

# A596 Calva Brow: Post Opening Project Evaluation

## Post Opening Evaluation Report

**November 2005**

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# 1. Introduction

## BACKGROUND

- 1.1 The A596 Calva Brow Junction improvements Local Network Management (LNM) scheme opened during March 2003. The junction improvements formed part of a package of proposals of traffic management and local improvements to the A596/A66.
- 1.2 The opening of the scheme was closely followed by the 'de-trunking' of the A596 in April 2003 and handover of responsibility for the route to Cumbria County Council.
- 1.3 The location of the scheme is presented in Figure 1.1 below.

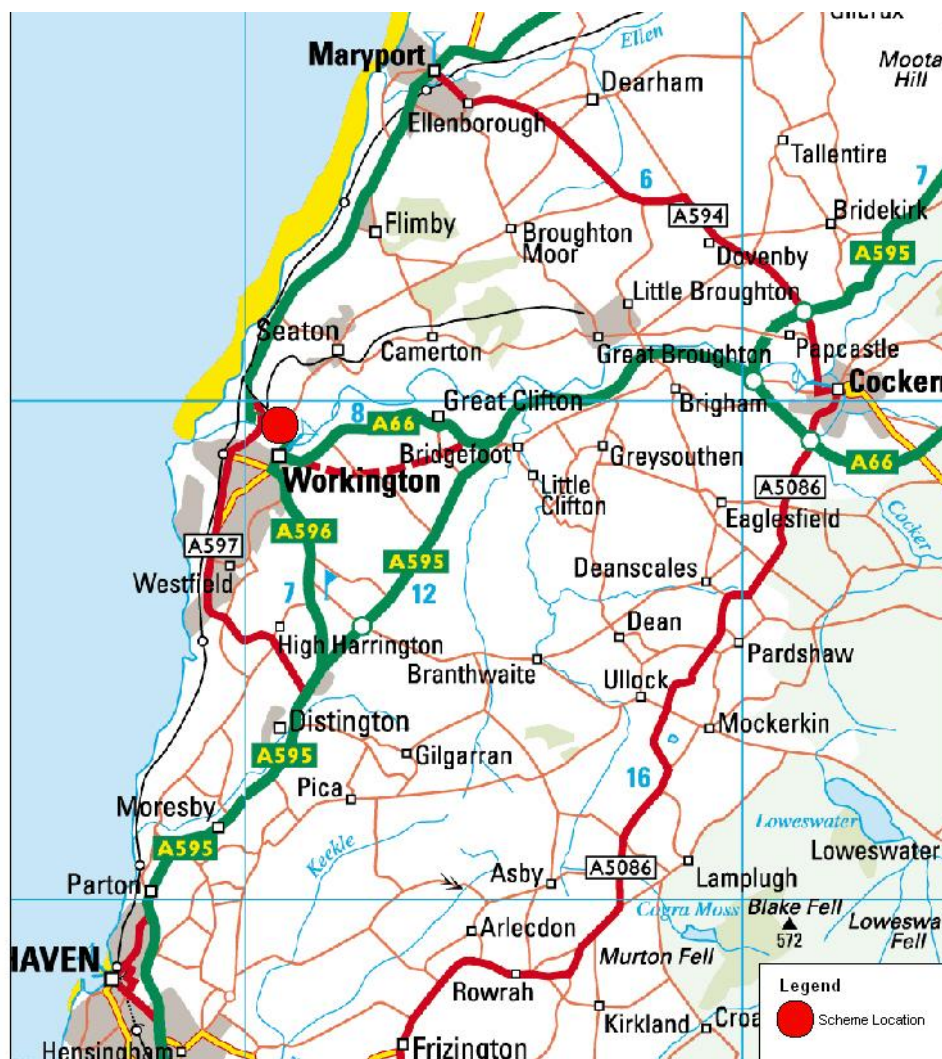
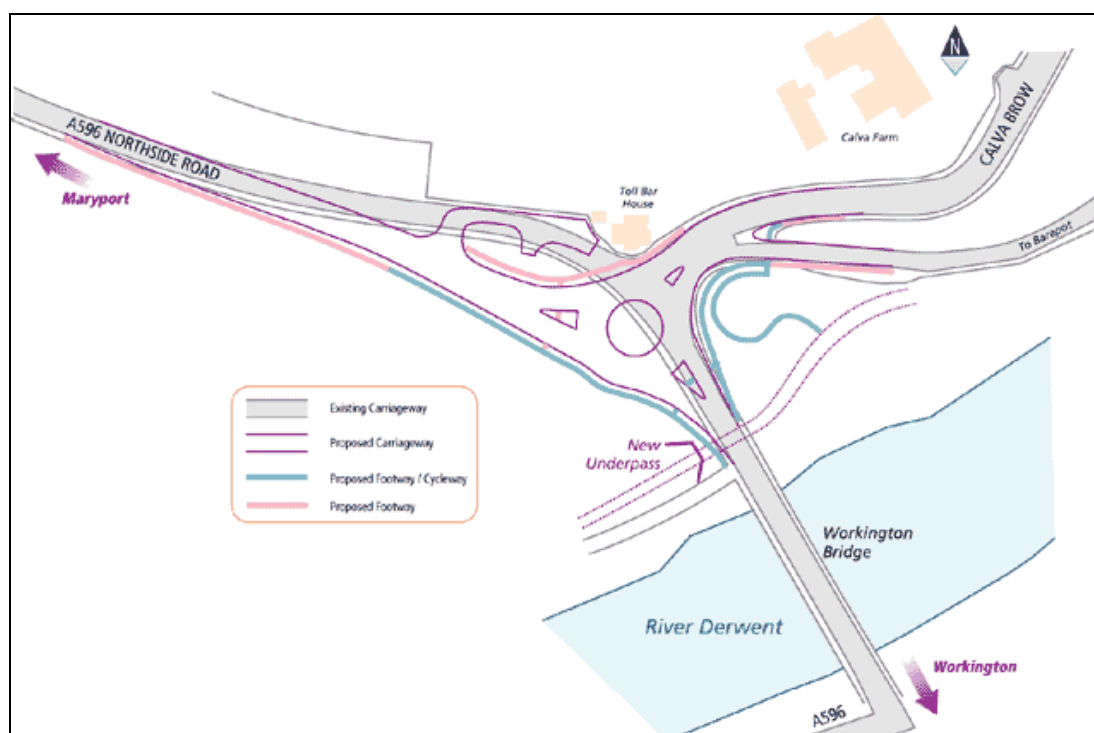


Figure 1.1 – Location Plan

- 1.4 The scheme consisted of the replacement of a priority junction with a roundabout and the realignment of the A596 Northside Road approach, as illustrated in Figure 1.2.



**Figure 1.2 – Calva Brow Junction Improvements**

### SCHEME OBJECTIVES

- 1.5 Local Network Management Schemes are classified into the main scheme types of Safety, Economy, or Integration depending on the type of scheme being undertaken. In this case the Calva Brow Junction Improvement Scheme was defined as an Integration scheme meaning that it would benefit non-motorised users. However it was acknowledged that the scheme would also deliver economic and safety benefits to road users.
- 1.6 Prior to the implementation of the scheme the priority junction at Calva Brow suffered severe congestion delays during peak times and had an injury accident rate similar to the national average for this type of junction. The scheme was therefore designed to primarily reduce the delays occurring during peak times for the A596 and C2001 traffic flows and reduce the number of accidents experienced at the location. However, in implementing the scheme a new underpass would be included together with new cycle facilities, hence the categorisation of the scheme as an integration scheme.

### PURPOSE OF THE REPORT

- 1.7 This report represents the LNMS Post Opening Evaluation Report for the A596 Calva Brow junction improvements. This report has been prepared as part of the Post Opening Project Evaluation (POPE) commission for the Highways Agency.

- 1.8 This report presents an assessment of the measurable impact of the scheme, namely:
- ◆ A comparison of the 'Before' and 'After' traffic volumes on the A596 to illustrate how traffic volumes have changed since the opening of the junction improvements;
  - ◆ A comparison of 'Before' and 'After' journey times to illustrate how journey times have changed since the opening of the junction improvements;
  - ◆ It will also present an evaluation of predicted and outturn economic forecasts based on changes in journey times as well as other outturn effects in the form of an Evaluation Summary Table (EST); and,
  - ◆ The report will also outline the changes in numbers of accidents at the site and whether the nature of the accidents has changed since the opening of the junction improvements.
- 1.9 This report specifically considers the re-evaluation of the predicted benefits for the A596 Calva Brow junction improvements. The three main elements involved are:
- ◆ To identify the costs and benefits originally forecast for the scheme at Order Publication Report (OPR) stage;
  - ◆ To quantify the outturn (actual) costs and the outturn level of benefits actually accruing, based on outturn traffic volume and journey time data for the scheme; and,
  - ◆ To compare the results and quantify the difference in the Present Value of Benefits (PVB).
- 1.10 Following this introduction the report has been divided into five further sections as follows:
- ◆ Section 2 outlines existing data collation and new data collection.
  - ◆ Section 3 presents the measurable outturn effects of the scheme (traffic flows, journey times and accident numbers);
  - ◆ Section 4 presents the original economic results, calculated by the Department for Transport's program COBA for this scheme and the level of benefits that would have been forecast if outturn traffic volumes and journey times were known at the time. The section also compares the COBA and POPE methodologies;
  - ◆ Section 5 presents the original Appraisal Summary Table (AST) for the Calva Brow junction improvements, and then re-evaluates these predictions with an Evaluation Summary Table (EST). The section also gives an early indication of changes in the number of accidents at the site; and finally
  - ◆ Section 6 summarises the main conclusions from the evaluations and the limitations to use.

## 2. Data Collection

### 'BEFORE' DATA

2.1 The PAR document submitted in support of the scheme was based upon the following data:

- ◆ Economic Evaluation using COBA.
- ◆ Accident data for the years 1999 – 2004 from Cumbria County Council.
- ◆ Traffic flow data from the Highways Agency monitoring.

### 'AFTER' DATA

2.2 In the course of undertaking the evaluation of this scheme, the following data was utilised:

- ◆ Traffic flow data from the Highways Agency Monitoring Team.
- ◆ Accident data from the relevant Managing Agent.
- ◆ COBA data from Amey Mouchel;
- ◆ Journey time surveys undertaken end of June 2004.

#### *Accident Data*

2.3 Accident data was obtained for the years 1999 to 2004, for a 250 metre radius of the junction. The information included brief accident descriptions.

#### *Automatic Traffic Counts*

2.4 Prior to the detrunking on 1<sup>st</sup> April 2003 the Highways Agency had a permanent count site in the vicinity of the A596 Northside Improvement, described as 'A597 – A594, Siddick Railway Bridge, Workington'. Data for this site was obtained for the period 1997-2002.

#### *Journey Time and Manual Traffic Count Surveys*

2.5 Journey time surveys were undertaken on 24<sup>th</sup> June 2004 by Atkins. The survey method was to identify timing points to the junction, and then to survey vehicle journey times between these points by matching vehicles. This survey was undertaken using video cameras. Figure 2.1 shows the location of the timing points at the scheme.

2.6 At the same time a manual classified turning count was undertaken at the junction for the period 0700 to 1900.

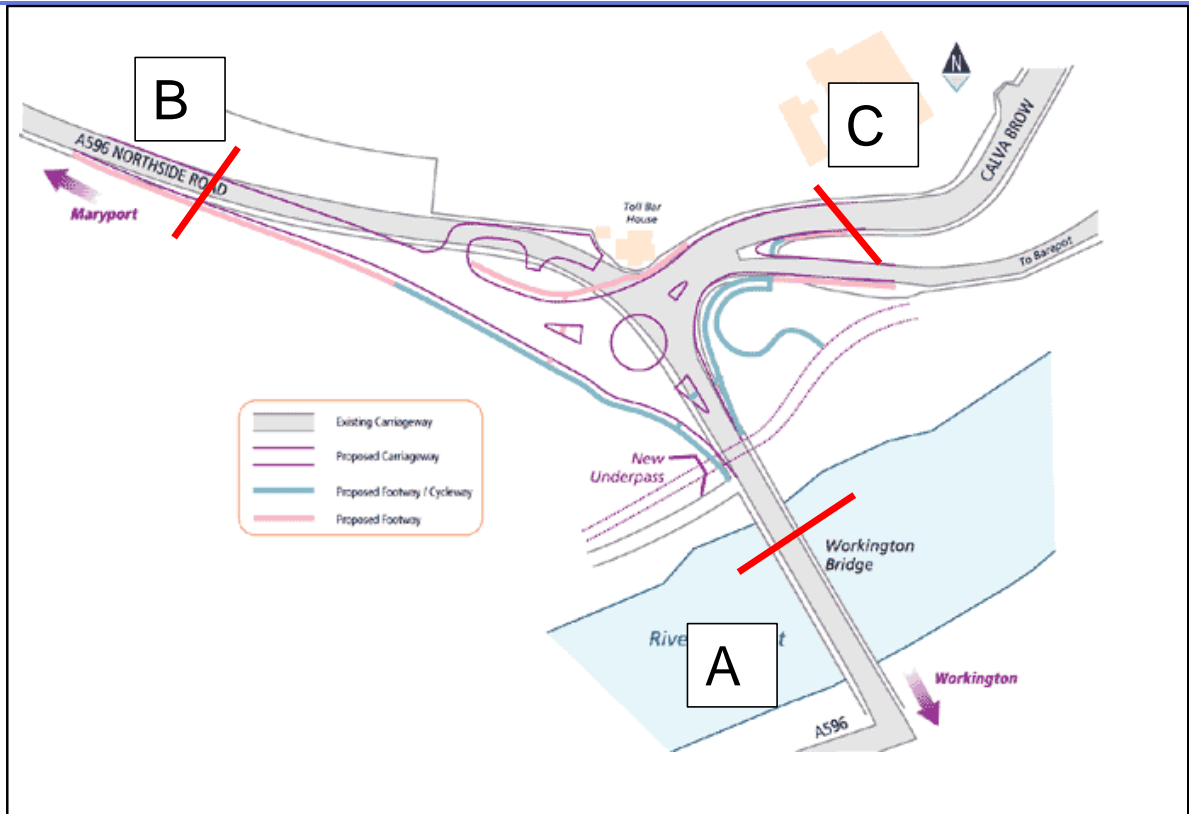


Figure 2.1 – Location of Journey Time Timing Points

### 3. Safety and Traffic Scheme Impact

#### OVERVIEW

- 3.1 This section provides details of the outturn safety and traffic impacts of the scheme.

#### SAFETY

##### *Accident Rate*

- 3.2 In the evaluation of accident data it is usual to have at least three years post-opening data in order to get an accurate assessment. In this case the post-opening accident assessment is based on only 12 months of data, and as such conclusions drawn from the assessment should be regarded as preliminary.
- 3.3 Accident data was obtained from the Managing Agent Contractor for the years 1999 to 2004. However as the scheme opened in March 2003 only 12 months of post opening accident data was available.

**Table 3.1 - Accidents at Calva Brow**

Year	Slight	Serious	Fatal	Total
1999	-	-	-	-
2000	3	-	-	3
2001	1	-	-	1
2002	-	-	-	-
2003	1	-	-	1
2004 (3 months)	-	-	-	-
PRE (51 months)	4	-	-	4 (0.94 Acc per year)
POST (12 months)	1	-	-	1 (1 Acc per year)

- 3.4 Table 3.1 illustrates that in the 51 months prior to the completion of the scheme there was an average of 0.94 accidents per year, while in the twelve months after scheme opening there was an average of 1.00 accidents per month. From this data, it is not possible to demonstrate that the scheme has resulted in a reduction in the accident rate at the Calva Brow junction and that there is as yet **no evidence of an accident reduction at the junction.**

##### *Comparison with COBA*

- 3.5 A comparative assessment of actual and forecast accident savings at the junction can be assessed using COBA. Prior to scheme opening (Do Nothing Case), a priority junction of this type would be forecast, within COBA, to have 1.04 accidents annually. This value is comparable to those of the observed pre-scheme of 0.94 accidents per annum. In the Do Something Case the COBA evaluation forecasts 0.52 accidents to occur annually. This is half that actually observed in the 12 months since the scheme opened.

- 3.6 Overall there appear to be a discrepancy in that COBA was able to accurately model the number of accidents prior to opening, but underestimates the observed number of accidents post-opening by 50%. One reason that in part may explain the failure to realise the forecast accident savings is the change in traffic patterns at the junction (see below). However it is unlikely that this will explain all of the difference between forecast and observed accident savings.

#### *Accident Severity*

- 3.7 As all accidents occurring at Calva Brow over the last 5 years have caused only slight casualties, no significant conclusions can be made on the positive impact of the scheme on the severity of casualties.

#### **Summary**

The replacement of the Calva Brow Priority Junction with a roundabout has had no significant impact on the number of accidents occurring annually at the Calva Brow Junction, with the figure remaining unchanged at approximately one accident a year.

Furthermore the forecast reduction in accident numbers from the replacement of a priority junction with a roundabout has not been realised. This may in part be due to a change in the pattern of traffic at the junction (see below).

#### **TRAFFIC FLOW CHANGES**

- 3.8 Figure 3.1 highlights the change in 12hr (0700-1900) traffic flows for each movement at Calva Brow between pre-opening survey undertaken in June 2000 and the post-opening survey undertaken in June 2004. This illustrates that the only significant change in traffic flows occurring at Calva Brow post scheme opening is the 96% increase in traffic turning right on the C2001 heading towards Workington. This equates to an increase of 421 vehicles per day between 2000 and 2004 above a total daily traffic volume of 858 vehicles making this movement.

#### **Summary**

The A596 Calva Brow Scheme has not led to any changes in flow on the A596 with the exception of the right-turn from the C2001 (Calva Brow). Under the new roundabout junction arrangement this movement is now easier to make and this has led to a doubling of traffic making this movement. The additional traffic making this movement is likely to comprise of traffic travelling from the north of Seaton to the A597 which previously would have used Lowca Lane.

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## JOURNEY TIMES

- 3.9 Journey time savings represent a key element of the forecast economic benefit of the scheme. In order to determine whether the scheme had delivered the forecast journey time savings it was necessary to undertake a comparison of before and after journey times. To this end post-opening journey time surveys were undertaken in June 2004.
- 3.10 However there was no pre-opening journey time data available against which to compare the post-opening journey times. In the absence of this data the only source of pre-opening journey time data was that contained in the COBA model. These are termed 'Replica Do Minimum Journey Times'.
- 3.11 The Replica Do Minimum 2002 journey times were extracted from COBA and used as the actual 2002 journey times (Pre scheme). When used in conjunction with the actual post scheme opening journey times (June 2004), a comparable pre and post scheme opening journey time dataset is held.

### *Interpeak Journey Time Savings*

- 3.12 Figure 3.2 illustrates the change in journey times at Calva Brow post scheme opening for the Interpeak period. The following can be concluded from Figure 3.2:
- ◆ Vehicles travelling in the interpeak experience a benefit when travelling from Calva Brow to the A596 to Workington and from Workington on the A596 going to Calva Brow, with journey time savings of 7% (2 sec) and 41% (15 sec) respectively. Vehicles travelling from Calva Brow to the A596 to Maryport also benefit, with a journey time saving of 12% (6 sec); and,
  - ◆ All other movements made in the interpeak suffer a decrease in journey time, particularly for vehicles travelling on the A596 from Workington to A596 Northside road and vice versa, showing a journey time disbenefit of 32% (7 sec) and 47% (10 sec) respectively.

### *AM Peak Journey Time Savings*

- 3.13 Figure 3.3 illustrates the change in journey times at Calva Brow post scheme opening in the AM peak. The following can be concluded from Figure 3.3:
- ◆ Vehicles travelling in the AM peak experience a benefit when travelling from Calva Brow to the A596 to Workington and from Workington on the A596 going to Calva Brow, with journey time savings of 42% (16 sec) and 45% (18 sec) respectively. Vehicles travelling from Calva Brow to the A596 to Maryport also benefit, with a journey time saving of 20% (8 sec); and,
  - ◆ All other movements in the AM peak suffer a decrease in journey time, particularly for vehicles travelling on the A596 from Workington to A596 Northside road and vice versa, showing a journey time disbenefit of 44% (9 sec) and 53% (11 sec) respectively.

### *PM Peak Journey Time Savings*

- 3.14 Figure 3.4 illustrates the change in journey times at Calva Brow post scheme opening in the PM peak, from which the following can be concluded:
- ◆ Vehicles travelling in the PM peak experience a benefit when travelling from Calva Brow to the A596 to Workington and from Workington on the A596 going to Calva Brow, with journey time savings of 47%(24 sec) and 35%(21 sec) respectively.

- ◆ All other movements in the PM peak experience a decrease in journey time, particularly for vehicles travelling on the A596 from Workington to A596 Northside Road and vice versa. These show a journey time increase of 226% (50 sec) and 104% (23 sec) respectively. In addition the Calva Brow to A596 Northside Road movement and the A596 Northside Road to Calva Brow movement accrue significant time increases as well of 114% (52 sec) and 84% (17 sec) respectively.
- 3.15 The evidence presented in the three time periods clearly indicates a reduction in journey times for traffic making the movement Calva Brow to the A596 heading towards Workington and the reverse movement. This would seem logical given the removal of the priority junction in favour of the new roundabout. However there has been a substantial increase in the journey times of vehicles travelling from Workington to Northside road which were previously unimpeded by the priority junction.

#### *Validation of the Journey Time Do Minimum*

- 3.16 As the Replica Do Minimum 2002 journey times are being used as a substitute for observed 2002 journey times, it was important to validate the journey time saving results. Towards this end the journey times output by the Outturn COBA for the 2004 Do Something were compared to the actual post opening year (2004) journey time survey results, the results of which are shown in Annex A. The main points to note from the comparison are:
- ◆ The difference in journey times between the observed post opening year (2004) and Outturn COBA for the 2004 Do Something were within 10 seconds for all traffic movements in the AM and Interpeak periods; and,
  - ◆ The differences in journey times between the observed post opening year (2004) and Outturn COBA for the 2004 Do Something were far greater in the PM peak and are illustrated in Table 3.2.
- 3.17 Table 3.2 highlights that in the PM peak there are significant differences in journey times for the traffic movements:
- ◆ A596 Workington to A596 Maryport (36.3 Second increase); and,
  - ◆ C2001 Calva Brow to A596 Maryport (70.9 Second increase).
- 3.18 This is probably the result of a lack of sensitivity in the COBA model built with regard to the modelling of a roundabout. It should be noted however that COBA can model the Do Minimum priority junction far more accurately than a roundabout, and hence the use of Do Minimum journey times as observed pre scheme opening journey times is acceptable.

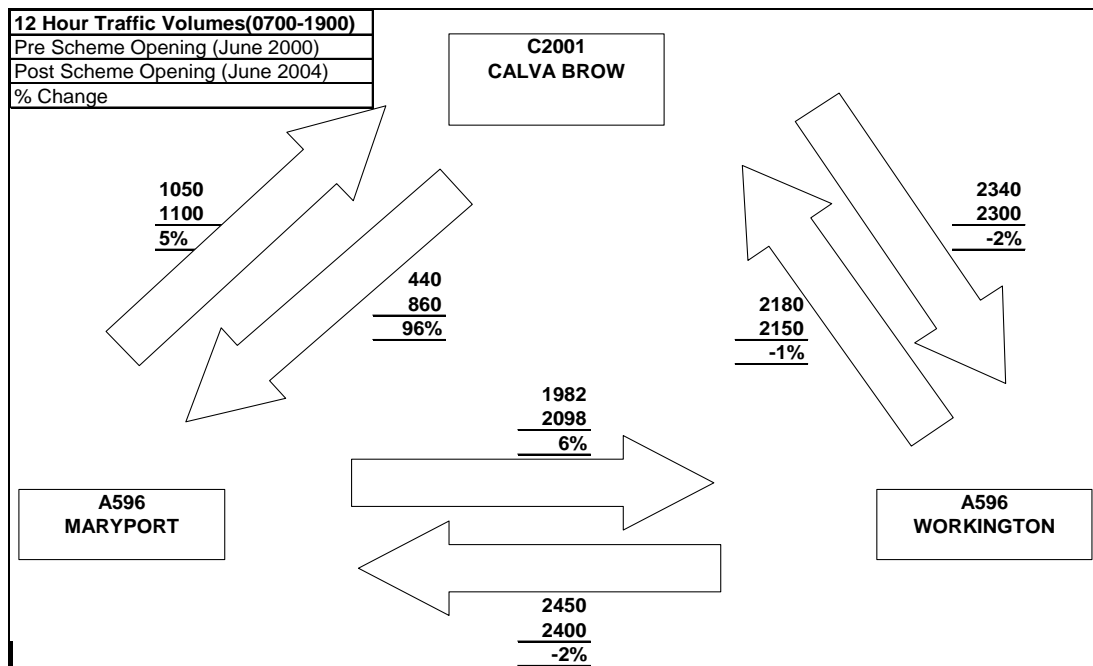
#### **Summary**

The difference in journey times between the observed post opening year (2004) and Outturn COBA for the 2004 Do Something were within 10 seconds for all traffic movements in the AM and Interpeak periods, but the journey time differences were far greater in the PM peak. This difference is probably related to the lack of sensitivity COBA affords to modelled roundabouts.

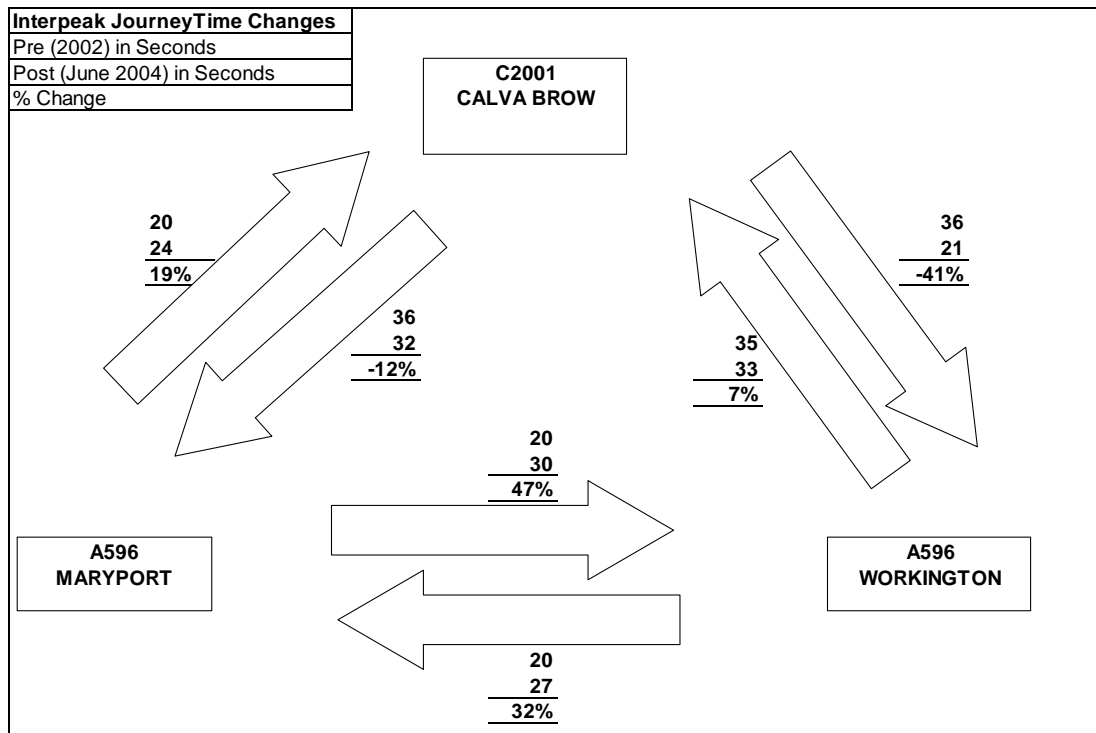
However, as the Outturn COBA Do minimum is modelling a priority junction the journey time results should be a fair representation of pre scheme journey times as COBA is well capable of accurately modelling a priority junction.

**Table 3.2 - Comparison of Outturn COBA Do Something Journey Times against Observed Post Scheme Opening Journey Times (PM Peak 2004).**

PM Peak	Observed Outturn Journey Times (June 2004) in Seconds (A)	Outturn DS Journey Times (2004) in Seconds (B)	Difference (A) – (B) In Seconds
A596 Workington to C2001 Calva Brow	38.0	32.0	6.0
A596 Workington to A596 Maryport	72.0	35.7	36.3
C2001 Calva Brow to A596 Maryport	97.0	26.1	70.9
C2001 Calva Brow to A596 Workington	27.0	31.5	-4.5
A596 Maryport to A596 Workington	45.0	34.1	10.9
A596 Maryport to C2001 Calva Brow	37.0	25.0	12.0



**Figure 3.1 - Traffic Flows for all movements at Calva Brow ‘Before’ and ‘After’ Scheme Opening (0700-1900).**



**Figure 3.2 - Change in Journey Times for all Movements at Calva Brow Post Scheme Opening Interpeak.**

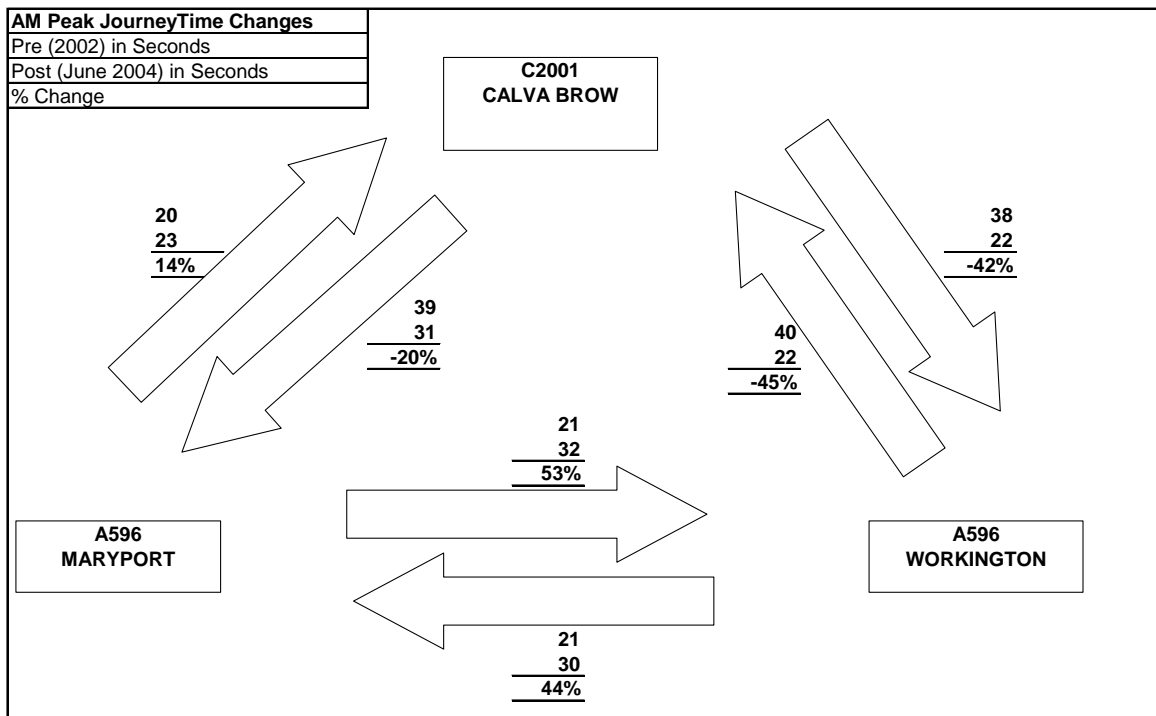


Figure 3.3 - The Change in Journey Times for all Movements at Calva Brow Post Scheme Opening AM peak.

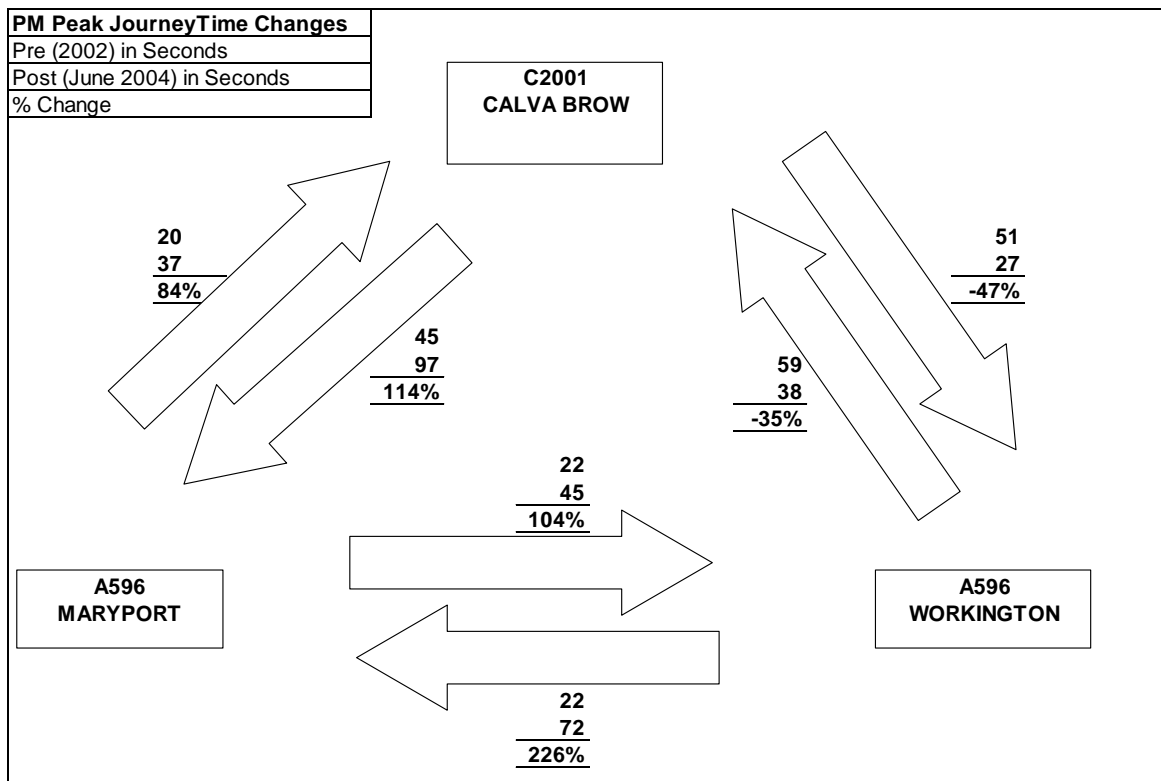


Figure 3.4 - The Change in Journey Times for all Movements at Calva Brow Post Scheme Opening PM peak.

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## 4. Economic Impact

### INTRODUCTION

4.1 This section assesses the level of economic benefits predicted for the scheme and compares these predictions with actual benefits accrued when considering actual traffic volume changes and actual journey time benefits. Two approaches are presented here:

- ◆ A simple comparison of the level of cost and benefits from the COBA evaluation with the outturn traffic flows were input into the original COBA model. This provides a brief assessment of how well the COBA model performs; and,
- ◆ The main re-evaluation, termed the Post Opening Project Evaluation (POPE) methodology. This uses observed outturn journey time and accident savings to provide an economic assessment of the performance of the scheme. This result is presented in the scheme EST and is expressed in same terms as the original evaluation (present value year of 1994, and discount rate of 6 per cent).

### COBA REPLICATION AND EVALUATION

4.2 The COBA input files used in the original appraisal were made available by Amey Mouchel. The COBA network consisted of a single node (priority in Do-Minimum, roundabout in Do-Something) with 3 entry links attached. Tables 4.1 and 4.2 show the output benefits for the COBA model for low and high traffic growth respectively.

4.3 The final column of the Table 4.1 presents the COBA using observed post-opening flows. This shows that the use of outturn traffic flow data has resulted in an increase in forecast benefits from £0.707m to £0.718m at low growth, but a benefit reduction from £2.060m to £1.650m at high growth.

4.4 The results of the COBA reassessment proves that at low growth the original and outturn COBA models are similar, but at high growth the original COBA model over estimated the forecast level of benefit. In addition there are some important conclusions regarding the ability of the COBA model to forecast actual journey time and accident benefits. These are presented in greater detail below.

### POPE EVALUATION

#### ACCIDENTS

4.5 The original Amey Mouchel assessment forecast an accident saving in the opening year of 0.5 PIAs and assumed that this saving would apply over the whole 30 year assessment period. This amounted to a total benefit of £0.466m.

**4.6 In the 12 month period after the scheme opened there has been no significant change in the number of accidents occurring at Calva Brow to that observed before the implementation of the scheme. Therefore, it can be assumed that no accident benefits have been accrued in the scheme's post opening year.**

4.7 Normally, it is usual for accident savings to be evaluated at least three years after opening in order to get a fair reflection in the number of accidents in the corridor. Therefore this evaluation should be seen as a preliminary conclusion.

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## JOURNEY TIME BENEFITS/DISBENEFITS

- 4.8 In order to compare the original and outturn assessments of journey time savings it was necessary to run a revised COBA model using the outturn traffic patterns at the junction, so providing an opening year assessment of the change in junction delay that a COBA model would forecast. This was then compared to an economic assessment based on the actual observed data journey time data. This process can be summarised as:
- ◆ The outturn COBA model (using 2004 traffic flows) predicted a weighted vehicle time saving of 1320 hours at Calva Brow in the opening year, equating to a benefit of £0.004m (1994 prices discounted at 6%). This value was then capitalised to 30-years using PAR capitalisation factors; then,
  - ◆ Using the journey time data, the level of benefit observed in opening year is assessed and then multiplied by the £/vehicle hour ratio from the post opening year of the outturn COBA model. The benefits are then factored to up to the 30 year assessment period using PAR 3.3 capitalisation factors.
- 4.9 Both of the above calculations are illustrated in Table 4.3. This process is significant in that the scheme exhibits a journey time disbenefit, as opposed to a benefit as predicted in the original PAR document. This is primarily a consequence of the increase in journey times for vehicles travelling from Workington to Northside Road, particularly during the PM peak (a 226% increase in journey times for this movement during the PM peak period, illustrated in chapter 3), a consequence of the increase in the number of vehicles making the movement from Calva Brow (C2001) towards Northside Road.

## COMPARISON OF OVERALL BENEFITS OVER THE 30 YEAR ASSESSMENT PERIOD

- 4.10 Table 4.4 highlights the net level of disbenefit offered by the scheme over 30 years in terms of accident and journey time changes. When the weighted average of accident/journey time benefits over the first 30 years is compared to the estimate based on post opening data, there is 112% less benefit than predicted by the outturn COBA.
- 4.11 However, as noted above the traffic patterns at the Calva Brow junction have changed following the opening of the scheme with more traffic now using the right turn to Maryport, this in turn implies that elsewhere on the highway network benefits are being experienced by traffic on routes relieved by this reassignment of traffic.

## SCHEME COST

- 4.12 **The cost predicted in the original PAR for the scheme was £639,000 in 1994 prices and Values discounted at 6%. The actual out-turn cost for the scheme in 1994 prices and Values discounted at 6% was £514,566, 19% lower than the original PAR.**

Summary

Table 4.4 presents a summary of the original PAR, outturn COBA, and POPE economic assessments all expressed in terms of 1994 prices, discounted to 1994 at 6 per cent.

The main points to note are:

- ◆ **The original evaluation overestimated the journey time and accident benefits resulting from the schemes implementation.**
- ◆ **The out-turn costs are £124,434 less than predicted in the Original Par Document.**

**Table 4.1 - Value of Benefits for Calva Brow at Low Growth**

<b>Low Traffic Growth</b>			
<b>COBA ITEM</b>	<b>OPR (as reported)</b>	<b>Replication</b>	<b>Outturn Count Data + Opening Yr Included</b>
Link Transit Time	£0.002m	£0.002m	£0.003m
Junction Delay	£0.291m	£0.291m	£0.321m
Accidents Link	£0.005m	£0.005m	£0.006m
Accidents Junction	£0.409m	£0.409m	£0.388m
Construction Delay	£0m	£0m	£0m
Main Exp Saving	£0m	£0m	£0m
<b>PVB (£)</b>	<b>£0.707m</b>	<b>£0.707m</b>	<b>£0.718m</b>
In 1994 Prices & Values discounted at 6%			

**Table 4.2 - Value of Benefits for Calva Brow at High Growth**

<b>High Traffic Growth</b>			
<b>COBA ITEM</b>	<b>OPR (as reported)</b>	<b>Replication</b>	<b>Outturn Count Data + Opening Yr Included</b>
Link Transit Time	£0.009m	£0.009m	£0.009
Junction Delay	£1.504m	£1.504m	£1.100m
Accidents Link	£0.007m	£0.007m	£0.007m
Accidents Junction	£0.537m	£0.537m	£0.537m
Construction Delay	£0m	£0m	£0m
Main Exp Saving	£0m	£0m	£0m
<b>PVB (£)</b>	<b>£2,057m</b>	<b>£2,057m</b>	<b>£1,653m</b>
In 1994 Prices & Values discounted at 6%			

**Table 4.3 – POPE Economic Evaluation**

<b>Item</b>	<b>Value</b>
A: Total Vehicle Hour Saving in Scheme Opening Year (COBA)	1320 Vehicle Hours
B: Total Vehicle Hour Saving in Scheme Opening Year (Observed, from Table 4.2)	-1384 Vehicle Hours
C = B/A: Ratio of Observed to Forecast Time Savings (=B/A)	-0.954
E: Opening Year Travel Time Benefit (COBA)	£0.004m
F: Weighted Capitalisation Factor (calculates 30 year benefits from opening year benefits: source PAR3.3)	28.8
G = E*F: Travel Time Benefits (30 year assessment period)	£0.115M
H = G*C: Accrued Benefit over 30 yrs (H) = (G)*(E)	£-0.121M

**Table 4.4 - Comparison of Original PAR Predicted Costs/Benefits with Out-turn Costs/Benefits**

In 1994 Prices and Values	Original PAR	Outturn COBA	Observed POPE
A. Link Transit and Junction Delay Benefit	£0.905m	£0.638m	-£0.121m
B: Accident Benefit	£0.475m	£0.466m	-
C : Present Value of Benefit = A+B	£1.380m	£1.004m	-£0.121m
D: Present Value of Costs (PVC)	£0.639m	£0.639m	£0.515m
E: Benefit/Cost Ratio (BCR) = C/D	2.15	1.57	-0.24

Notes: 1. All costs and benefits are weighted and are in 1994 prices discounted to 1994 at 6%.

2. Does not include benefits that may be accruing outside of the immediate study area (see text).

## 5. Appraisal and Evaluation Summary Tables

### INTRODUCTION

- 5.1 In order to evaluate fully the impacts of the opening of the A596 Calva Brow junction improvements, we have undertaken a review of the Appraisal Summary Table (AST) prepared for the original PAR document. The AST is the record of the predicted impacts of the scheme.
- 5.2 This AST summarises the predicted impacts of the scheme across a range of different sub-objectives. The sub-objectives within an AST are:
- ◆ **Environmental impacts** such as Noise, Local Air Quality, Landscape, Biodiversity, Heritage and Water;
  - ◆ **Safety Impacts**, measuring and reduction in accidents;
  - ◆ **Economy impacts**, including savings in Journey time and Vehicle Operating Costs, Scheme Cost and Reliability of journeys;
  - ◆ **Accessibility impacts**, such as change in access to public transport, severance within communities and impact on pedestrian and other modes; and
  - ◆ **Integration**, measured by how the scheme accords with local policy.

### ORIGINAL SCHEME APPRAISAL SUMMARY TABLE (AST)

- 5.3 Annex A presents the original AST for A596 Calva Brow junction improvements. The main points to note from the Calva Brow AST are:

#### *Environment*

- 5.4 Slight improvement in local air quality predicted and a slight decrease in noise levels for local properties. As far as can be established these conclusions are not based upon a formal assessment in accordance with the DMRB.

#### *Safety*

- 5.5 Slight Improvement in safety with 16.14 accidents predicted to be saved over the 30 year assessment period. This is based on a COBA 10 R5 (weighted averages LG\*0.6 + HG\*0.4) output and uses full PAR guidance.

#### *Economy*

- 5.6 A substantial benefit in journey times is predicted with savings of 1.23minutes during the peak and 0.55minutes interpeak. This is a calculated from a COBA 10 output using full PAR guidance.

#### *Accessibility*

- 5.7 The provision of increased and better facilities for footways and cycleways together with provision of splitter islands at the roundabout offers non-motorised users a slight benefit by enhancing amenity and safety.

- 5.8 The provision of splitter islands for the A596 roundabout is scored as slightly beneficial as it offers slightly reduced severance.

#### *Integration*

- 5.9 The scheme offers enhanced integration via fulfilling strategic inter-modal and freight transport objectives, improving access to the port of Workington and the enhancement of the local cycle network.
- 5.10 All other objectives within the AST were either not appraised or were not applicable for this scheme.

### **OUTTURN EFFECTS (ATKINS EST)**

- 5.11 In order to assess the actual or outturn effects of the opening of the scheme, we have produced an Evaluation Summary Table (EST), which mirrors the appearance of the AST, and includes details of the actual sub-objectives that have been evaluated. The EST is presented in Annex B, the main conclusions from which are covered in the following sections:

#### **Environment**

- 5.12 An initial view has been taken of the environment sub-objectives that are related to changes in traffic operating conditions. These are 'Air Quality' and 'Noise'.
- 5.13 A slight improvement in local air quality was predicted, along with a slight decrease in noise levels for local properties. These improvements were based on the increase in distance from properties of the northern side of the carriageway.
- 5.14 Properties are slightly further away from the road after the roundabout was built, however the distances involved are very small, hence there would be little difference in noise or air quality; indeed air quality would worsen due to the stop-start nature of traffic now approaching a roundabout. The results of the revised assessment is shown in Table 5.1.

**Table 5.1 – Summary of Environmental Sub-Objectives**

<b>Sub-Objective</b>	<b>Predicted</b>	<b>Outturn</b>
AIR QUALITY	Slight Beneficial	Neutral
NOISE	Neutral	Neutral

- 5.15 No assessment has been made of the other environmental sub-objectives.

#### **Accessibility**

- 5.16 The PAR predicted that the provision of increased and better facilities for footways and cycleways together with provision of splitter islands at the roundabout offers non-motorised users a slight benefit by enhancing amenity and safety.
- 5.17 The photographs in Annex C show examples of these improvements:
- ◆ Photograph C1 shows one such Splitter Island and photograph C2 shows a cycleway at the Calva Brow approach. The presence of these improvements and the good

access to the underpass (C3 and C4) provide an increase in the levels of amenity and reduce the level of severance at the location.

5.18 In summary, the outturn accessibility sub-objectives are as presented in Table 5.2.

**Table 5.2 – Summary of Accessibility Sub-Objectives**

Sub-Objective	Predicted	Outturn
Pedestrians	Slight Beneficial	Slight Beneficial
Access to Public Transport	Neutral	Neutral
Community Severance	Slight Beneficial	Slight Beneficial

### Integration

5.19 The original PAR predicted that the junction improvement would fulfil strategic inter-modal and freight transport objectives, improve the local riverside environment, enhance the local cycle network, and improve access to the Port of Workington without adversely affecting the structure or setting of Workington Bridge: Listed Building or the River Derwent Site of Special Scientific Interest. A review of these aims is as follows:

#### *Inter-modal and Freight Transport Objectives*

5.20 It can be assumed that freight moving towards interchange points will generally be travelling on the main road (A596) and in doing so will now have a slight junction delay at Calva Brow. Hence no benefit is derived by freight through this scheme. The impact here has been evaluated as slight negative.

#### *Improve Riverside Environment*

5.21 As no information is held on the riverside environment pre scheme, this prediction cannot be appraised. The impact here has been evaluated as neutral.

#### *Enhancement of the Local Cycle Network*

5.22 As new cycleways have been introduced, the local cycle network has been enhanced as per the original PAR's prediction (see Annex C1 and C2). The impact here has been evaluated as beneficial.

#### *Improved Access to the Port of Workington*

5.23 Access has been improved to the Port for vehicles travelling towards the site from Calva Brow (C2001), but slightly worse access is now shown on the A596. The impact here has been evaluated as slight negative.

#### *No adverse affect on Workington Bridge / Local Historic sites and Sites of Special Scientific Interest*

5.24 Due to a lack of pre data, subjective assessments cannot be made as to the accuracy of the predicted benefits. The impact here has been evaluated as neutral.

### **Summary of Integration Sub-Objectives**

- 5.25 In summary, some of these aims have been achieved and thus the beneficial score is retained.

## 6. Summary of Conclusions

6.1 The Highways Agency has a requirement to carry out re-evaluations of new trunk road schemes. The purpose of these re-evaluations is to provide a comparison of the predicted and actual impacts accruing from new schemes and to determine how far the Highways Agency achieves the objectives and benefits from its road programme.

6.2 In summary, the main points to note from the Post Opening Evaluation of the Calva Brow Junction Improvements are:

### *Safety*

6.3 The scheme was purported to save 0.5 accidents in the post opening year. However no significant change in accidents was observed in the post opening year. Given the short time period for which post-opening data is available, it should be concluded that there is **no evidence yet of an accident reduction at the junction**. The accident benefits derived from this scheme should be monitored over the next five years.

### *Traffic Volumes*

6.4 The only significant change in traffic flows post scheme opening came from traffic travelling from Calva Brow (C2001) to the A596 Northside road. A daily rise of 96% vehicles was observed between 2000 and 2004 (421 vehicles per day in 2000 rising to 858 vehicles a day in 2004). Trunk road movements showed little change in flow.

### *Journey Times*

6.5 Although the Calva Brow approach showed time benefits for vehicles accessing onto the A596, through traffic experienced a slight increase in time, as a result of negotiating the new roundabout. The balance of these time changes is a net increase of time at the roundabout.

6.6 The forecast benefits (calculated from the one year post opening COBA run) predicted a weighted benefit of 1320 vehicle hours in the post opening year, this corresponded to a benefit of £0.004m (in 1994 prices discounted at 6%).

6.7 The observed data indicated an overall increase in vehicle hours corresponding to disbenefit of £0.004m in the post opening year.

### *Scheme Costs*

6.8 The out-turn scheme cost was £514,566 in 1994 prices and Values discounted at 6%. This was 19% lower than the original PAR predicted cost of £639,000.

### *Economic Evaluation*

6.9 The predicted corrected weighted benefit of £1.004M, was shown for this scheme, against costs of £0.639M, suggesting a weighted BCR of 2.0. However when the outturn traffic flows were inserted into the appraisal COBA, a similar level of benefit was shown. However an assessment of actual vehicle hour changes and accident savings suggested a very different result.

*Post Opening Evaluation Report*

- 6.10 Over the thirty year assessment period the scheme is set to provide a disbenefit of £0.121million, as opposed to the PAR's predicted £0.466million of benefits over the same time period (all in 1994 prices and values discounted at 6%).
- 6.11 The scheme provided fewer benefits than predicted in the original PAR document for the post opening year; this was largely due to increases in junction delay experienced by traffic that previously had priority at Calva Brow and an overestimate on the accident savings.
- 6.12 The disappointing level of accident benefits can only be confirmed through further monitoring of the roundabouts performance over the next few years.

*Accessibility*

- 6.13 The scheme has provided increased and better facilities for footways and cycleways, together with provision of splitter islands at the roundabout offering non-motorised users a slight benefit by enhancing amenity and safety.

*Integration*

- 6.14 The scheme has through enhancing the local cycle network improved integration at Calva Brow. All other predicted levels of integration can not be assessed through lack of before data.

**Overall Conclusion**

The scheme has failed to produce the economic and safety benefits predicted in the original PAR, although the safety benefits cannot be fully appreciated until more data is available.

The scheme has succeeded in increasing the level of accessibility and integration at Calva Brow.

The scheme should be re-evaluated in future years when more post opening data is available. This will enable more robust conclusions to be drawn. Especially regarding the levels of accident benefits achieved.

**Wider Implication for Scheme Evaluation**

It is clear that in the case of the Calva Brow Improvement scheme (a) the original PAR evaluation did not take adequate account of the additional delay to traffic by introducing a roundabout and (b) the re-assignment of traffic from competing routes was not considered, thus the level of benefit at the junction was overestimated. However benefit elsewhere on the highway network resulting from the re-assignment of traffic away from other routes to the Calva Brow junction was not accounted for.

## **Annex A - Original Scheme AST**

## Original Scheme AST

A596 CALVA BROW JUNCTION IMPROVEMENT, WORKINGTON		2000/01 SCHEME –Provision of small Roundabout and realign Northside Road Approach.		Current Cost £1.229 m, Date Q2 2002
<b>PROBLEMS</b>		14,000 AADT, 8.0% HGV, (2000) Existing priority junction with severe congestion at peak times and safety problems. Similar traffic flows on C2001 side road and A596 Northside Trunk Road. . Severe sub standard junction visibility from C2001.		
<b>OTHER OPTIONS</b>		Provision of traffic signals at existing junction.		
OBJECTIVES		QUALITATIVE IMPACTS	QUANTITATIVE MEASURE	ASSESSMENT
<b>ENVIRONMENT</b>	<b>Noise</b>	Noise increases as traffic increases. The new carriageways are further away than existing and with the use of thin wearing course, noise would be reduced. Impact is assessed as <i>slight beneficial</i> .	No. properties experiencing: - Increase in noise 0 - Decrease in noise 1	Net 1 properties experience <i>lower</i> noise levels
CO <sub>2</sub> : xxx tonnes added or removed	<b>Local air quality</b>	Not assessed. However with moving road away from property and with reduction in pollution from vehicles with time through legislation; air quality would improve. Impact assessed as <i>beneficial</i> .	No. properties experiencing: - better air quality N/A - worse air quality N/A	+/- PM10 +/- NO <sub>2</sub>
	<b>Landscape</b>	Locally scarce combination of individually valued features, suffers low adverse impact.	Not Applicable	<i>Slight Adverse</i>
	<b>Biodiversity</b>	Little impact on biodiversity of an important and designated site, strict controls during construction	Not Applicable	<i>Slight Adverse</i>
	<b>Heritage</b>	Some beneficial impacts on the setting of a listed bridge, direct physical impact on site of locally significant dismantled railway.	Not Applicable	<i>Slight Adverse</i>
	<b>Water</b>	Direct discharges of surface water to River Derwent controlled by pollution interceptor.	Not Applicable	<i>Slight Adverse</i>
<b>SAFETY</b>	-	Construction and/or maintenance disbenefits have not been assessed. Estimated number of injury accidents saved in first year 0.5	Accidents Deaths Serious Slight 16.1 0.3 4.2 16.3	PVB £0.41 m / £0.54 m 74 % of PVC
<b>ECONOMY</b>	<b>Journey times &amp; Veh. op. costs</b>		Scheme journey time savings: Peak 1.23 mins; inter-peak 0.55 mins	PVB £0.30 m / £1.51 m 122 % of PVC
	<b>Cost</b>		Not Applicable	PVC £ 0.64 m
	<b>Journey time reliability</b>	Small scheme : not relevant	Stress on key trunk road link: Before %; After %	<i>Not assessed</i>
	<b>Regeneration</b>	Small scheme : not considered	Serves regeneration priority area? Development depends on project?	<i>Yes</i> <i>No</i>
<b>ACCESSIBILITY</b>	<b>Pedestrians and others</b>	Proposed splitter islands – improved amenity	Not Applicable	<i>Slight beneficial</i>
	<b>Access to public transport</b>	Existing bus stop unchanged, little used	Not Applicable	<i>Neutral</i>
	<b>Community severance</b>	Proposed splitter islands, reduces existing severance	Not Applicable	<i>Slight beneficial</i>
<b>INTEGRATION</b>	-	Fulfils strategic inter-modal and freight transport objectives, improves access to the Port of Workington	Not Applicable	<i>Enhance</i>
<b>Version of ..April 2002</b>		Cost benefit analysis (low / high)	PVB £ 0.71 m / £2.06 m, PVC £0.64 m, NPV £0.07m / £1.42m, BCR 1.11 / 3.22, FYRR 3.80% / 4.70%	

## **Annex B - Atkins EST**

## Atkins EST

A596 CALVA BROW JUNCTION IMPROVEMENT, WORKINGTON		2000/01 SCHEME –Provision of small Roundabout and realign Northside Road Approach.	Date 10/02/2005
<b>PROBLEMS</b>		14,000 AADT, 8.0% HGV, (2000) Existing priority junction with severe congestion at peak times and safety problems. Similar traffic flows on C2001 side road and A596 Northside Trunk Road. . Severe sub standard junction visibility from C2001.	
<b>OTHER OPTIONS</b>		Provision of traffic signals at existing junction.	
<b>OBJECTIVES</b>		<b>QUALITATIVE IMPACTS</b>	<b>QUANTITATIVE MEASURE</b>
<b>ENVIRONMENT</b>	<b>Noise</b>	Noise increases as traffic increases. The new carriageways are further away than existing, noise would be reduced. However there is no thin wearing course. Impact is assessed as <i>slight beneficial</i> .	Not Applicable
CO <sub>2</sub> : xxx tonnes added or removed	<b>Local air quality</b>	Not assessed. However with moving road away from property and with reduction in pollution from vehicles with time through legislation; air quality would improve. Impact assessed as <i>beneficial</i> .	Not Applicable
	<b>Landscape</b>	Locally scarce combination of individually valued features, suffers low adverse impact.	Not Applicable
	<b>Biodiversity</b>	Little impact on biodiversity of an important and designated site, strict controls during construction	Not Applicable
	<b>Heritage</b>	Some beneficial impacts on the setting of a listed bridge, direct physical impact on site of locally significant dismantled railway.	Not Applicable
	<b>Water</b>	Direct discharges of surface water to River Derwent controlled by pollution interceptor.	Not Applicable
<b>SAFETY</b>	-	Apparent increase in accidents by 0.75 in post opening year. This is taken as evidence not that the scheme is worse in accident terms than the original junction, but that the scheme is not yet able to demonstrate an accident benefit.	30 Yr Assessment <i>No evidence of accident benefit</i>
<b>ECONOMY</b>	<b>Journey times &amp; Veh. op. costs</b>	Increase in Journey times of 1384 vehicle hours in the Post opening Year	30 Yr Assessment £0
	<b>Cost</b>		Not Applicable
<b>ACCESSIBILITY</b>	<b>Pedestrians and others</b>	Proposed splitter islands – improved amenity – They are present at the location.	Not Applicable
	<b>Access to public transport</b>	Existing bus stop unchanged, little used	Not Applicable
	<b>Community severance</b>	Proposed splitter islands, reduces existing severance	Not Applicable
<b>INTEGRATION</b>	-	Provision of cycleways at location and underpass	Not Applicable
<b>Version of ..April 2002</b>	Cost benefit analysis (low / high)	PVB £-0.121 m PVC £0.515m, NPV £-0.636M BCR -0.24.	

## **Annex C – Photographs of Completed Scheme**



C1: Splitter island on the A596 Approaching Calva Brow roundabout from Workington.



C2: Cycleway approaching the Calva Brow roundabout.



C3: Cycleway to the underpass at Calva Brow roundabout



C4: Underpass at Calva Brow roundabout