period being considered, then the demand is exceeding the capacity for more than 80 hours already. Based on this, and accepted international best practice, the construction of the Knysna Toll Highway is justified from a traffic flow viewpoint already.**

H J Stander  
BKS (Pty) Ltd  
1 September 2009

## **BS RESPONSE TO COMMENTS RECEIVED ON 18 JUNE 2009 ON THE ECONOMIC FEASIBILITY OF THE KNYSNA TOLL HIGHWAY ALTERNATIVES FROM MR R G BATSON**

### **1 Background**

BKS provided a copy of the Traffic Impact Assessment for the Knysna Toll Highway to Mr Batson after the meetings with the public in Knysna on 4 and 5 May 2009. On 29 May 2009 comments were received from Mr Batson on the assumptions used for estimating the future usage of the Toll Highway. A reasonable explanation was provided on 5 June 2009, but it appears as if Mr Batson is ignoring it and is proceeding with his own assumptions.

On 18 June 2009 a second set of comments (23 pages - on the economic feasibility of the Toll Highway) was received. There is reference on the first page to seven major errors, but in view of the substantial repetition in the comments, it is not 100% clear exactly what the seven errors are. The following nine sections in Mr Batson's comments are addressed below (his numbering):

- 7.1 Average hourly costs of time
- 7.2 Calculating travel time costs
- 7.3 Design Hour volumes and vehicle speeds vs average values (travel time)
- 7.4 Disregard of travel time costs of occupants of vehicles travelling to and from Knysna in Toll Highway Alternatives
- 7.5 Travel time costs carried over to Table 3-15
- 8.1 Design Hour volumes and vehicle speeds vs average values (vehicle operating cost)
- 8.2 Example of calculation of vehicle operating costs
- 8.3 Disregard of vehicle operating cost of vehicles travelling to and from Knysna in Toll Highway Alternatives
- 9 Accident costs

This document provides a response to the points raised in these sections. See **Sections 4 to 12** below. Other general comments are also addressed.

### **2 Economic analysis**

BKS completed a **micro economic analysis** – i.e. only the benefits and costs of the road users are taken into account. Other specialists were responsible for the macro economic analysis (impact on the wider economy of Knysna, multiplier effects, etc) and the financial analysis. Work done in the past by Prof W J Pienaar of the Stellenbosch University indicated that macro economic benefits tend to be much larger than micro economic ones for road projects in general.

The methods and approach followed in the micro economic analysis comply with both local and international practice. Assumptions have to be used with respect to a number of items and these are discussed as necessary below.

### **3 Traffic using new Toll Highway**

As mentioned above, the reasoning behind the value of 42% of eastbound traffic expected to use the Toll Highway, was provided on 18 June 2009 to Mr Batson. It is considered that it complies with the test of a reasonable person and it is therefore disagreed with the "more than 70%" (of traffic that will enter the CBD) referred to on page 2 of Mr Batson's comments. In addition it is believed that the future situation for N2 users with the Toll Highway will be different to the present one – motorists will have a choice between driving through Knysna or passing the town. Motorists

tend to plan their stops differently when they know they do not have to pass through a town. The N2 at both George and Mossel Bay are examples of this. Land uses tend to change to benefit from the accessibility provided by a by-pass type of road and relocate to adjacent to such a road (what happened at George is a good example).

**It is concluded that the estimated split of traffic between the existing N2 and the planned future road (should the Toll Highway be constructed), is reasonable.**

#### **4 Average hourly cost of time (7.1)**

The values of time used by BKS were obtained from Prof C J Bester of the Department of Civil Engineering of Stellenbosch University. As this was used before for SANRAL and was considered the best local source, it was used for this study.

The value of travel time to be used in economic analysis is an involved matter with numerous viewpoints. Regarding the values used in this analysis (R19-55 and R23-83), the following can be said:

- The order of magnitude of the values used compares well with previous South African values provided by the CSIR. The values used can be considered conservative;
- The order of magnitude of the values used compares well with values proposed in the rest of the world (again conservative). Illustrative values per person hour are: business time - Euro 21-00, Commuting time – Euro 6-00, Leisure/holiday – Euro 4-00 (Source: Victoria Transport Policy Institute);
- Allowance has been made for workers and non workers (leisure time), as well as for the number of persons per vehicle;
- It is widely acknowledged that travel time is one of the largest costs of travel, and travel time savings are often the primary justification for infrastructure improvements.
- Other attributes of travel such as comfort, lack of stops, road surface quality, etc are difficult to quantify and travel time is often considered a proxy for them.

**It is concluded that the average hourly cost of time that has been used in the economic analysis is reasonable and in fact conservative.**

#### **5 Calculating travel time costs (7.2)**

After checking the calculations in the Traffic Impact Assessment thoroughly, it was found that there has been an error in the calculation of the travel time costs. The impact of this error is substantial as indicated in Mr Batson's letter, but the final conclusion is not affected and stays the same.

The travel time cost savings are determined in minutes. In the calculations when the travel time savings are converted to a monetary value by multiplying the savings by the average hourly cost, the savings were not first converted from minutes to hours, except in the calculation that was used to illustrate the methodology (Table 3-8).

A section has been prepared at the end of this response providing new tables (**Tables 3-14 to 3-17**). The report will be similarly updated.

In his letter Mr Batson also states that the calculation method described does not tie up with the formulae used or the results obtained. The formula and the results are correct. Any error when checking the calculations is due to the rounding effect. No values in the EXCEL spreadsheet are

rounded off and thus whenever a value is used, such as vehicle speed, the value shown is only one decimal point but the calculation uses the full value. In the table the only confusion that can occur is where the calculation of the number of commuters is based on the pro-rata vehicle occupancy for light vehicle and for heavy vehicles. As a check the data in **Table 3-8** for 2013 has been calculated using a calculator and the peak period costs in 2013 (comparing to column I in the table) is R 10 572 672. The difference between the two amounts is extremely small (2.2%).

**It is concluded that an error has been made in the calculation of the travel time costs. It was a pure calculation error, which was not at all intended. Even though it is substantial, the final conclusion regarding the economic feasibility of the Knysna Toll Highway remains the same as before. The Life Cycle Cost of the four alternatives is as follows (see tables below):**

<b>Proposed Route Alternative</b>	<b>R3 064 058 000</b>
<b>Short Route Alternative</b>	<b>R3 462 122 000</b>
<b>“Do Minimum” Alternative</b>	<b>R4 115 213 000</b>
<b>“Do Nothing” Alternative</b>	<b>R5 665 501 000</b>

**From a micro economic viewpoint the implementation of both the Proposed Route Alternative and the Short Route Alternative is justified.**

## **6 Design Hour volumes and vehicle speeds vs average values – travel time (7.3)**

In his comments Mr Batson suggested that a table similar to **Table 3-8** in the report be constructed to assist in the determination of the travel speeds. This was done in the EXCEL spreadsheet in which the calculations for the micro-economic evaluation was done. The reason that it was not included in the report is that the table is extremely large and varies for each alternative.

In determining the travel speed of vehicles the speed profiles shown in **Figure 3-1** have been used. Using Table 3-8 as an example the travel speed in 2013 has been calculated as follows:

<b>Segment 1</b>	Travel speed for flow rate of 1750	33 kph (as shown in Figure 3-1)
	Travel speed for flow rate of 1800	10 kph (as shown in Figure 3-1)

From **Table 3-8** the total demand is 1764 vehicles (1613 light and 151 heavy). For simplicity it has been assumed that the relationship between travel speeds at the respective flow rates above is linear. The calculated travel speed for 1764 vehicles is therefore 26.6 kph  $(33 - ((33 - 10) / (1800 - 1750)) * (1764 - 1750))$ .

It has further been assumed that heavy vehicles will travel at a slightly different speed than light vehicles (under free-flow conditions 5kph slower) and this difference has been applied proportionately as the flow rate increases and the travel speed decrease, thus the travel speed of 25.2kph for heavy vehicles in **Table 3-8**.

The travel speed of 15 kph that has been used in 2014 and onward is slightly higher than the 10 kph shown in **Figure 3-1** as it has been assumed that the “do minimum” alternative will result in a slightly higher minimum travel speed than the “do nothing” alternative. Thus the higher travel speed for the “do minimum” alternative will result in slightly lower travel time costs.

The determination of all travel speeds has been based on the speed profiles shown in **Figure 3-1**.

Please note that the minimum travel speed is only applicable for the “do nothing” and the “do minimum” alternatives. For the other alternatives the expected demand does not approach the maximum flow rates shown on **Figure 3-1**.

**It is concluded that the speed profiles as shown in Figure 3-1 have been used and that the speed calculations are correct.**

**7 Disregard of travel time cost of vehicles travelling to Knysna on Toll Road alternatives (7.4)**

In the calculation of the costs for both the “short” alternative and the “proposed” route alternative the costs for the vehicles expected to use the alternative route and the costs of the vehicles expected to remain on the existing road have been determined separately and then added together to determine the total cost for that alternative. Therefore provision has been made for the cost of travel into and out of Knysna. This will be indicated in more detail in the final document.

**The calculations for travel time cost have included the Knysna bound vehicles and are therefore correct.**

**8 Travel time costs carried over to Table 3-15 (7.5)**

The travel time costs carried over to Table 3-15 are incorrect as a result of the error made regarding the calculation of the travel time costs, discussed in Section 5.

**Conclusion: Due to the calculation error described in 5 above, the costs carried over to Table 3-15 are in fact incorrect.**

**9 Design Hour volumes and vehicle speeds vs average values – vehicle operating cost (8.1)**

Same point as made under section 7.3 of Mr Batson’s comments – now referring to vehicle operating cost. Discussed under Section 6 above.

**It is concluded that the speed profiles as shown in Figure 3-1 have been used and that the speed calculations are correct.**

**10 Vehicle Operating Costs (8.2)**

The vehicle speeds used in the determination of the Vehicle Operating Costs (VOC) are the same as set out in Section 6 above.

**Conclusion: The vehicle speeds used in the Vehicle Operating Cost calculation are correct as described in 6 above.**

**11 Disregard of vehicle operating cost of vehicles travelling to Knysna on Toll Road alternatives (8.3)**

In the calculation of the costs for each both the “short” alternative and the “proposed” route alternative the costs for the vehicles expected to use the alternative route and the costs of the vehicles expected to remain on the existing road has been determined separately and then added together to determine the total cost for that alternative. Therefore provision has been made for the cost of travel into and out of Knysna.

**The calculations for vehicle operating cost have included the Knysna bound vehicles and are therefore correct.**

**12 Disregard of accident cost of vehicles travelling to Knysna on Toll Road alternatives (9)**

Similar to the estimation of the travel time costs and the vehicle operating costs, the costs of accidents for vehicles travelling to and from Knysna have been included in the determination of the accident costs for both toll highway alternatives.

The costs of accidents for vehicles travelling to and from Knysna have been included in the percentage of accident reduction due to improvements (the second last row in each of **Tables 3-10 to 3-13**. This percentage reduction also includes the 70% reduction due to the provision of the toll highway. An example of this calculation is given below.

Consider the accident reduction percentage in **Table 3-13**.

The 40% accident reduction (Section 1) has been calculated as follows:

	% of total	Accident Reduction	Contribution to total reduction
Toll road traffic	42%	70%	12.6% (42%*(100-70%))
Existing N2 traffic	58%	18%	47.6% (58%*(100-18%))

The total reduction is thus 39.8% (100-12.6%-47.6%) or 40% with decimal places set to zero.

**It is concluded that the costs of accidents for vehicles travelling to and from Knysna have been included in the determination of the accident costs for both toll highway alternatives.**

**13. Revised tables**

In accordance with the identification of the error in the calculation of the travel costs the revised **Tables 3-14 to 3-17** are attached below.

**Appendix 6: Specialist responses on comments received – Oct 2009**

**Table 12-1: Present Worth – “Do Nothing” Alternative – All costs**

END OF YEAR		Undiscounted costs (July 2008 Rands)					Discounted costs $i = 10\%$					
DATE	NO	Construction cost	VOC	Accidents	Time	TOTAL	Construction cost	VOC	Accidents	Time	TOTAL	
2008	0											
2009	1											
2010	2											
2011	3											
2012	4											
2013	5		R 316 375 784	R 108 761 842	R 37 209 652	R 462 347 279	R 196 444 000	R 67 533 000	R 23 104 000		R 287 081 000	
2014	6		R 379 190 826	R 167 743 472	R 38 330 420	R 585 264 718	R 214 043 000	R 94 687 000	R 21 637 000		R 330 367 000	
2015	7		R 395 208 763	R 175 865 227	R 39 484 946	R 610 558 936	R 202 805 000	R 90 247 000	R 20 262 000		R 313 314 000	
2016	8		R 411 599 384	R 184 192 685	R 40 674 247	R 636 466 315	R 192 014 000	R 85 927 000	R 18 975 000		R 296 916 000	
2017	9		R 428 980 743	R 193 335 444	R 41 899 369	R 664 215 556	R 181 930 000	R 81 993 000	R 17 769 000		R 281 692 000	
2018	10		R 447 907 184	R 203 743 013	R 43 161 393	R 694 811 590	R 172 688 000	R 78 552 000	R 16 641 000		R 267 881 000	
2019	11		R 468 051 620	R 215 525 698	R 44 461 429	R 728 038 748	R 164 049 000	R 75 540 000	R 15 583 000		R 255 172 000	
2020	12		R 489 088 269	R 229 158 823	R 45 800 623	R 764 047 715	R 155 839 000	R 73 017 000	R 14 593 000		R 243 449 000	
2021	13		R 511 499 965	R 245 801 055	R 47 180 154	R 804 481 174	R 148 163 000	R 71 200 000	R 13 666 000		R 233 029 000	
2022	14		R 543 478 593	R 264 086 688	R 48 601 237	R 856 166 518	R 143 115 000	R 69 542 000	R 12 798 000		R 225 455 000	
2023	15		R 580 880 898	R 290 760 841	R 50 065 124	R 921 706 863	R 139 058 000	R 69 606 000	R 11 985 000		R 220 649 000	
2024	16		R 633 855 034	R 330 111 658	R 51 573 103	R 1 015 539 796	R 137 945 000	R 71 842 000	R 11 224 000		R 221 011 000	
2025	17		R 803 828 470	R 490 940 437	R 53 126 503	R 1 347 895 410	R 159 033 000	R 97 130 000	R 10 511 000		R 266 674 000	
2026	18		R 1 101 183 168	R 749 203 195	R 54 726 692	R 1 905 113 055	R 198 057 000	R 134 751 000	R 9 843 000		R 342 651 000	
2027	19		R 1 143 477 739	R 787 227 238	R 56 375 079	R 1 987 080 056	R 186 968 000	R 128 718 000	R 9 218 000		R 324 904 000	
2028	20		R 1 178 480 521	R 816 778 104	R 58 073 117	R 2 053 331 741	R 175 174 000	R 121 409 000	R 8 632 000		R 305 215 000	
2029	21		R 1 210 353 517	R 839 411 056	R 59 822 299	R 2 109 586 872	R 163 556 000	R 113 430 000	R 8 084 000		R 285 070 000	
2030	22		R 1 242 690 977	R 862 489 389	R 61 624 168	R 2 166 804 535	R 152 660 000	R 105 953 000	R 7 570 000		R 266 183 000	
2031	23		R 1 275 991 128	R 886 401 834	R 63 480 310	R 2 225 873 271	R 142 500 000	R 98 992 000	R 7 089 000		R 248 581 000	
2032	24		R 1 310 273 717	R 910 832 043	R 65 392 359	R 2 286 498 120	R 133 026 000	R 92 473 000	R 6 639 000		R 232 138 000	
2033	25		R 1 353 717 067	R 941 635 282	R 67 362 000	R 2 362 714 350	R 124 943 000	R 86 909 000	R 6 217 000		R 218 069 000	
						<b>R 27 188 543 000</b>						<b>R 5 665 501 000</b>

**Appendix 6: Specialist responses on comments received – Oct 2009**

**Table 12-2: Present Worth – “Do Minimum” Alternative – All costs**

END OF YEAR		Undiscounted costs (July 2008 Rands)					Discounted costs $i = 10\%$					
DATE	NO	Construction cost	VOC	Time	Accidents	TOTAL	Construction cost	VOC	Time	Accidents	TOTAL	
2008	0											
2009	1											
2010	2											
2011	3	R 23 329 200				R 23 329 200	R 15 934 000				R 15 934 000	
2012	4	R 23 329 200				R 23 329 200	R 14 486 000				R 14 486 000	
2013	5		R 274 932 890	R 103 942 706	R 36 478 994	R 415 354 590		R 170 712 000	R 64 540 000	R 22 651 000	R 257 903 000	
2014	6		R 296 882 589	R 122 889 562	R 37 429 004	R 457 201 155		R 167 582 000	R 69 368 000	R 21 128 000	R 258 078 000	
2015	7		R 309 740 704	R 128 398 884	R 38 403 755	R 476 543 343		R 158 946 000	R 65 889 000	R 19 707 000	R 244 542 000	
2016	8		R 323 148 326	R 134 029 633	R 39 403 891	R 496 581 850		R 150 751 000	R 62 526 000	R 18 382 000	R 231 659 000	
2017	9		R 337 488 853	R 140 377 528	R 40 430 073	R 518 296 455		R 143 128 000	R 59 534 000	R 17 146 000	R 219 808 000	
2018	10		R 353 160 046	R 147 910 416	R 41 482 979	R 542 553 441		R 136 158 000	R 57 026 000	R 15 993 000	R 209 177 000	
2019	11		R 369 017 026	R 156 760 633	R 42 563 306	R 568 340 965		R 129 338 000	R 54 944 000	R 14 918 000	R 199 200 000	
2020	12		R 385 486 477	R 167 409 837	R 43 671 768	R 596 568 082		R 122 828 000	R 53 342 000	R 13 915 000	R 190 085 000	
2021	13		R 402 992 203	R 181 039 683	R 44 809 097	R 628 840 983		R 116 732 000	R 52 441 000	R 12 980 000	R 182 153 000	
2022	14		R 428 656 004	R 196 164 585	R 45 976 045	R 670 796 634		R 112 879 000	R 51 656 000	R 12 107 000	R 176 642 000	
2023	15		R 459 210 546	R 219 759 156	R 47 173 383	R 726 143 086		R 109 931 000	R 52 609 000	R 11 293 000	R 173 833 000	
2024	16		R 507 684 926	R 256 489 068	R 48 401 904	R 812 575 897		R 110 487 000	R 55 819 000	R 10 534 000	R 176 840 000	
2025	17		R 664 116 167	R 414 657 756	R 49 662 418	R 1 128 436 341		R 131 392 000	R 82 038 000	R 9 825 000	R 223 255 000	
2026	18		R 670 354 158	R 414 126 229	R 50 955 759	R 1 135 436 147		R 120 569 000	R 74 484 000	R 9 165 000	R 204 218 000	
2027	19		R 703 983 000	R 439 616 684	R 52 282 782	R 1 195 882 467		R 115 107 000	R 71 881 000	R 8 549 000	R 195 537 000	
2028	20		R 731 438 868	R 457 655 747	R 53 644 365	R 1 242 738 980		R 108 724 000	R 68 028 000	R 7 974 000	R 184 726 000	
2029	21		R 751 735 306	R 470 476 111	R 55 041 407	R 1 277 252 824		R 101 582 000	R 63 576 000	R 7 438 000	R 172 596 000	
2030	22		R 772 247 481	R 483 504 914	R 56 474 831	R 1 312 227 227		R 94 867 000	R 59 397 000	R 6 938 000	R 161 202 000	
2031	23		R 793 518 455	R 497 050 886	R 57 945 586	R 1 348 514 927		R 88 619 000	R 55 510 000	R 6 471 000	R 150 600 000	
2032	24		R 815 154 789	R 510 894 581	R 59 454 643	R 1 385 504 013		R 82 759 000	R 51 869 000	R 6 036 000	R 140 664 000	
2033	25		R 841 613 574	R 528 375 856	R 61 003 000	R 1 430 992 430		R 77 678 000	R 48 767 000	R 5 630 000	R 132 075 000	
						<b>R 18 413 440 000</b>						<b>R 4 115 213 000</b>

Upgrading of Waterfront Drive to take place over 24 months.

**Table 12-3: Present Worth – Short Route Alternative – All costs**

END OF YEAR		Undiscounted costs (July 2008 Rands)					Discounted costs $i = 10\%$					
DATE	NO	Construction cost	VOC	Time	Accidents	TOTAL	Construction cost	VOC	Time	Accidents	TOTAL	
2008	0											
2009	1	R 150 367 594				R 150 367 594	R 124 271 000				R 124 271 000	
2010	2	R 300 735 188				R 300 735 188	R 225 947 000				R 225 947 000	
2011	3	R 526 286 579				R 526 286 579	R 359 461 000				R 359 461 000	
2012	4	R 526 286 579				R 526 286 579	R 326 783 000				R 326 783 000	
2013	5		R 228 891 230	R 65 502 246	R 33 299 386	R 327 692 862		R 142 123 000	R 40 672 000	R 20 676 000	R 203 471 000	
2014	6		R 243 561 673	R 69 673 297	R 33 549 057	R 346 784 027		R 137 484 000	R 39 329 000	R 18 938 000	R 195 751 000	
2015	7		R 245 124 738	R 70 151 753	R 33 800 599	R 349 077 090		R 125 788 000	R 35 999 000	R 17 345 000	R 179 132 000	
2016	8		R 253 557 688	R 72 567 374	R 34 054 028	R 360 179 091		R 118 287 000	R 33 853 000	R 15 886 000	R 168 026 000	
2017	9		R 262 289 755	R 75 067 623	R 34 309 357	R 371 666 736		R 111 236 000	R 31 836 000	R 14 551 000	R 157 623 000	
2018	10		R 271 473 110	R 77 698 598	R 34 566 600	R 383 738 308		R 104 665 000	R 29 956 000	R 13 327 000	R 147 948 000	
2019	11		R 280 889 263	R 80 396 402	R 34 825 773	R 396 111 438		R 98 450 000	R 28 178 000	R 12 206 000	R 138 834 000	
2020	12		R 290 633 836	R 83 186 696	R 35 086 888	R 408 907 420		R 92 605 000	R 26 506 000	R 11 180 000	R 130 291 000	
2021	13		R 300 724 446	R 86 076 279	R 35 349 961	R 422 150 686		R 87 109 000	R 24 933 000	R 10 240 000	R 122 282 000	
2022	14		R 311 167 528	R 89 066 383	R 35 615 007	R 435 848 918		R 81 940 000	R 23 454 000	R 9 379 000	R 114 773 000	
2023	15		R 322 127 745	R 92 245 716	R 35 882 039	R 450 255 501		R 77 115 000	R 22 083 000	R 8 590 000	R 107 788 000	
2024	16		R 332 229 283	R 94 668 749	R 36 151 074	R 463 049 106		R 72 303 000	R 20 603 000	R 7 868 000	R 100 774 000	
2025	17		R 342 565 651	R 97 153 631	R 36 422 126	R 476 141 408		R 67 775 000	R 19 221 000	R 7 206 000	R 94 202 000	
2026	18		R 353 277 071	R 99 765 590	R 36 695 211	R 489 737 872		R 63 540 000	R 17 944 000	R 6 600 000	R 88 084 000	
2027	19		R 364 172 954	R 102 508 842	R 36 970 343	R 503 652 138		R 59 545 000	R 16 761 000	R 6 045 000	R 82 351 000	
2028	20		R 375 345 199	R 105 413 348	R 37 247 538	R 518 006 084		R 55 793 000	R 15 669 000	R 5 537 000	R 76 999 000	
2029	21		R 385 423 855	R 108 482 253	R 37 526 811	R 531 432 918		R 52 083 000	R 14 659 000	R 5 071 000	R 71 813 000	
2030	22		R 396 254 346	R 111 747 077	R 37 808 178	R 545 809 601		R 48 678 000	R 13 728 000	R 4 645 000	R 67 051 000	
2031	23		R 407 535 097	R 115 534 706	R 38 091 654	R 561 161 457		R 45 513 000	R 12 903 000	R 4 254 000	R 62 670 000	
2032	24		R 420 242 469	R 120 669 393	R 38 377 257	R 579 289 119		R 42 665 000	R 12 251 000	R 3 896 000	R 58 812 000	
2033	25		R 443 676 789	R 135 067 902	R 38 665 000	R 617 409 691		R 40 950 000	R 12 466 000	R 3 569 000	R 56 985 000	
						<b>R 11 041 777 000</b>						<b>R 3 462 122 000</b>

Implementation of Short Route Alternative to take place over 48 months.

**Table 12-4: Present Worth – Proposed Route Alternative – All costs**

END OF YEAR		Undiscounted costs (July 2008 Rands)					Discounted costs i = 10%					
DATE	NO	Construction cost	VOC	Time	Accidents	TOTAL	Construction cost	VOC	Time	Accidents	TOTAL	
2008	0											
2009	1	R 156 348 034				R 156 348 034	R 129 213 000				R 129 213 000	
2010	2	R 312 696 068				R 312 696 068	R 234 933 000				R 234 933 000	
2011	3	R 547 218 120				R 547 218 120	R 373 757 000				R 373 757 000	
2012	4	R 547 218 120				R 547 218 120	R 339 779 000				R 339 779 000	
2013	5		R 182 035 666	R 56 673 873	R 32 356 641	R 271 066 179		R 102 754 000	R 35 190 000	R 20 091 000	R 158 035 000	
2014	6		R 195 174 878	R 60 125 533	R 32 412 532	R 287 712 942		R 110 171 000	R 33 939 000	R 18 296 000	R 162 406 000	
2015	7		R 194 977 512	R 60 728 736	R 32 468 520	R 288 174 768		R 100 054 000	R 31 163 000	R 16 661 000	R 147 878 000	
2016	8		R 201 688 060	R 62 823 726	R 32 524 604	R 297 036 390		R 94 089 000	R 29 308 000	R 15 173 000	R 138 570 000	
2017	9		R 208 647 716	R 64 987 650	R 32 580 786	R 306 216 152		R 88 487 000	R 27 561 000	R 13 817 000	R 129 865 000	
2018	10		R 215 921 897	R 67 259 833	R 32 637 064	R 315 818 793		R 83 247 000	R 25 932 000	R 12 583 000	R 121 762 000	
2019	11		R 223 347 123	R 69 576 558	R 32 693 440	R 325 617 121		R 78 282 000	R 24 386 000	R 11 459 000	R 114 127 000	
2020	12		R 231 127 165	R 72 011 204	R 32 749 913	R 335 888 281		R 73 644 000	R 22 945 000	R 10 435 000	R 107 024 000	
2021	13		R 239 170 993	R 74 520 892	R 32 806 483	R 346 498 368		R 69 279 000	R 21 586 000	R 9 503 000	R 100 368 000	
2022	14		R 247 503 103	R 77 110 038	R 32 863 151	R 357 476 292		R 65 175 000	R 20 305 000	R 8 654 000	R 94 134 000	
2023	15		R 256 275 683	R 79 893 715	R 32 919 918	R 369 089 315		R 61 350 000	R 19 126 000	R 7 881 000	R 88 357 000	
2024	16		R 264 729 663	R 81 983 606	R 32 976 782	R 379 690 051		R 57 613 000	R 17 842 000	R 7 177 000	R 82 632 000	
2025	17		R 273 508 217	R 84 189 151	R 33 033 744	R 390 731 112		R 54 112 000	R 16 656 000	R 6 536 000	R 77 304 000	
2026	18		R 282 599 049	R 86 482 960	R 33 090 805	R 402 172 814		R 50 828 000	R 15 555 000	R 5 952 000	R 72 335 000	
2027	19		R 291 854 866	R 88 908 645	R 33 147 964	R 413 911 476		R 47 721 000	R 14 537 000	R 5 420 000	R 67 678 000	
2028	20		R 301 367 302	R 91 478 690	R 33 205 222	R 426 051 215		R 44 796 000	R 13 598 000	R 4 936 000	R 63 330 000	
2029	21		R 309 382 959	R 94 182 926	R 33 262 579	R 436 828 464		R 41 807 000	R 12 727 000	R 4 495 000	R 59 029 000	
2030	22		R 318 018 823	R 97 121 896	R 33 320 036	R 448 460 754		R 39 067 000	R 11 931 000	R 4 093 000	R 55 091 000	
2031	23		R 326 827 036	R 100 527 579	R 33 377 591	R 460 732 206		R 36 499 000	R 11 227 000	R 3 728 000	R 51 454 000	
2032	24		R 336 688 548	R 105 308 090	R 33 435 246	R 475 431 884		R 34 183 000	R 10 691 000	R 3 395 000	R 48 269 000	
2033	25		R 353 576 483	R 119 211 638	R 33 493 000	R 506 281 121		R 32 634 000	R 11 003 000	R 3 091 000	R 46 728 000	
						<b>R 9 404 366 000</b>						<b>R 3 064 058 000</b>

Implementation of Proposed Route Alternative to take place over 48 months.

SANRAL Western Region  
Parc du Cap, Building 5  
cnr. Mispel St. & W van Schoor Ave.  
BELLVILLE, 7530

**Attention : Mr C Brink**

**KNYSNA N2 TOLL HIGHWAY - PRELIMINARY ENGINEERING DESIGN OF  
ALTERNATIVE ROUTES : RESPONSE TO QUERIES ARISING FROM THE PUBLIC  
PARTICIPATION PROCESS DURING MAY 2009**

Your two email messages dated 08 May and 13 May 2009 refer. The four issues you asked us to address are as follows :

1. Comparison of the proposed White Bridge Option compared with an earlier similar proposal prepared by Mr A McVitty and the reasons for the small cost difference between the main route proposal across the Knysna River and the proposed White Bridge option.
2. Additional land requirements for the access road from the lagoon road up to the Eastford Interchange, particularly for the revised intersection designed to tie in with the new 4 lane lagoon road upgrading.
3. Safety of the houses on the southern side of the lagoon road in the event of a runaway vehicle coming down the proposed Eastford Link Road.
4. Provision of access to the Eastford Township area north of the bypass in the event that the interchange is constructed at Salt River instead of Eastford.

Our response to these queries is given overleaf :

## 1. COMPARISON OF PROPOSED WHITE BRIDGE OPTION WITH PREVIOUS SIMILAR PROPOSAL.

This information is provided in response to the e-mail dated 1 May 2009 from Mr Alan McVitty to the environmental consultants for this project.

Mr McVitty's e-mail sets out his concerns relating to the White Bridge Short Route alternative alignment and particularly the viaduct as detailed in the Environmental Impact Report. His concerns are:

1. The horizontal and vertical alignment of the White Bridge Short Route and the length of the viaduct.
2. The relatively small cost difference between the Proposed Route and the Short Route options.

### 1. Horizontal and Vertical Alignment of the White Bridge Short Route Option

The horizontal alignment of the proposed White Bridge option is very similar to the alignment depicted on the drawings of the Eastford Hill and Cheeseman Underpass alignment provided by Mr McVitty. The horizontal and the vertical alignment of the proposed Short Route option are depicted on the Preliminary Design Drawings.

The alignment starts at the widened White Bridge, continues on the embankment across the lagoon and then rises over the existing Lagoon Road at Cheeseman Corner and into the valley towards Eastford. The road negotiates the eastern side of the valley so as not to obstruct the watercourse in the valley and to limit impacts on the western side of the valley which has the more sensitive and conservation-worthy vegetation according to the specialists.

The viaduct starts on the western (White Bridge) side where the embankment height exceeds 3m and ends as the alignment enters side cut/ side fill on the eastern side of the valley and is 620m long. The alignment is then in side cut/ side fill with the fill side contained by a reinforced earth wall to limit spilling into the valley and watercourse.

The alignment then enters a box cut with a maximum depth of 19m, an earth fill with maximum height of 8m and a further box cut with maximum depth 20m before joining the Proposed Route alignment west of the Eastford interchange. A possible toll plaza location for the Short Route option is situated where the Short Route option joins the Proposed Route.

This alignment is similar to the alignment depicted in Mr McVitty's drawings except that Mr McVitty's vertical alignment crests at about RL 50,0 m which is about 11 m lower than the proposed vertical alignment at this point. As a result the earthworks through the cuts in the alignment depicted in Mr Mc Vitty's drawings are significantly increased but the viaduct length is reduced by about 170m.

We wish to comment on Mr McVitty's proposed alignment as follows:

- (a) From the drawings provided it appears as if the viaduct in his option starts when the embankment height reaches about 7m so as to reduce the length of the viaduct. This is considered undesirable for several reasons.
- The visual impact of an embankment is far greater than that of a thin-profile viaduct structure.
  - The imprint of the embankment into the lagoon would increase considerably with the concomitant environmental impacts.
  - Construction under traffic would be problematic. A bypass would be required around the embankment which would encroach into the lagoon as it would not be possible to build the embankment in half widths without major problems in traffic flow. The construction of the footings and piers of the viaduct under traffic would be possible and the impacts would be much less.
- (b) The increase in depth of the two box cuts over the crest to Eastford is significant. The box cut in the first cutting increases in depth from 19m to 30m and the depth of the second cutting increases from 20m to 27m. This results in a much greater land take and increased visual and environmental impacts. Cut volumes increase from 370 000m<sup>3</sup> to 850 000m<sup>3</sup> with most of the extra material having to be spoiled at some place which will add to the costs and the environmental impacts.
- (c) The comparative costs of the two options are very similar, the reduced cost of the viaduct being balanced out by the additional costs of the earthworks quantities. This is illustrated in table of estimated costs below :

Item	NS/UWP Alignment			McVitty Alignment			Saving
	Quantity	Rate	Cost	Quantity	Rate	Cost	
Cut & borrow to fill	145653.3	R 35.00	R 5 097 865.50	78965.2	R 35.00	R 2 763 782.00	R 2 334 083.50
Cut to spoil	224308.26	R 100.00	R 22 430 826.00	814564.97	R 100.00	R 81 456 497.00	R -59 025 671.00
Restricted overhaul	184980.78	R 6.50	R 1 202 375.07	446765.09	R 6.50	R 2 903 973.05	R -1 701 597.98
Overhaul	138735.59	R 6.50	R 901 781.30	335073.81	R 6.50	R 2 177 979.79	R -1 276 198.49
Viaduct Structure	12648	R 16 000.00	R 202 368 000.00	9180	R 16 000.00	R 146 880 000.00	R 55 488 000.00
<b>Total saving</b>							<b>R -4 181 383.97</b>

In summary:

- It appears as if the horizontal alignment of the Short Route option and Mr McVitty's alignment are very similar;
- the vertical alignment of Mr McVitty's alignment is lower and, as a result, the length of the viaduct is reduced but earthworks quantities and environmental impacts are increased;
- the costs of the two alignments are of the same order.

We believe the alignment of the White Bridge Short Route option as shown in the drawings and reflected in the Environmental Impact Report is the better option.

2. Overall Costs associated with the White Bridge Short Route Option and the Proposed Route Option

Mr McVitty appeared concerned about the small difference in construction costs between the Proposed Route option and the White Bridge Short Route option. The following information may help to provide some background to this.

1. The following additional work items are required for the Short Route option

Widening of the White Bridge	R8 500 000
Additional interchange ramp at White Bridge	R1 000 000
New Rheenendal/N2 interchange on existing alignment	R11 000 000
Upgrading of roads for Red Bridge detour alignment	R7 500 000
New deck on Red Bridge	<u>R4 000 000</u>
	<b><u>R32 000 000</u></b>

2. The cost of the viaduct estimated at R202m (R147m for McVitty's option), is significantly more expensive than the estimated cost of R60m for the new Knysna River Bridge for the Proposed Route options.

Note these are all net costs i.e. costs for additional items to which P&G costs, contingencies, fees and other costs including VAT need to be added.

2. **Additional land requirements for the Eastford Interchange Access Road**

The original proposal was for a two lane access road between a simple T-junction off the old lagoon road up to the Eastford Interchange. This has now developed into a four lane undivided access road which ties into the upgraded four lane lagoon road with a new intersection which gives priority to the Eastford / Knysna traffic and brings the western side of the lagoon road in on a T-junction.

These significant upgrades have been necessitated by an increase in estimated traffic volumes and have resulted in the need for additional land requirements. At the same time some of the land on Erf 1505 which was expropriated to provide the originally envisaged T-junction with the lagoon road will no longer be required.

The road reserve and land requirements for the currently proposed Eastford Interchange access road are shown on the attached Drawing No. 10109-500. The required areas of land take required for each affected erf are shown on the table at the

bottom of the drawing just to the left of the drawing legend table and are described overleaf.

As per the legend on the drawing the following aspects are shown on this drawing :

- The proclaimed road reserve required for the N2 bypass is shown by a thick dashed black line and the first 800m of the proposed Eastford Interchange access road is within this reserve and no additional land is required.
- The road reserve for the originally proposed access road between the N2 reserve and the lagoon road is shown by a thick solid black line. The section of the access road from km 0+800 down to km 1+500 falls within this reserve. However, as shown by the light red hatched area between km 1+100 and km 1+250 the road reserve needs to be widened to accommodate the proposed 4 lane access road. From the available information it appears as though the road reserve kinks in at this point and that the sections of erf's 14950 & 14951, as well as the section marked "Servitude", were not originally expropriated.
- In addition to the above listed land requirements additional land is also required to the west of the Eastford Interchange access road to provide a new service road for access to the erf's just west of the section of the access road between km 0+800 & km 1+250.
- Between km 1+250 and km 1+500 the area required for the proposed access road (light blue hatching) remains within the original road reserve. In addition, because the alignment has now been swung eastwards towards Knysna, sections of the expropriated erf's 12949 and the remainder of 1506 are no longer required (yellow shaded areas. (See second table showing areas of unutilised land within the existing road reserve.)
- For the last section of the road from km1+500 to km 1+700 the new intersection design requires additional land take as shown by the light red hatching. (In addition two small areas as shown by the green shading) would also need to be expropriated. *The alternative to this new land take would be to revert to a straight T-junction onto the lagoon road at the bottom of erf 1505.*

### **3. Safety of houses on southern side of the lagoon road below the Eastford Interchange Access Road junction with Lagoon Road.**

The potential danger posed by runaway trucks coming down the access road could be alleviated by providing a single slope concrete barrier as shown on the attached

Drawing No. 10109 – 500. (Consideration could also be given to providing a truck arrestor bed in the unused corner at the top eastern side of erf 1505 which has already been expropriated for the road reserve. This is not shown on the drawing as it may not be practical – we would need to look at the actual terrain more carefully.)

**4. Provision of access to Eastford Township in the event that the Eastford Interchange is not constructed.**

If the Eastford Interchange is not constructed access to the Eastford developments north of the N2 bypass can be provided via the same overpass bridge as proposed for the interchange. The bridge would be narrowed down from 4 lanes to two lanes as shown by the red shading on Drawing No. 10109-500.

The overpass would be linked into the existing municipal roads south of the N2 bypass as shown by the red shaded road realignment sections on Drawing No. 10109-500. All of these realignments can be accommodated within existing N2 or municipal road reserves so no additional land take is required.

We trust that we have answered the various queries satisfactorily but if you require any additional information please let us know.

Yours faithfully



M H White  
*UWP Consulting / Ninham Shand*