Bexhill to Hastings Link Road

Economic Assessment Report

East Sussex County Council
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Bexhill to Hastings Link Road

Economic Assessment Report

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1 Introduction

1.1.1 This Economic Assessment Report covers the costs and benefits of building a link road between Bexhill and Hastings. The assessment has been undertaken in line with guidance contained on WebTAG and within DMRB Volume 13. The economic assessment follows on from the transport model building and forecasting process described in the three previous reports:

- Traffic Survey Report (ref Traffic and Transport Report Appendix A);
- Local model Validation Report (ref Traffic and Transport Report Appendix B, and
- Traffic Forecasting Report (ref Traffic and Transport Report Appendix C).

1.1.2 TUBAv1.7 and COBA11 r7 programs have been used to calculate the Scheme transport and accident costs and benefits based on traffic forecasts produced using DIADEM as described in the Traffic Forecasting Report referenced above. TUBA has been used to calculate the transport benefits and disbenefits as a result of changes to journey times and lengths. TUBA has also been used to calculate the benefits or disbenefits of carbon emissions. COBA has been used to calculate the impact of the Scheme on the number and cost of accidents.

1.1.3 The economic assessment report also includes the benefits/disbenefits resulting from regeneration effects of the Scheme and transport related noise impacts.

1.1.4 Economic assessments have been undertaken for the Most Likely scenario as well as a modelling parameters sensitivity test.

2 TUBA Input Data

2.1 Traffic Model Outputs

2.1.1 The main inputs to TUBA, apart from the scheme cost, are all taken form the traffic modelling work previously undertaken for the Scheme. Vehicle and public transport passenger matrices are output from the final highway and public transport assignments together with journey cost matrices.

2.2 Highway Model Outputs

2.2.1 The final trip matrices are extracted from the highway modelling and input to TUBA. Trip matrices for each of the five user classes, namely cars commuting, cars on employers business, other cars, LGVs and HGVs, are input separately to TUBA.

2.2.2 The split of the HGV matrices into the OGV1 and OGV2 has been calculated using the counts undertaken on the A259 at Glyne Gap. The split of the LGV matrices into personal and freight trips uses the standard WebTAG (Unit 3.5.6 Table 8) proportions of 88% freight and 12% personal.

2.2.3 Time and distance matrices by user class have been skimmed from the final highway assignments and input to TUBA.

2.3 Public Transport Model Outputs

2.3.1 As with the highway model, the final public transport trip matrices have been input into TUBA. Matrices have been input separately by bus and rail and by user class. The availability of a car does not impact on the economic assessment, so car available and car non-available matrices have been combined.

2.3.2 Journey cost matrices have been skimmed from the final assignments and input to TUBA. For commuting and other tip purposes, this journey cost includes the weighting of various elements as described in section 4.1 of the Traffic Forecasting Report. For employers business trips following WebTAG guidance (unit 3.5.6) this weighting is removed.

2.3.3 Bus and rail fare matrices have also been included in the TUBA assessments. Fares have been assumed to remain constant in future years.

2.4 Scheme Cost

2.4.1 Table 2.1 below shows the scheme cost split into construction, land, preparation and supervision elements by year of spending. The costs are also shown separately for the Scheme, the developer funded connection from the Scheme onto Wrestwood Road and the Complementary Measures.

2.4.2 In line with WebTAG unit 3.5.9 the construction cost elements of the Scheme, developer connection and Complementary Measures have been uplifted to construction cost increases over and above inflation. It has been assumed that construction costs are increasing at 6% per annum, compared to general inflation of 2.5% per annum.

2.4.3 A scheme cost estimate is not available for the developer funded connection, so the main Scheme construction cost estimate has been applied pro-rata based on scheme length. Land, preparation and supervision costs have not been included. It has been further assumed that the costs of this connection will be spent in 2010/2011.

2.4.4 It has also been assumed that the costs associated with implementing the Complementary Measures will be spent in 2011/2012. The measures have been designed with no land take, so construction costs only are assumed.

2.4.5 Three risk workshops have been undertaken in 2006, each one reassessing previously highlighted risks and considering any new risks to the Scheme. This has provided risk costs for the Scheme which have been applied to the construction, land, preparation and supervision elements proportionally by year. As the cost of the developer funded connection is pro-rata'ed from the main Scheme estimate this will include risk at the same levels of the main Scheme. A 20% risk allowance has been applied to the Complementary Measures cost estimate.

2.4.6 The recently released WebTAG Unit 3.5.9 gives default Optimism Bias cost increase percentages dependant on scheme stage. It is considered that the Scheme is at provisional approval stage and therefore an Optimism Bias of 15% has been applied to the scheme costs input to TUBA.

2.4.7 The above considerations result in the scheme costs as shown below in Table 2-1. Costs that were incurred before 2005/2006 have not been included as they have already been spent and are therefore not included in the assessment.

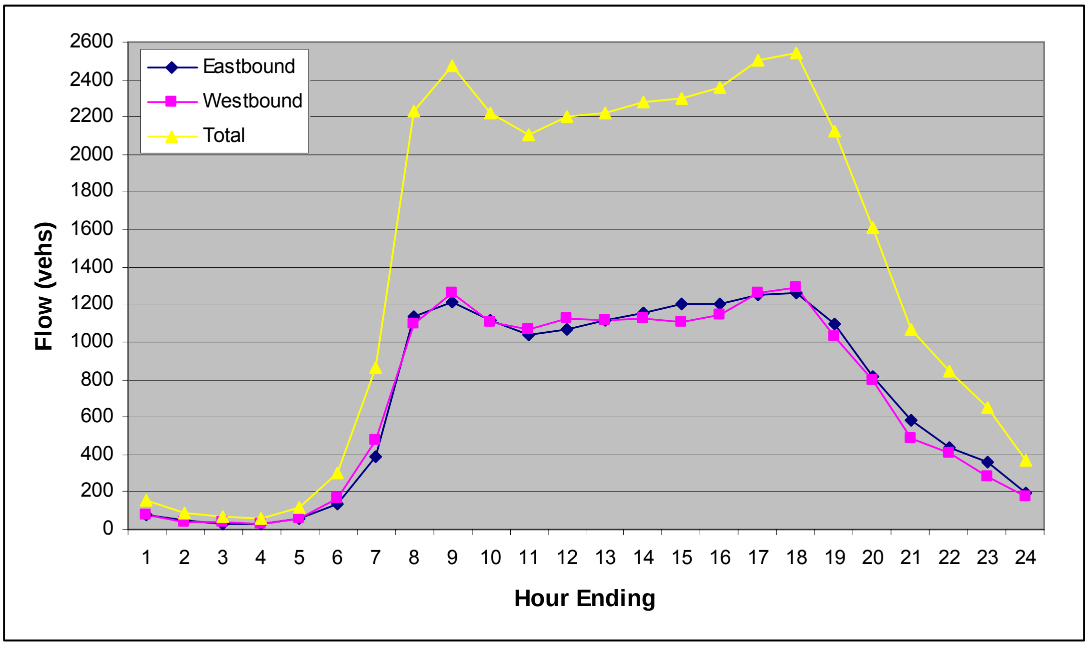
Table 2-1: Scheme Costs Including Risk and Optimism Bias

		2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	TOTAL
BHLR Scheme	**Construction**			2,278	28,800	25,906		56,983
	Land	120	1,700	6,250			1,300	9,370
	Preparation	1,810	1,200	700				3,710
	Supervision			170	380	340	100	990
	Risk	18	256	2,488	4,231	3,699	185	10,877
	TOTAL	1,948	3,156	11,886	33,411	29,945	1,585	81,931
	Optimism Bias	292	473	1,783	5,012	4,492	238	12,290
	TOTAL plus Optimism Bias	2,241	3,629	13,669	38,422	34,436	1,823	94,220
Development Connection	**TOTAL plus Optimism Bias**					17,830		17,830
Complementary Measures	**TOTAL plus Optimism Bias**						2,244	2,244

2.5 Annualisation Factors

2.5.1 Figure 2.1 below shows the flow profile on the A259 at Glyne Gap. The profile shows a single peak hour in the morning but two peak hours in the evening. The interpeak traffic levels remain similar from 1000-1600. As a consequence the annualisation factors applied are 253 equivalent annual am peak hours, 506 equivalent annual pm peak hours and 1518 equivalent annual interpeak hour.

Figure 2-1: Glyne Gap September 2004 ATC daily profile



3 COBA Input Data

3.1 Introduction

3.1.1 COBA models have been built to analyse the accident numbers predicted for the Do Minimum and Do Something separately. In addition a COBA has been prepared using validation base year flows and local accident data to calculate local accident rates for the links within the model network for which full flows have been modelled.

3.2 Traffic Flow Data

3.2.1 Traffic flow data output from the am, interpeak and pm peak highway models has been converted to AADT flows for input into COBA. Factors to get from modelled hours to and AADT level have been calculated using ATC data from the site on the A259 at Glyne Gap.

3.3 Network Data

3.3.1 The COBA network is the full highway network included in the highway traffic model for both the Do Minimum and Do Something scenarios.

3.4 COBA Basic Data

Scheme Years

3.4.1 Flows have been input to COBA for both modelled years, namely 2010 and 2025. The Scheme opening year has been set to 2010.

Network Classification

3.4.2 The overall network classification is Built-Up Principal Roads. In the Do Minimum network, the majority of links in the Bexhill and Hastings urban area have been classified as urban non-central with links in the centre of Hastings and Bexhill classified as urban central. On the outskirts of Bexhill and Hastings roads have been classified as suburban and in outlying areas roads have been classified as small town or rural. The accident type for all links in the network is defined as ‘other single 2-lane roads’ (Accident Type 9) except A-roads which are defined as ‘older single 2-lane A-roads’ (AT 8).

3.4.3 In the Do Something network, classifications remain the same. The Scheme is classed as urban non-central through the built up areas of Bexhill and as rural thereafter. The accident type is defined as a ‘modern single 2-lane road’ through the built up areas of Bexhill and as a ‘modern wide single 2-lane road’ thereafter.

Traffic Proportions

3.4.4 Traffic proportions were calculated from the manual counts for Glyne Gap in both directions undertaken on 14th May 2002 in conjunction with the eastbound Roadside Interview Survey. 16 hour count data between 0600 and 2200 has been used to calculate vehicle type proportions. Table 3-1 contains the resulting proportions.

Table 3-1: - Vehicle Proportions

Category	Proportion
Car	0.822
LGV	0.137
OGV1	0.021
OGV2	0.010
PSV	0.010

Traffic Growth

3.4.5 The traffic growth for the validation COBA was taken from ATC data at Glyne Gap over the period 2000 to 2005. Traffic growth was assumed to be the same for all vehicle categories.

3.4.6 For the forecast COBA assessments growth in veh kms from the highway assignments was used by vehicle type.

Proportion of Vehicles in Working Time

3.4.7 The default proportions of vehicles in working time were used in the assessments.

Expansion Factors

3.4.8 Seasonality Indices account for seasonal variation in traffic flows. For this assessment a Seasonality Index (SI) was calculated using the Glyne Gap ATC data. The ratio of August traffic to neutral month traffic was 0.9.

3.4.9 As AADT flows were input, E and M factors which convert 12 hour flows into 16 hour flows, and then AADT flows, were not used.

3.5 Accident Data

3.5.1 The COBA manual recommends the use of local accident data wherever possible. Therefore accident data from police records for the years 2001 to 2005 (inclusive) were used to calculate accident rates for all the links and junctions in the network where full flows were modelled. Figure 3.1 shows the extent of the network for which local accident data was used.

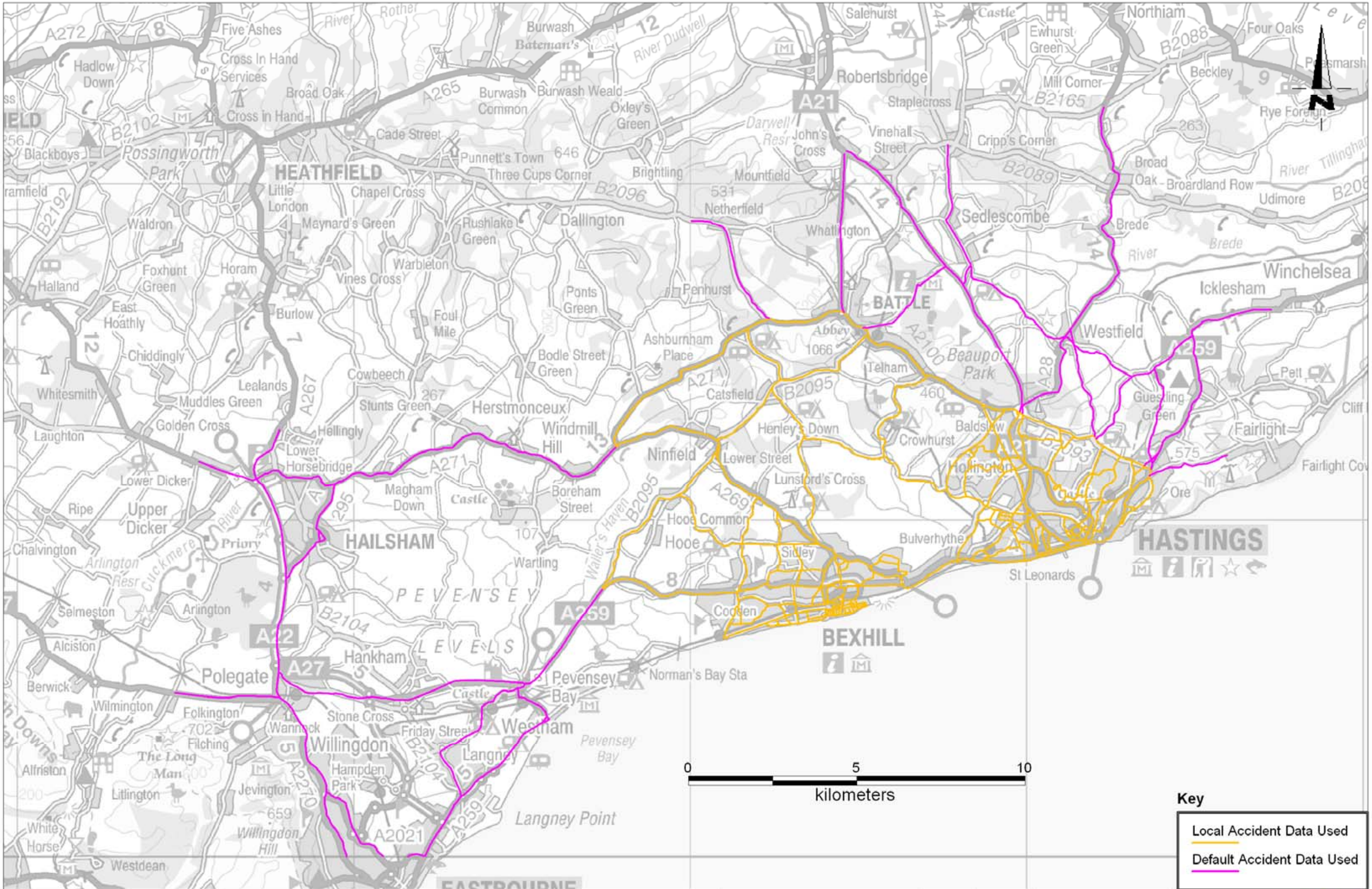
3.5.2 The table below compares the calculated local accident rates with the default accident rates for those type of roads for the four existing alternative east-west routes between Bexhill and Hastings. The default accident rates for the two halves of the Scheme are also shown for comparison purposes.

Table 3-2: Accident Rate Comparison

	Local Accident Rate	COBA Default Accident Rate
A271	0.69	0.226
B2095	0.96	0.297
Henleys Down	0.25	0.297
A259 Glyne Gap	2.19	0.226
Scheme – Bexhill end		0.297
Scheme – Hastings end		0.102

3.5.3 The comparison above shows that the local accident rates on the existing east –west routes between Bexhill and Hastings are higher than the default rates for these types of roads. Transfer of traffic from these roads onto the Scheme will result in accident benefits.

Figure 3-1: Local Accident Data Study Area



BEXHILL TO HASTINGS LINK ROAD

Figure : 3.1	Scale	NTS	Carolyn Dwyer BEng (Hons), DipTrans, DMS, MIHT, MILT Assistant Director, Transport & Waste County Hall, St. Anne's Cresent Lewes, East Sussex BN7 1UE Telephone: 01273 481000
Local Accident Data Study Area	Sheet	1 of 1	
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4 Other Economic Impacts

4.1 Noise Benefits

4.1.1 WebTAG unit 3.3.2 requires monetary assessment of noise nuisance to be calculated. The level of nuisance is determined by the change in traffic related noise based on flows with and without the Scheme and the number of households or people affected. The information has been supplied by the Southdowns who has undertaken the noise impact assessment. A slight increase in the number of people annoyed by traffic noise is forecast which equates to a Scheme specific noise NPV of -£1,574,251

5 Economic Assessment Results

5.1 TUBA Results

5.1.1 TUBA takes trip, time, distance and charge matrices from the highway and public transport models. These matrices are disaggregated by vehicle type and trip purpose. Fare matrices for public transport trips are also input. TUBA then calculates the user benefits in time, fuel vehicle operating costs (VOC), non-fuel VOC and charge, and the scheme costs, discounted to the present value year. The Economic Assessment Report in Appendix D provides more detail on the inputs used for the TUBA assessments

5.1.2 Table 5-1 below shows a summary of the economic assessment results for transport users from the TUBA assessments. The Net Present Value (NPV) result shows that the Scheme is good value for money with more benefits than costs.

5.1.3 Only the carbon benefits calculation element shows a disbenefit as a result of the scheme. This is consistent with the air quality assessment contained within Chapter 10 which also shows a slight disbenefit with the Scheme.

Table 5-1: TUBA Results[i]

Benefits/Disbenefits/Costs	Most Likely £000's
Consumer User Benefits	75,333
Business User Benefits	136,041
Private Sector Provider Impacts	2,338
Carbon Benefits	-2,568
Present Value of Benefits (PVB)	**211,144**
Investment Costs	95,125
Indirect Tax Revenue	-18,863
Present Value of Costs (PVC)	**76,262**
Net Present Value (NPV)	**134,882**
BCR (PVB/PVC)	**2.8**

All entries are present values discounted to 2002, in 2002 prices

Robustness of TUBA Results

5.1.4 Lack of convergence between the demand and supply within the traffic model can lead to errors in the scale of economic benefits calculated for the Scheme. WebTAG unit 3.10 explains that the required level of convergence needs to be linked to the scale of the benefits of the scheme being appraised, relative to the network size. Table 5.2 below compares the road user benefits as a percentage of network costs as output by TUBA with the final DIADEM convergence gaps. The user benefit percentage should be at least 10 times as large as the worst of the Do Minimum or Do Something DIADEM convergence gaps.

Table 5-2: TUBA DIADEM Convergence

	TUBA User Benefits (%)	**DIADEM Convergence Relative Gap % (DM / DS)**	**User Benefit / Convergence Gap (DM / DS)**
2010	0.86	0.19	4.5
2025	2.02	0.19	10.6

5.1.5 The ratio of TUBA user benefits to DIADEM convergence gap meets the required criteria for the 2025 assessments but does not for the 2010 assessments. WebTAG unit 3.10.4 recommends that if the DIADEM convergence gap value is greater than 0.2%, remedial work to reduce it should be undertaken. However the 2010 assessments gap is less than 0.2% so does not require remedial work.

5.1.6 To ensure the traffic model assignment converged well, the SATURN assignment model convergence criteria was tightened to a difference in flows between consecutive loops of 2% for 97% of links in the network as described in Chapter 4 of the LMVR. This is more robust than the DMRB Volume 12 criteria of 5% difference in flows for 95% of links in the network. This extra convergence of the SATURN assignments and a DIADEM gap value of less than 0.2% gives confidence that the economic benefit results obtained from TUBA are robust.

5.2 COBA Results

5.2.1 Table 5-3 below shows the link and junction accident costs for the with and without Scheme assessments. Over the 60 year assessment period from 2010 to 2069, the Scheme would result in link accident benefits as traffic transfers off roads with higher than average accident rates onto the Scheme. However, the overall increase in travel (vehicle-kms) on the network with the Scheme results in an increase in traffic through the junctions on the network which results in accident disbenefits. With the Scheme, three additional signal junctions are added to the network and three existing junctions are converted to signal junctions as part of the Complementary Measures. Overall there is a reduction in accident costs of some £51,000,000.

Table 5-3: Accident Costs (2010-2069)

	Do Minimum (Without Scheme) (£000s)	Do Something (With Scheme) (£000s)	Difference (£000s)
Links	2,236,890	2,175,464	-61,426
Junctions	960,271	970,751	+10,480
Total	**3,197,161**	**2,859,681**	**-50,946**

Note: All entries are present values discounted to 2002, in 2002 prices

5.2.2 Table 5-44 shows the changes in accident and casualty numbers with and without the scheme over the 60 year assessment period. Even though traffic increases with the Scheme, accidents and casualties are reduced as traffic switches from roads with high accident rates onto the Scheme.

Table 5-4: Changes in Accident and Casualty Numbers (2010-2069)

	Without Scheme	With Scheme	Difference
Total Accidents:	74,707	73,810	-897
All casualties:	103,976	102,684	-1,292
Slight casualties	94,265	93,122	-1,143
Serious casualties	8,879	8,742	-137
Fatal casualties	832	820	-12

5.3 Noise Economic Assessment Results

5.3.1 A slight increase in the number of people annoyed by traffic noise is forecast with the Scheme which equates to a noise NPV of -£1,574,251.

5.4 Combined Economic Assessment Results

5.4.1 Table 5.5 below combined the TUBA, COBA and noise economic assessment results to give the overall scheme BCR.

Table 5-5: Overall Scheme BCR

Benefits/Disbenefits/Costs	Most Likely £000's
TUBA Benefits	211,144
COBA Benefits	50,946
Noise Benefits	-1,574
Present Value of Benefits (PVB)	**260,516**
Present Value of Costs (PVC)	**76,262**
Net Present Value (NPV)	**184,254**
BCR (PVB/PVC)	**3.4**

All entries are present values discounted to 2002, in 2002 prices

5.4.2 If the scheme opening year were to be delayed until 2012, Table 5.6 below shows the impact on the Scheme BCR calculation.

Table 5-6: Economic Assessment Scheme Opening Year 2012

Benefits/Disbenefits/Costs	Most Likely £000's
TUBA Transport Benefits	204,458
COBA Accident Benefits	50,946
Noise Benefits	-1,574
TOTAL Benefits - PVB	**253,830**
TOTAL Costs (inc Indirect Tax Revenues) - PVC	**74,075**
Net Present Value (PVB-PVC)	**179,755**
Scheme BCR (PVB/PVC)	**3.4**

All entries are present values discounted to 2002, in 2002 prices

5.4.3 TUBA guidance states that if the scheme opening is only 1 or 2 years after the first modelled year then the modelled year data can be used to represent the scheme opening year. For the above economic assessment therefore, the modelled outputs from 2010 and 2025 have been taken to be representative of 2012 and 2027 respectively. The accident and noise economic assessments have not been recalculated for an opening year of 2012.

5.4.4 The TAG methodology does not include guidance for making a monetary valuation of the regeneration benefit of facilitating new jobs. However, a number of studies have assessed such values resulting in a range of values from £23,000 to £56,000 per new job facilitated. The lowest value comes from a National Audit Office report. This is a reasonable figure to apply to this study as the most conservative estimate of the regeneration "value" of the Link Road as it is one of the very few independent analyses of cost per job – most are undertaken or commissioned by partnerships or delivery organisations themselves.

5.4.5 As the Scheme will facilitate 2,000 additional local jobs the regeneration value of this is estimated at £44.8m, equivalent to a PVB of £22.2m in 2002 prices.

6 Modelling Parameters Sensitivity Tests Economics

6.1.1 TUBA and COBA assessments have also been run using the results of the DIADEM parameters sensitivity test to check the robustness of the Scheme. The TUBA results show the Scheme still provides value for money with a BCR of 2.1. The amount of benefits has reduced from the Most Likely assessment due to the extra traffic and longer trips resulting from this sensitivity test.

Table 6-1: Modelling Parameters TUBA Results

Benefits/Disbenefits/Costs	DIADEM Parameters Sensitivity Test £000's
Consumer User Benefits	28,314
Business User Benefits	96,557
Private Sector Provider Impacts	-9818
Carbon Benefits	-5120
Present Value of Benefits (PVB)	**109,933**
Investment Costs	95,125
Indirect Tax Revenue	-41,231
Present Value of Costs (PVC)	**53,894**
Net Present Value	**56,039**
BCR	**2.0**

Note: All entries are present values discounted to 2002, in 2002 prices

6.1.2 Table 5-3 below shows the link and junction accident costs for the with and without Scheme assessments with the revised DIADEM parameters Again the increased traffic with the Scheme and longer trips reduce the accident benefits of the Scheme. Overall there is still a slight accident benefit with the Scheme.

Table 6-2: DIADEM Parameters Sensitivity Test Accident Costs (2010-2069)

	Do Minimum (£000s)	Do Something (£000s)	Difference (£000s)
Links	2,283,492	2,267,351	-16,141
Junctions	974,122	989,485	15,363
Total	**3,257,614**	**3,256,836**	**-778**

Note: All entries are present values discounted to 2002, in 2002 prices

6.1.3 Table 6-3 shows the changes in accident and casualty numbers with and without the scheme over the 60 year assessment period.

Table 6-3: Changes in DIADEM Parameters Sensitivity Test Accident and Casualty Numbers (2010-2069)

	Without Scheme	With Scheme	Difference
Total Accidents:	75,937	75,916	-21
All casualties:	105,276	105,671	-55
Slight casualties	95,830	95,779	-51
Serious casualties	9,043	9,037	-6
Fatal casualties	853	855	2

7 Summary and Conclusions

7.1.1 The economic assessment of the Most Likely Scheme shows that the Scheme is value for money with a good overall BCR of 3.4.

7.1.2 Although the provision of the Scheme results in extra traffic on the network, the Scheme results in good transport benefits as a result of time and vehicle operating costs savings. This is because with the Scheme the average travel time between Bexhill and Hastings reduces.

7.1.3 The transfer of traffic from existing roads with high accident rates onto the Scheme results in accident benefits. Some 15 accidents are predicted to be saved across the network each year. The increase in traffic does result in additional carbon emissions and increased noise levels. These in turn give economic disbenefits with the Scheme.

7.1.4 However the transport and accident benefits outweigh the Scheme costs and carbon and noise disbenefits giving the Scheme an overall positive benefit cost ratio of 3.4.

7.1.5 The economic assessment of the modelling parameters sensitivity test also shows that the Scheme is good value for money. The additional trips generated with the Scheme in this test reduce the level of transport and accident benefits, but there are still more benefits than Scheme costs.