

LNMS EVALUATION REPORT

A523 Leek to Hazel Grove Traffic Safety Measures



September 2005



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| JOB NUMBER: 4416515.600 | | | DOCUMENT REF: POPE of LNMS - A523 Leek to Hazel Grove_FINAL.doc | | | |
|---|-----------------------|------------|---|----------|------------|--------|
| Revision | Purpose / Description | Originated | Checked | Reviewed | Authorised | Date |
| 0 | FINAL Report | RS | KP | IW | PR | Sep 05 |
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1. Introduction

BACKGROUND

The Scheme

- 1.1 The A523 Leek to Hazel Grove Traffic Safety Measures scheme opened on the 30th May 2002. The scheme comprised of a variety of traffic safety measures to improve safety for both road users and pedestrians along the A523 corridor. An indication of the measures implemented is shown on the plans included in Annex A.
- 1.2 An earlier traffic safety scheme on the A523/A52 (T) south of Leek was implemented in 1999 with initial feedback indicating that the impact of the scheme was favourable. As a consequence it was then proposed to extend these measures along the A523 (T) between Leek and Hazel Grove.

Original PAR Document

- 1.3 The PAR was produced by consultant Scott Wilson and was last updated on September 2001.
- 1.4 In a previous study Scott Wilson had produced a Scheme Identification Study which investigated road traffic accidents along the route and identified possible traffic safety measures to reduce the numbers and severity of these accidents. The majority of these measures were taken forward for inclusion in this scheme.
- 1.5 The primary problem identified by both the earlier study and the PAR was the high level of accidents on this section of the A523. The PAR stated that over the period 1996 to 1999) there had been 305 recorded personal injury accidents on the A523(T) between Leek and Hazel Grove. In particular there was evidence of particular accident concentrations at junctions. It was noted that the road had poor forward visibility together with a substandard horizontal. In addition existing traffic signs and road markings were inadequate, and that villages did not possess 'gateway features' to distinguish them from the remainder of the route. Further problems included high vehicle speeds, inconsistent speed limits, use of the route by motorcyclists for recreational purposes, and severance within communities on and adjacent to the route.

The Scheme

- 1.6 The scheme comprised of the following measures:
 - ◆ New cycle facilities;
 - ◆ Reduction in national speed limits to 50mph;
 - ◆ Extension of village speed limits;
 - ◆ Gateways;
 - ◆ 40 mph buffers around villages;
 - ◆ Junction Improvements;

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- ◆ New/replacement road studs;
- ◆ New speed/red light cameras;
- ◆ New/extended road markings;
- ◆ New interactive, fibre optic signs;
- ◆ New/revised safer parking areas;
- ◆ New, high friction coloured surfacing;
- ◆ Rationalisation of existing traffic signs;
- ◆ New/extended speed limits with 'gateways'; and,
- ◆ New/replacement highly visible traffic signs.

1.7 Figure 1.1 shows the location of the scheme.



Figure 1.1 - A523 Leek to Hazel Grove Traffic Safety Measures

- 1.8 Since the implementation of the scheme the road has been 'de-trunked' (1st July 2002) and is now in control of Staffordshire, Cheshire and Greater Manchester Councils.

SCHEME OBJECTIVES

- 1.9 The scheme was designed to improve safety for both road users and pedestrians along the A523 (T) corridor. The proposals sought to address the higher than national average accident and severity rates for this class of road, whilst also seeking to smooth the flow of traffic. In addition the scheme aimed to ensure that the whole of the route between Derby and the Southern outskirts of Manchester has a consistent and strategic approach to road safety. As an example, Figure 1.2 shows a section of the A523 before the implementation of the scheme whilst Figure 1.3 shows the same section of road after the implementation of the scheme.



Figure 1.2 – Bridge Over River Dene BEFORE Safety Scheme



Figure 1.3 – Bridge Over River AFTER Safety Scheme

- 1.10 From the photos it be seen that the scheme typically comprises of additional road markings and signs which in the case presented above are seeking to improve the safety standard of the road.

PURPOSE OF THE REPORT

- 1.11 The Highways Agency has commissioned a series of studies to re-evaluate recently implemented trunk road schemes. The aim of this process is to provide a back check of the levels of benefit accruing from new schemes and to determine how far the department achieves the objectives and benefits it claims from its road programme.
- 1.12 This report represents the LNMS evaluation report for the A523 Leek to Hazel Grove traffic safety measures. This report has been prepared as part of the Post Opening Project Evaluation (POPE) Commission. It will initially undertake an assessment of the 'physical' impact of the scheme, namely:
- ◆ A comparison of the 'Before' and 'After' traffic volumes on the A523 to illustrate how traffic volumes have changed since the opening of the scheme;
 - ◆ A comparison of 'Before' and 'After' journey times/speed limits to illustrate how journey times have changed since the opening of the safety improvements; and,
 - ◆ The report will also outline the changes in accidents on the route since the scheme has been implemented and establish whether they have changed as predicted since the opening of the scheme.
- 1.13 This is in turn followed the assessment of the scheme in accordance with the 'POPE methodology', which is being followed for the purpose of this study. This methodology aims to provide a method by which the forecast and outturn effects of a scheme can be evaluated on a common basis. This process ultimately presents two appraisals:

- ◆ Appraisal 1: The Original PAR assessment (including the original AST). This is a forecast of the cost/benefits of the scheme, usually calculated in accordance with PAR2 (1994 prices discounted at 6%).
- ◆ Appraisal 2: An Evaluation Summary Table (EST) based on outturn effects, but evaluated on precisely the same terms (version of the PAR document, present value year and discount rate) of the original assessment. The calculation is usually a simple pro-rate of the original assessment based on the outturn impact with regard to user benefits and scheme costs. The advantage of this assessment is that it is an outturn assessment that is directly comparable with the original PAR AST.

1.14 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 outlines the scheme's impact and reports on traffic volume and journey time changes attributable to the A523 Leek to Hazel Grove Traffic Safety Measures;
- ◆ Section 4 presents an assessment of predicted and outturn economic benefits using the POPE journey time methodology;
- ◆ Section 5 presents the contents of the original Appraisal Summary Table (AST) for the A523 Leek to Hazel Grove Traffic Safety Measures, and then re-evaluates these predictions; and
- ◆ Section 6 summarises the main conclusions from the evaluations and the limitations to use.

1.15 It is intended that the findings of this report will feed into a wider summary of the outcomes of the POPE process.

2. Data Collection

'BEFORE' SURVEYS

- 2.1 The PAR document submitted in support of the scheme was based upon the following data:
- ◆ Consultant Scott Wilson's average speed survey;
 - ◆ Traffic flow data from the Highways Agency monitoring;
 - ◆ Accident data from Highways Agency; and,
 - ◆ Speed Limit information.

'AFTER' SURVEYS

- 2.2 In the course of undertaking the LNM evaluation of the scheme, the following data was utilised.

Automatic Traffic Counts

- 2.3 Prior to the de trunking in October 2002 the Highways Agency had 6 permanent count sites in operation on the A523. These sites were removed at the end of September 2002 during the de trunking process. They were as follows:
- ◆ NB A523, South of Brocklehurst Way, Hurdsfield (Grid Reference 391920,373851);
 - ◆ SB A523, South of Brocklehurst Way, Hurdsfield (391930, 373847);
 - ◆ NB A523, Poynton Lake (392402, 385032);
 - ◆ SB A523 Poynton Lake (392412, 385022);
 - ◆ SB A523 Bradley Mount (391166, 377295); and,
 - ◆ Combined A523 NW of Leek (Rudyard) N of B5331 (396376, 358588).
- 2.4 At present there is only one permanent count site on the stretch of the A523 between Leek and Hazel Grove. This is located on the A523 Macclesfield Road at Poolend (North of Leek) at grid reference 396364 358605.

Manual Classified Counts

- 2.5 Due to the lack of automatic traffic counters (post opening) only sporadic traffic count data was obtained from Cheshire County Council.

Vehicle Speed Surveys

- 2.6 Data from vehicle speed surveys were obtained from Cheshire County Council. They were undertaken between 01/03/04 to 08/03/04 at the following three locations:
- ◆ Leek Road, Bosley near Bennetts Lane at Grid Ref: 392019, 365043;
 - ◆ Leek Road, Bosley near Primary School at Grid Ref: 391842, 365562; and

- ◆ A523 London Road, South of Macclesfield, near First Avenue at Grid Ref: 391560, 382552.

Accident Data

- 2.7 Accident data was obtained from the local authorities for the years 1998 to 2003 along the 22 mile section of the A523.

3. Scheme Impact: Safety, Traffic Flow and Journey Times

OVERVIEW

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

SAFETY

3.2 The original PAR evaluation was based on accident data for the period 1st December 1996 to the 30th January 1999. During this period of 38 months, 305 PIA's occurred, of which 6 were fatal, 56 serious and 243 slight.

3.3 For the purpose of the POPE re-evaluation it was necessary to compare the original pre-opening accident data to that from the post-opening period. However, from the original PAR document the extent of the original study area was not clear, thereby making a direct comparison between before and after opening data problematic. Therefore it was necessary to repeat the 'pre-opening' evaluation in order that an accurate like-for-like comparison could be made.

3.4 Accident data for the period 1st January 1998 and the 31st December 2003 was obtained from the three local authorities through which the scheme passes.

Table 3.1 – Accident Rate

| Year | Length of road (km) | Average Flow (AADT)* | No. of accidents | Accident Rate (PIA/MVKM) |
|---|---------------------|----------------------|------------------|--------------------------|
| 1999 | 35 | 7303 | 92 | 0.986 |
| 2000 | 35 | 7292 | 61 | 0.655 |
| 2001 | 35 | 7379 | 91 | 0.965 |
| Average Pre Opening | | | | 0.869 |
| 2002 | 35 | 7183 | 73 | 0.796 |
| 2003 | 35 | 7817 | 63 | 0.631 |
| COBA Default Accident Rate for Older S 2 A Road 30/40 mph | | | | 0.229 |
| COBA Default Accident Rate for Older S 2 A Road 50/60/70 mph | | | | 0.165 |
| Weighted COBA Default Accident Rate for Length of A523 Scheme** | | | | 0.194 |

accident data presented in Table 3.1 it is first necessary to exclude the period during which the scheme was implemented, which was principally in 2002. Examining the data for period before the scheme was implemented (1998 to 2001) shows that there was an annual average of 81 accidents. This can be compared to the post-opening

data (2003) which shows a total of 63 accidents, indicating a first year accident saving of 18 PIA's.

- 3.6 Consideration was also made of the accident severity. Normally within the POPE evaluation process severity is not considered as it requires extensive data to arrive at any conclusions. In the case the scope of the scheme ensures that there is more data than would normally be available from a more local scheme.
- 3.7 The severity index was calculated by taking the fatal plus serious accidents as a percentage of total accidents. Table 3.2 shows the severity index by year, average pre (1999 – 2001) and post opening (2003) and 19 month pre (October 2000 – April 2002) and post opening (June 2000 – April 2002).

Table 3.2 – Severity index by Year

| Year | Severity Index |
|------------------------------------|----------------|
| 1999 | 19.6% |
| 2000 | 24.6% |
| 2001 | 18.7% |
| Average Pre Opening | 21.0% |
| 2002 | 16.2% |
| 2003 (Average Post Opening) | 20.6% |
| <i>19 Months Pre</i> | <i>24.8%</i> |
| <i>19 Months Post</i> | <i>18.6%</i> |

- 3.8 Table 3.2 shows that when the severity index is compared pre opening to post opening there is only a 0.4% difference (less post opening) which suggests that although the number of accidents has reduced the severity of the accidents occurring has not changed significantly.
- 3.9 Further analysis of accidents on this scheme is presented in Annex B.

TRAFFIC FLOW

- 3.10 In assessing the likely impact of the scheme with regard to traffic flows, it would be expected that the imposition of lower speed limits coupled with other speed-restraint measures would encourage traffic on the A523 to seek other routes with less restrictive speed limits. In seeking to confirm whether or not this has been the case it is necessary to examine long term automatic traffic monitoring data available from sites along the route of the scheme.
- 3.11 Traffic flow data was available from a number of permanent monitoring sites on the A523. Two sites in particular provide good time series data regarding traffic growth on the A523; these were the site at Bradley Mount north of Macclesfield and the site at Bradnop immediately to the south of Leek (It should be noted that this count is located to the south of the scheme). A summary of the two-way AADT values at these sites is presented in Table 3.3.

Table 3.3 – Summary of ATC Data at Bradley Mount and Bradnop

| Year | Bradley Mount | | Bradnop* | |
|------|---------------|-------|----------|-------|
| | AADT | Index | AADT | Index |
| 1997 | 21022 | 1.000 | 8381 | 1.000 |
| 1998 | 21604 | 1.028 | 7569 | 0.903 |
| 1999 | 21480 | 1.022 | 7427 | 0.886 |
| 2000 | 21148 | 1.006 | 6942 | 0.828 |
| 2001 | 22079 | 1.050 | 6994 | 0.835 |
| 2002 | 22048 | 1.049 | 7544 | 0.900 |

*Located to the south of the scheme

- 3.12 Table 3.3 shows that the site at Bradley Mount has much more traffic than the site at Bradnop, illustrating the diverse ranges of flow catered for by the A523. With regard to traffic growth, the Bradley Mount site has experienced a slow growth, with overall growth approaching 5%. In contrast the site at Bradnop has experienced an almost 10% reduction in traffic between 1997 and 2002.
- 3.13 What is not clear from the data is the impact of the scheme. In particular there is no data for 2003, the first year after scheme completion, although there is data for 2002, the year in which the scheme was being implemented. The site at Bradley Mount shows a very similar flow between 2001 and 2002, while the site at Bradnop has growth of 6.5%. This suggest that, at least in 2002, there was no evidence that the scheme had an adverse impact on traffic flows, and that traffic had not been encouraged to route elsewhere.
- 3.14 Further analysis of traffic flow data is presented in Annex C.

TRAFFIC SPEEDS

Speed Limit Changes

- 3.15 A brief assessment of the impact of the changes in speed limits along the route is presented in Table 3.4. This illustrates that the average speed limit along the length of the route has decreased from 54.31mph to 47.98 mph, and that the total journey time along the route, if travelled at the designated speed limit for each section, has increased from 23.48 minutes to 26.57 minutes.

Table 3.4 - Cumulative Length of Speed limits before and after the Scheme Implementation

| Speed Limit | Before | Percentage of Route | After | Percentage of Route |
|------------------------------------|---------------|---------------------|---------------|---------------------|
| 30 mph | 3.06 km | 9.0% | 6.27 km | 18.4% |
| 40 mph | 4.48 km | 13.2% | 9.12 km | 26.8% |
| 50 mph | 3.29 km | 9.7% | 6.28 km | 17.4% |
| 60 mph | 21.08 km | 62.0% | 11.25 km | 31.2% |
| 70 mph | 2.09 km | 6.1% | 2.09 km | 6.1% |
| Total Distance or Average Speed | 34.0 km | 54.31 mph | 34.0 km | 47.98 mph |
| Total Travel Time (at Speed Limit) | 23.48 minutes | | 26.57 minutes | |

Note: All distances are in kilometres, but all speeds are expressed as miles per hour.

Vehicle speeds

- 3.16 The increase in journey times as a result of the introduction of the new lower speed limits proposed under the scheme would clearly result in an economic dis-benefit in the form of increased journey times. Clearly the extent of the dis-benefit would depend on the speed of vehicles on each section of road following the implementation of the scheme.
- 3.17 In the original PAR assessment the forecast average speed of traffic on each section after the implementation of the scheme was assumed to be 5% below the speed limit on that section. Using this as a basis the overall economic dis-benefit was calculated by:
- ◆ Taking the length of the section over which the speed limit had changed;
 - ◆ The assumed change in average speed over this section; and,
 - ◆ The number of vehicles on this section.
- 3.18 Multiplying these values together provided a calculation of the annual increase in vehicle journey times resulting from the speed limit changes. This provided a forecast opening year (2001) increase in vehicle journey times of 74,079 hours at low growth and 74,805 hour at high growth. Further detail on this calculation is presented in Table D1 of Appendix D.
- 3.19 In order to substantiate whether or not the original PAR assessment of journey time increases was an accurate reflection of the impact of the scheme two different approaches were used:
- ◆ **Cheshire Speed Surveys:** Cheshire County Council provided Atkins with some spot speed data obtained from surveys undertaken in the week beginning 01/03/04. Data was provided from three survey sites, two of which (Bosley and Poynton South 1) corresponded to two of the

eleven survey sites used in the evaluation presented within the PAR. The speed survey data from these two sites was used to factor the other sites to provide post opening speed data used in the economic evaluation.

- ◆ **Finch Assumption:** This approach is based on research that proved that a reduction in an existing speed limit would be forecast to result in a reduction in mean speed of 25% of the difference between the old speed limit and the new speed limit. Using this approach a 2.5 miles/h reduction in mean speed would be expected to be achieved from a change in speed limit from 60 to 50 miles/h. Further detail on this approach is provided in the Transport Research Laboratory Project Report 58 'Speed, Speed Limits, and Accidents'.
- 3.20 Table D2 of Appendix D presents the assessment of the increase in opening year journey times using the Cheshire speed survey data, the Finch approach, and also the original approach presented in the PAR document. In each case the evaluation has been based on observed traffic flows for 2003.
- 3.21 The increase in opening year journey times using each approach was as follows:
- ◆ Scott Wilson speed surveys (74,739 additional hours);
 - ◆ The Finch approach (64,322 additional hours); and,
 - ◆ Cheshire Speed surveys (33,848 additional hours).
- 3.22 This illustrates that the original approach used in the PAR assessment provides the highest estimate of additional journey time as a consequence of the scheme, while the Cheshire speed survey (which is the only approach based on at least partially observed data) provides the lowest forecast.

4. POPE Methodology

INTRODUCTION

- 4.1 This section assesses the level of economic benefits predicted for each of the scheme and compares these predictions with actual benefits accrued when considering actual traffic volume changes and actual journey time benefits. The approach that we have taken is termed the Post Opening Project Evaluation (POPE) methodology. The basis of the POPE methodology is that through previous economic evaluations undertaken it has been identified that the majority of benefits are derived primarily from two areas:
- ◆ Link transit time (vehicle hours) benefit/disbenefits; and
 - ◆ Accident benefits.
- 4.2 As such, link transit time, (which is represented by traffic volumes multiplied by journey times) and the number of accidents can be collected before and after scheme opening and the difference between these observed values can be compared to the difference shown in time and accidents for the same links shown in the original Scott Wilson assessment. The premise of the POPE methodology is that the change in the observed flows, times and accidents can be directly associated to the economic benefits predicted for this scheme.
- 4.3 A consequence of the POPE methodology is that all costs and benefits are expressed in terms of the present value year and the discount rate prevalent at the time that the original PAR was submitted. For this scheme the present value year is 1994, and the discount rate was 6 per cent. It should also be noted that the PAR was done in accordance with PAR2 guidance.

ACCIDENTS

- 4.4 The original Scott Wilson assessment forecast an accident saving in the opening year of 18 accidents.
- 4.5 The assessment undertaken of the scheme impact after opening, as presented in section 4 of this report, states that in the 19 month period after the scheme opened there has been a saving of 24 accidents. This represents an annual accident saving of 15.16 accidents a year. In the first full year after opening 18 accidents were saved but it was more astute to include 19 months of data and obtain an average.
- 4.6 Table 4.1 presents the 30-year accident savings and benefits attributed to the scheme.

Table 4.1 – POPE Comparison: Accident Benefits

| | Original Scott Wilson | | | POPE | | |
|-------------|----------------------------|-------------------------|---------------------------|----------------------------|-------------------------|---------------------------|
| | First Year Accident Saving | 30 Year Accident Saving | 30 Year Accident Benefits | First Year Accident Saving | 30 Year Accident Saving | 30 Year Accident Benefits |
| Low Growth | 18 | 620 | £18.270m | 15.16 | 522 | £15.387m |
| High Growth | 18 | 720 | £22.248m | 15.16 | 606 | £18.738m |

All costs and benefits are 1994 prices discounted to 1994 at 6%.

- 4.7 Table 4.1 demonstrates that the scheme delivers slightly less benefit than predicted although this is only based on 19 months of accident data.

VEHICLE OPERATING COST SAVINGS

- 4.8 PAR3.2 evaluates vehicle operating cost savings (VOC) in terms of changes in total kilometres travelled. As there are no traffic re-assignment effects associated with this scheme, for the purposes of this evaluation it is assumed that there are no VOC benefits/disbenefits.
- 4.9 It should be noted that in reality some vehicle operating cost benefits will accrue to the scheme as vehicles are in general travelling slower than they were before the scheme was implemented. This reflects the basic premise that, in general, the slower a vehicle travels, the more efficiently it will use fuel, and the less will be the wear and tear on the vehicle.

JOURNEY TIME BENEFITS/DISBENEFITS

- 4.10 The observed journey time dis-benefits associated with the scheme were forecast to be 74,079 at low growth and 74,805 at high growth.
- 4.11 Section 3 and Annex D calculated the increase in annual journey times using three methods:
- ◆ Scott Wilson speed surveys (74,739 additional hours);
 - ◆ The Finch approach (64,322 additional hours); and,
 - ◆ Cheshire Speed surveys (33,848 additional hours).
- 4.12 The annual travel time increase as observed from the Scott Wilson surveys represents a 'worst case' of the three calculated values, although this is almost exactly that forecast in the PAR assessment. Table 4.2 compares this data to the original estimates through the POPE methodology.

Table 4.2 – POPE Comparison: Journey Time Disbenefits

| | Original Scott Wilson | | POPE | |
|-------------|-------------------------------|-------------------------|-------------------------------|-------------------------|
| | First Year Disbenefit (hours) | 30 Year Disbenefit (£m) | First Year Disbenefit (hours) | 30 Year Disbenefit (£m) |
| Low Growth | 74,079 | £8.4m | 74,739 | £8.5m |
| High Growth | 74,805 | £10.4m | 74,739 | £10.4m |

All costs and benefits are 1994 prices discounted to 1994 at 6%.

- 4.13 Table 4.2 illustrates that the original PAR assessment of opening year journey time dis-benefit is almost identical to that observed in the 'worst case' assessment of actual speeds and flow.

SCHEME COST

- 4.14 The estimated outturn cost (2003) of the scheme was £1,800,000 (including preparation and site supervision). This figure was provided by the Highways Agency's Route Sponsor for MAC Area 7. It is not clear whether this figure includes or excludes VAT. In the absence of more detailed information it is assumed that the value includes VAT at the same rate as the original assessment.
- 4.15 Table 4.3 presents the conversion of the outturn cost to the present value year of 1994.

Table 4.3 – POPE Comparison: Conversion of Outturn Cost to Present Value Cost

| | Cost (1) | RPI (2002) (2) | RPF (2002) (3) | RPI (1994) (4) | Discount Factor (2002) (5) | Present Value Cost $((4*3*1)/2)^* 5$ |
|----------------|------------|----------------|----------------|----------------|----------------------------|--------------------------------------|
| Original PAR | £1,176,000 | - | - | - | - | £621,323 |
| Actual Outturn | £1,800,000 | 176 | 0.98 | 144.1 | 0.63 | £909,893 |

All Costs are in 1994 prices discounted to 1994 at 6%.

- 4.16 Table 4.3 illustrates that the outturn scheme cost was 46% above the forecast value.

SUMMARY

- 4.17 Table 4.4 presents a summary of the original PAR and POPE economic evaluation of the scheme. It should be emphasised that the assessment is expressed in terms of 1994 prices, discounted to 1994 at 6 per cent, and that the methodology used is in accordance with PAR2.

Table 4.4 – POPE Comparison: Summary

| | PAR | | POPE | |
|--------------|----------|-----------|---------|----------|
| | Low (1) | High (2) | Low (3) | High (4) |
| Accidents | £18.27 m | £22.25 m | £15.39m | £18.74m |
| VOC | N/A | N/A | N/A | N/A |
| Journey Time | -£8.40m | -£10.40m | -£8.50m | -£10.4m |
| PVB | £9.87 m | +£11.85 m | £6.89m | £8.34m |
| PVC | £0.62 m | £0.62 m | £0.91m | £0.91m |
| NPV | £9.25 m | £11.23m | £5.98m | £7.43m |
| BCR | 15.91 | 19.11 | 7.57 | 9.16 |

All costs and benefits are 1994 prices discounted to 1994 at 6%.

4.18 The main points to note are:

- ◆ The accident benefits delivered by this scheme was 16% less than predicted;
- ◆ The journey time dis-benefits delivered by the scheme were identical to that predicted;
- ◆ The scheme is forecast to deliver a lower level of PVB due to a lower level of accident benefit than that forecast;
- ◆ The outturn scheme cost was approximately 47% higher than predicted;
- ◆ As a result of higher scheme costs than forecast, the scheme BCR is now forecast to 50% less than originally predicted;

4.19 Overall the scheme continues represents good value for money, even with the higher than forecast outturn scheme cost.

5. Summary of Appraisal and Evaluation Summary Tables

INTRODUCTION

- 5.1 In order to fully evaluate the effects of the traffic safety measures scheme, Atkins has undertaken a review of the original PAR document prepared by Scott Wilson. The Appraisal Summary Table (AST) from this document, which summarise the predicted impact of the scheme under the five objectives of environment, safety, economy, accessibility and integration, is presented in Annex E of this report.
- 5.2 The Atkins review focused on:
- ◆ The main body of the PAR document itself; and,
 - ◆ The Appraisal Summary Table (AST) from the PAR.
- 5.3 Each of these is dealt with in turn below.

PAR DOCUMENT

- 5.4 The main points to note from the PAR document of the A523 Leek to Hazel Grove Traffic Safety measures are as follows.

Safety

- 5.5 The PAR document included accidents from 1997 to 1999 and calculated a severity index of 15.3% for built up roads and 27.1% for non built up roads. This was then compared against the national average of 14% for built up roads and 22% for non built up roads, which showed that this stretch of road exhibited a higher severity index than the national average.
- 5.6 The PAR predicts that there will be an accident saving of 20% but that this was felt to be a conservative estimate. The TRL Molasses Database (Monitoring of Local Authority Safety Schemes database) has shown an average accident saving of 39.8% for an urban scheme of this type and 48.9% saving for rural schemes.

Economy

- 5.7 The proposed speed limit changes were forecast to have an impact on road user journey times. The forecast increase on journey times associated with the proposed speed limit changes is summarised in Table 5.1. The forecast changes in vehicle journey times were calculated on a section by section basis, in accordance with the existing and proposed speed-limit changes, and the observed/forecast traffic flow on each section.
- 5.8 Overall it was forecast that the proposed scheme would result in an increase in total user journey times of 74,079 hours per annum at opening year under low growth

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assumptions, and an increase of 74,805 hours per annum under high growth (an average of 74,442).

Accessibility

- 5.9 The PAR states that the trunk road bisects numerous communities along the route. It is proposed to address this with a combination of new pedestrian refuges, 'toucan' crossings and a 'puffin crossing'.
- 5.10 The PAR states that cyclist's conflict with trunk road traffic. Cycle facilities have been included on the route at locations where either a national or local cycling strategy exists.

Integration

- 5.11 The PAR does not include any additional information on integration other than the slight beneficial impact predicted in the AST.

Appraisal Summary Table (AST)

- 5.12 The main points to note from the AST of A523 Leek to Hazel Grove Traffic Safety measures PAR are:

Environment

- ◆ No impacts predicted.

Safety

- ◆ Predicted an estimated saving of 18 personal injury accidents in the first year.

Economy

- ◆ Predicted a journey time increase of 74,079 (low growth)/74,805 (high growth) vehicle hours a year; and,
- ◆ Substantial benefit over scheme cost.

Accessibility

- ◆ Slight beneficial impact for accessibility in terms of pedestrians and others;
- ◆ Slight beneficial impact for access to public transport; and,
- ◆ Slight beneficial impact for community severance.

Integration

- ◆ Slight beneficial impact predicted for integration.

OUTTURN EFFECTS

- 5.13 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 F.

-
- 5.14 Section three discussed the economy and safety impacts of the scheme. This section concentrates on the other three impacts included in the AST, namely
- ◆ **Environmental Impacts** such as noise, local air quality, landscape, biodiversity, heritage and water;
 - ◆ **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 policy.
- 5.15 The assessments that follow are all subjective assessments from members of the evaluation team.
- 5.16 The following reiterates the statements that accompanied these impacts before providing photographic evidence that the mitigating measures have been implemented.

Environment

- 5.17 No predictions were made within the PAR document or AST but the following can be concluded:
- ◆ **Noise:** Appendix B section 4 of the PAR3.2 Full Guidance advises that, in the absence of mitigation measures, if traffic flow and the percentage of HGV's does not change, and the change in average speed of traffic is less than 10%, then the impact on traffic noise can be considered to be neutral. In the case of this scheme the precise change in vehicles speeds on each section would be dependent on local conditions, however it is likely that the scheme would be neutral or The lower vehicle speeds associated with the scheme would provide a reduction in traffic noise levels, and as such would be '**neutral**' or '**beneficial**'.
 - ◆ **Local Air Quality:** Appendix B section 5 of the PAR3.2 Full Guidance advises that in cases where the change in traffic flow on a scheme is less than 700 vehicles AADT, the impact on local air quality should be considered as neutral if the changes in speed is less than 5kph. In the case of this scheme the average reduction in vehicle speeds is greater than 5kph, and as such the impact on local air quality is '**beneficial**'.
 - ◆ **Greenhouse Gases:** Appendix B section 6 of the PAR3.2 Full Guidance advises that if the change in the total distance travelled on roads affected by the project (i.e. the change in total vehicle kilometres travelled) is less than 10%, then the impact on the scheme should be considered as neutral. In the case of this scheme, while vehicle speeds are lower (and so greenhouse gas emissions are lower), the total vehicle kilometres travelled is unchanged, and as such the impact is '**neutral**'.

Accessibility

- 5.18 Slight beneficial impacts were predicted for pedestrians and others, access to public transport and community severance but pedestrians and others and access to public transport were not qualified.

Community Severance – Trunk Road bisects numerous communities numerous communities along the route. It is proposed to address this with a

combination of new pedestrian refuges, 'Toucan' Crossings and a 'Puffin' Crossing. Slight Benefit.

5.19 Figure 5.1 shows one such pedestrian refuge in Leek whilst Figure 5.2 shows a pedestrian crossing in Poynton.



Figure 5.1 – Pedestrian Refuge in Leek



Figure 5.2 – Pedestrian Crossing in Poynton

5.20 In terms of post opening evaluation we can only state that these facilities have been provided. There is no robust evaluation method to define what benefit the facilities have actually provided and as a result we can only agree with the PAR in stating that there has been a slight beneficial impact.

Cyclists – Conflict with trunk road traffic. Cycle facilities have been included on the route at locations where either a national or local cycling strategy exists.

5.21 Figure 5.3 shows an example of a cycle facility in Hazel Grove.



Figure 5.3 - Cycle Facility at Hazel Grove

5.22 In terms of post opening evaluation we can only state that these facilities have been provided. There is no robust evaluation method to define what benefit the facilities have actually provided and as a result we can only agree with the PAR in stating that there has been a slight beneficial impact.

Integration

5.23 A slight beneficial impact was predicted for integration but this was not qualified

Pictorial Examples of the Safety Measures that have been implemented

5.24 The figures (Safety Scheme Examples 1 and Safety Scheme Examples 2) provided in the Annex A show examples of the safety measures that have been implemented along the route. The figures also show the location of the examples.

6. Conclusions

- 6.1 The main points to note from this evaluation of the A523 Leek to Hazel Grove Traffic Safety Measures are:

Safety

- 6.2 Scheme has saved 18 accidents in the opening year (2003);
- 6.3 When comparing 19 months of pre opening accident data with 19 month post opening accident data there has been a reduction of 24 accidents equating to 15.16 accidents per year;
- 6.4 In the first year after opening 2003 there was an accident rate of 0.631 PIA/per million vehicle kilometres compared to an average pre opening accident rate of 0.869 PIA/per million vehicle kilometres
- 6.5 The accident rate on this 35 km route has fallen but is still approximately three times higher than the COBA default accident rates for roads of this type.

Traffic Volumes

- 6.6 The largest average daily traffic occurs on the 35km route occur in Macclesfield;
- 6.7 Average daily Flows in Hazel Grove and Macclesfield are approximately double those to the North of Leek; and
- 6.8 Traffic has grown at 6% over two years (3% a year) to the north of Leek.

Speed Limit Changes

- 6.9 Post scheme opening the length of the 30/40/50 mph speed limit has approximately doubled when compared to pre scheme opening;
- 6.10 Post scheme opening the length of the 60 mph speed limit (national speed limit) has approximately halved when compared to pre scheme opening;
- 6.11 Post scheme opening the length of the 70 mph speed limit has remained unchanged when compared to pre scheme opening;

Journey Time Increases

- 6.12 Scott Wilson predicted a journey time increase, as a result of the new scheme, of 74,079 hours low growth and 74,805 hours high growth;
- 6.13 Scott Wilson predictions were revised to an increase of 55749 additional hours with up to date post opening AADTs;

- 6.14 Using the Finch Assumption it was calculated that an additional 45211 hours were added onto the route as a result of the scheme;
- 6.15 Using actual Cheshire Speed Survey data it was calculated that an additional 35345 hours were added onto the route as a result of the scheme;
- 6.16 Although the scheme added additional hours onto the network these were less than predicted;

Scheme Costs

- 6.17 Outturn scheme cost was 46% above the forecast value.

POPE Methodology

- 6.18 The accident benefits delivered by this scheme was 16% less than predicted;
- 6.19 The journey time disbenefits delivered by the scheme were approximately equal to what was predicted;
- 6.20 The scheme delivered similar levels of PVB to that predicted;
- 6.21 The outturn costs was approximately 48% higher than predicted;
- 6.22 As a result of higher scheme costs than what was predicted the BCR's delivered by the scheme were 20% less than forecast;

Observations

- 6.23 Community Severance was mitigated through the provision of numerous pedestrian crossings.
- 6.24 Cyclist conflicts were mitigated through the provision of facilities.

Overall

- 6.25 The scheme appears to have been a success and has delivered more benefit than predicted.
- 6.26 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.

Annex A – Examples of Safety Schemes Implemented

Insert plan 1

Insert plan 2

Annex B – Analysis of Accident Data

Safety

The original Scott Wilson PAR and AST forecast that the scheme would provide significant accident savings. In order to evaluate whether these forecast savings have occurred or will occur, Atkins has undertaken an initial evaluation of accident savings accrued in the first full year post opening. This is of particular relevance given that the PAR predicts that 18 personal injury accidents (PIA's) will be saved in the first year.

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 considered to be an initial view based upon limited available data.

The PAR examined accidents between 1st December 1996 and the 30th January 1999. During this period of 38 months, 305 PIA's occurred, of which 6 were Fatal, 56 serious and 243 slight. This equated to a severity index of 15.3% for the section of the scheme categorised as 'built-up roads', and 27.1% for 'non-built up roads' section, both of which were above the national average of 13.3% and 21.3% for built-up/non-built up respectively.

From the PAR it was unclear which sections of the A523 were included within the accident dataset. Therefore for the purpose of this evaluation the accident assessment was revisited to assess the pre and post opening accident record so that an accurate like-for-like comparison could be made.

Accident data for the period 1st January 1998 and the 31st December 2003 was obtained from the three local authorities through which the scheme passes. It should be noted that local authorities typically only retain accident data for a five year period, hence the 1998 limit on available accident data.

Figure B1 provides an indicative plan of the location of accidents along the scheme for the period January 1st 1998 to December 31st 2003, while Table B1 summarises this data.

Table B1 – Selected Accidents

| Year | Slight | Serious | Fatal | Total | AADT |
|-------|--------|---------|-------|-------|------|
| 1999 | 74 | 18 | 0 | 92 | 7303 |
| 2000 | 46 | 13 | 2 | 61 | 7292 |
| 2001 | 74 | 15 | 2 | 91 | 7379 |
| 2002 | 62 | 11 | 1 | 74 | 7183 |
| 2003 | 50 | 10 | 3 | 63 | 7817 |
| Total | 306 | 67 | 8 | 381 | - |

A523 Leek to Hazel Grove Traffic Safety Measures

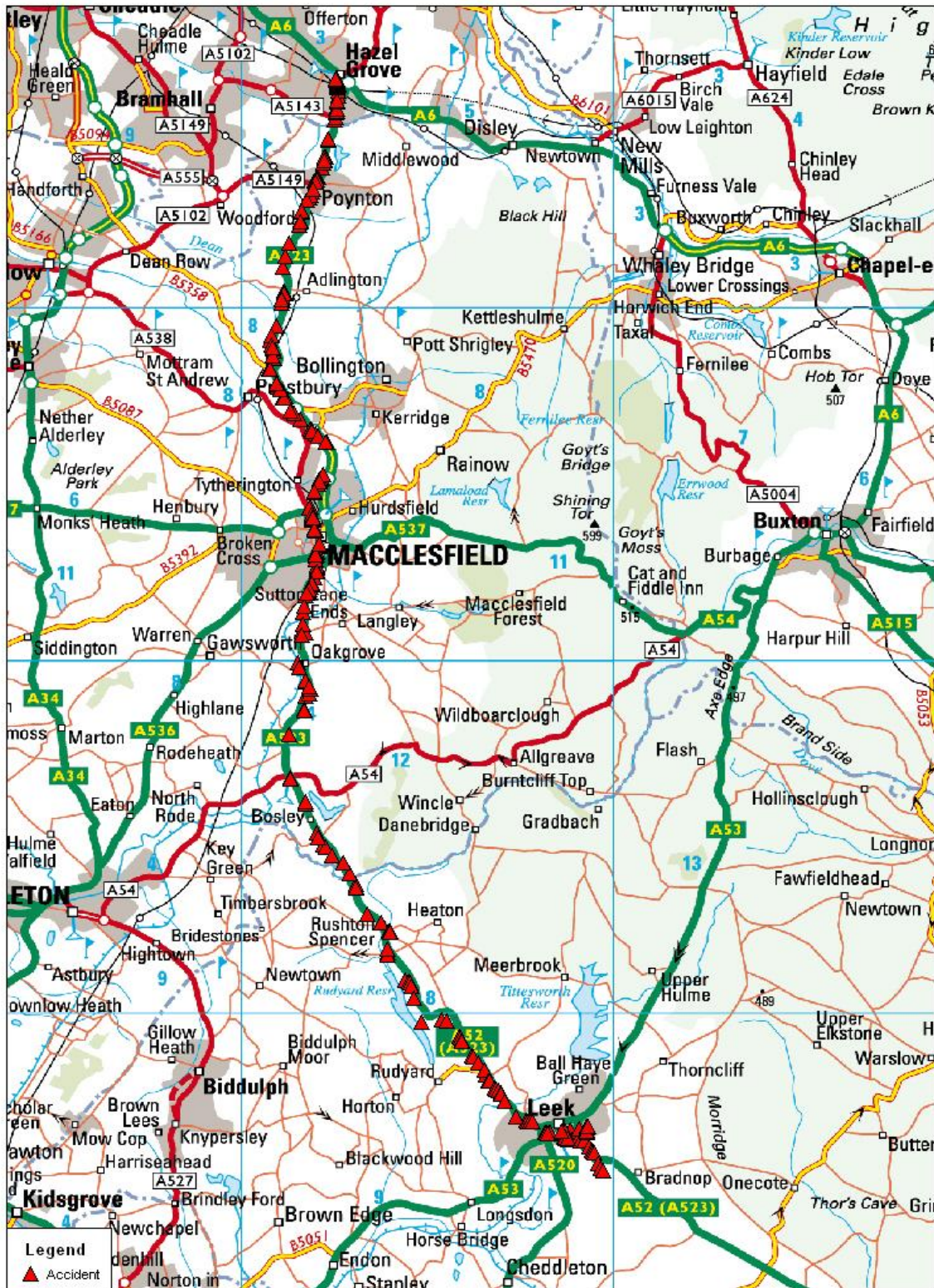


Figure B1 - Accidents 1998 – 2003

From Table B1 it can be seen that the number of accidents varied between years. In the post opening year (2003) there were 63 accidents in total, whilst the pre opening (1999 – 2001) there were on average 81 accidents. Hence it can be inferred that 18 accidents were saved in 2003 (post opening) when compared to the pre opening annual average number of accidents.

It should be noted that in analysing the accident impact of the proposed scheme, consideration needs to be made of the period over which the scheme was implemented. The package of measures that comprise the A523 Leek to Hazel Grove Traffic Safety Measures were implemented over a period focused around 2002. By taking the period 1998 to 2001 for the pre-opening period, and from 2003 for the post-opening, the analysis has avoided the main transitory period (2002) over which the measures were implemented.

Figure B2 presents a bar chart of accident numbers by month, with the red hatched line indicating the final opening date of the traffic safety measure scheme.

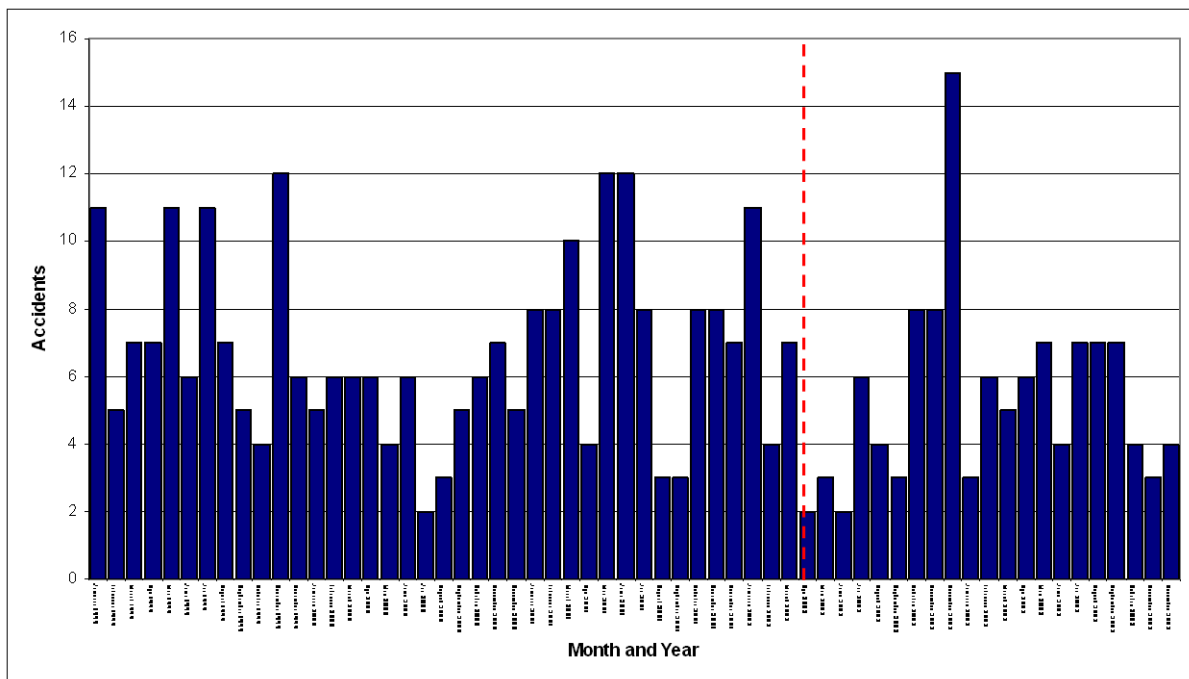


Figure B2 – Accidents by Month on the A523

Figure B2 shows that the number of accidents has dropped post opening (other than December 2002). During the 19 months post opening (June 2002 – December 2003) 109 accidents occurred along this stretch of the A523. During the 19 months pre opening (October 2000 - April 2002) there were 133 accidents. Hence if the 19 months post opening is compared to the 19th month's pre opening then there has been a reduction in 24 accidents.

Severity Index

Severity index is calculated by taking fatal plus serious accidents as a percentage of total accidents. Table B2 shows the severity index by year, average pre (1999 – 2001) and post

opening (2003) and 19 month pre (October 2000 – April 2002) and post opening (June 2000 – April 2002).

It should be noted that local data on accident severity is notoriously difficult to interpret and, for example, HA TAME would typically require 20 years of accident data to substantiate a local severity rate. Consequently a comparison of accident severity over two 19 month periods may not provide a sufficiently accurate assessment.

Table B2 – Severity index by Year

| Year | Severity Index |
|------------------------------------|----------------|
| 1999 | 19.6% |
| 2000 | 24.6% |
| 2001 | 18.7% |
| Average Pre Opening | 21.0% |
| 2002 | 16.2% |
| 2003 (Average Post Opening) | 20.6% |
| <i>19 Months Pre</i> | <i>24.8%</i> |
| <i>19 Months Post</i> | <i>18.6%</i> |

Table B2 shows that when the severity index is compared pre opening to post opening there is only a 0.4% difference (less post opening) which suggests that although the number of accidents has reduced the severity of the accidents occurring has not reduced (reduced by 0.4%, rounding gives 0%).

Another comparison which can be made is comparing the 19 months post opening with the 19 months pre opening. The average severity index in the 19th months post opening is 18.6% whilst in the 19th month's pre opening it is 24.8%. This comparison suggests that the severity of accidents has indeed fallen post opening but this isn't a very robust conclusion. This issue is examined in greater detail in Figure B3 which presents a bar chart of accident numbers and accident severity by month, again with the scheme opening date highlighted.

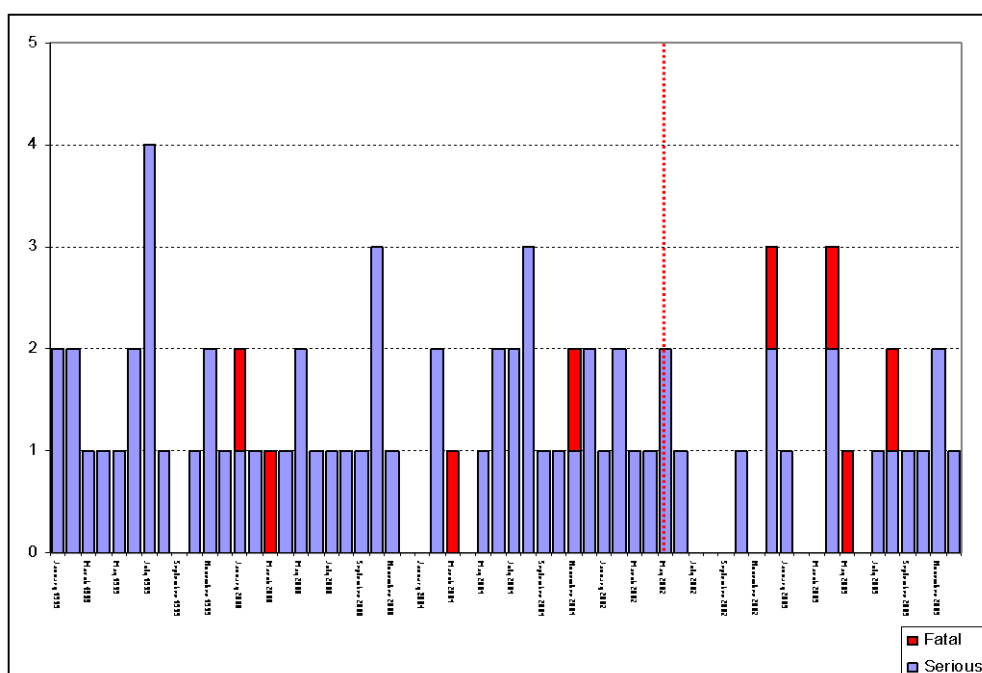


Figure B3- Accidents and Accident Severity by Month on the A523

Figure B3 is inconclusive when comparing number of serious and fatal accidents pre and post opening, although it does appear that there are slightly less serious accidents post opening than there was pre opening.

Accident Rate

Table B3 shows the accident rate per million vehicle kilometres.

Table B3 – Accident Rate

| Year | Length of road (km) | Average Flow (AADT)* | No. of accidents | Accident Rate (PIA/MVKM) |
|---|---------------------|----------------------|------------------|--------------------------|
| 1999 | 35 | 7303 | 92 | 0.986 |
| 2000 | 35 | 7292 | 61 | 0.655 |
| 2001 | 35 | 7379 | 91 | 0.965 |
| Average Pre Opening | | | | 0.869 |
| 2002 | 35 | 7183 | 73 | 0.796 |
| 2003 | 35 | 7817 | 63 | 0.631 |
| COBA Default Accident Rate for Older S 2 A Road 30/40 mph | | | | 0.229 |
| COBA Default Accident Rate for Older S 2 A Road 50/60/70 mph | | | | 0.165 |
| Weighted COBA Default Accident Rate for Length of A523 Scheme** | | | | 0.194 |

*based on actual split (weighted average) between 30/40 mph and 50/60/70mph sections of the route. ** based on permanent count site just to the north of Leek

From Table B3 it can be seen that the accident rate has dropped post opening when compared with pre opening values. For example when the 2003 accident rate is compared with the average pre opening (1999 - 2001) it can be seen that there is a difference of 0.238 accidents per million vehicle kilometres, which equates to lesser chance of an accident happening on the scheme route post opening. It should be noted that this is only based on three years pre opening data and one year post opening data. The traffic flows used are by no means the highest on the route, they were used due to their completeness i.e. if the higher flows from Macclesfield were used then the accident rate would fall. Ideally an average flows along the entire route would need to be used in the calculation

The average pre opening accident rate is greater than both the COBA default accident rate for Older A roads with a 30/40mph speed limit and greater than the COBA default accident rate for older A roads with a 50/60/70 mph speed limit. When the COBA default accident rates are averaged to represent the speed limits on the scheme route an accident rate of 0.194 is generated. The post opening accident rate of 0.631 is greatly above the national average for these routes.

The main points to note from the safety section are:

- ◆ Accident data was obtained for 1st January 1998 to 31st Dec 2003 for the 35km scheme length;
- ◆ Scheme saved 18 accidents in the opening year (2003);
- ◆ When comparing 19 months of pre opening accident data with 19 month post opening accident data there has been a reduction of 24 accidents;
- ◆ Although the number of accidents has reduced the severity of these accidents has stayed approximately the same, although this is based on only 19 months of data;
- ◆ In the first year after opening 2003 there was an accident rate of 0.631 PIA/per million vehicle kilometres compared to an average pre opening accident rate of 0.869 PIA/per million vehicle kilometres; and
- ◆ The accident rate on this 35 km route has fallen but is still approximately three times higher than the COBA default accident rates for roads of this type.

Annex C – Analysis of Traffic Flow Data

Traffic Volume Changes by Route Section

- 6.27 Figure C1 shows year on year changes (5 day average) in traffic flow at various locations along the route.

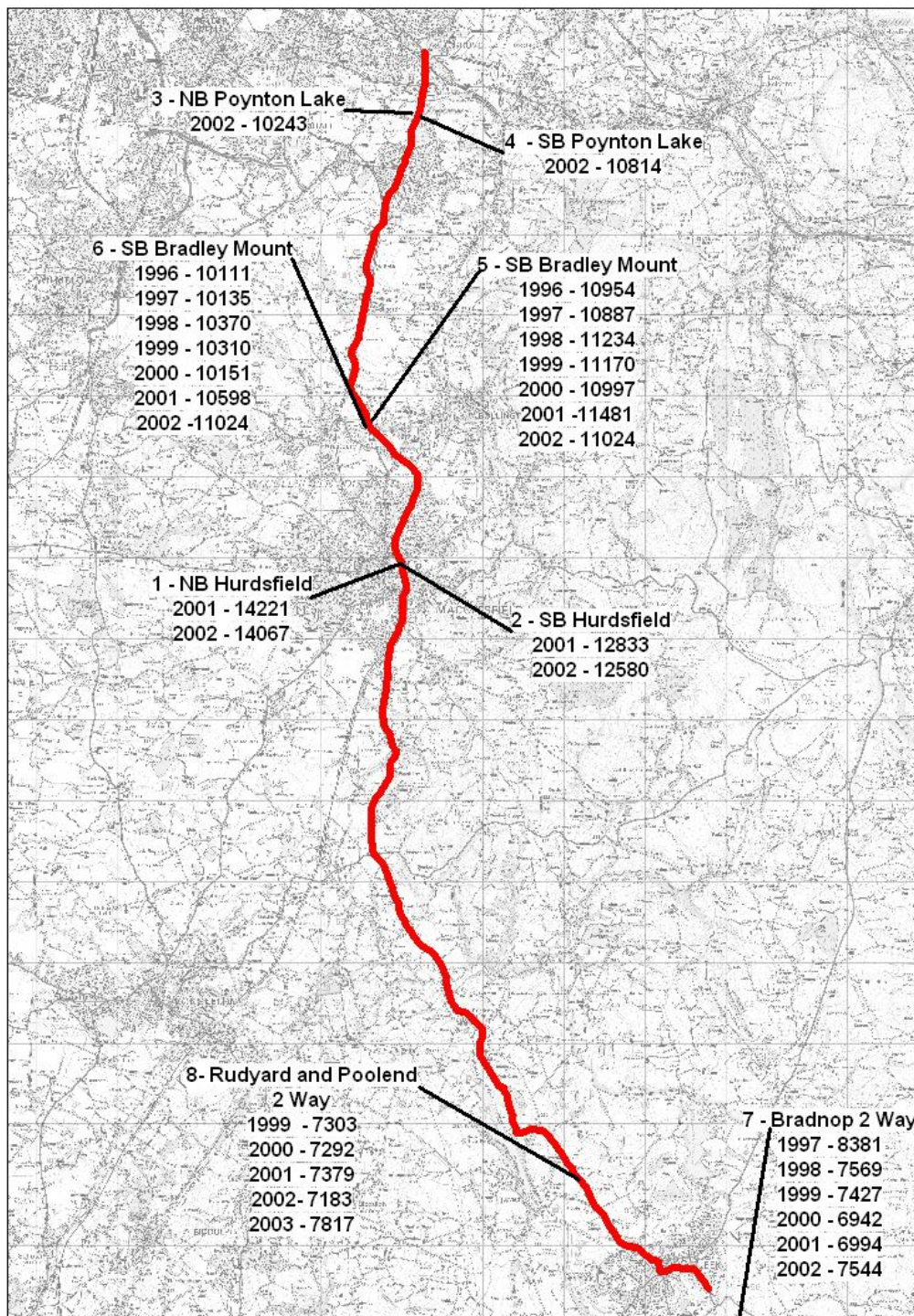


Figure C1 – Average Daily Traffic Volume Changes along the A523 Traffic Safety Measure Route

Figure C1 shows that the largest flows on the route occur in Macclesfield but also that the flows on the route vary significantly with flows on some sections double that of others.

Traffic Growth

Figure C2 presents a bar chart of traffic flow by month at Rudyard/Poolend. It should be noted that the counter was under Highways Agency control until September 2002 and was then handed over to Staffordshire County Council. Hence pre data was obtained from the Highways Agency Monitoring team and post data was obtained from Staffordshire County Council.

Figure C2 shows 24 hour 5 day average per month. October 2002 is missing as this was when the count site was handed over from the Highways Agency to Staffordshire County Council.

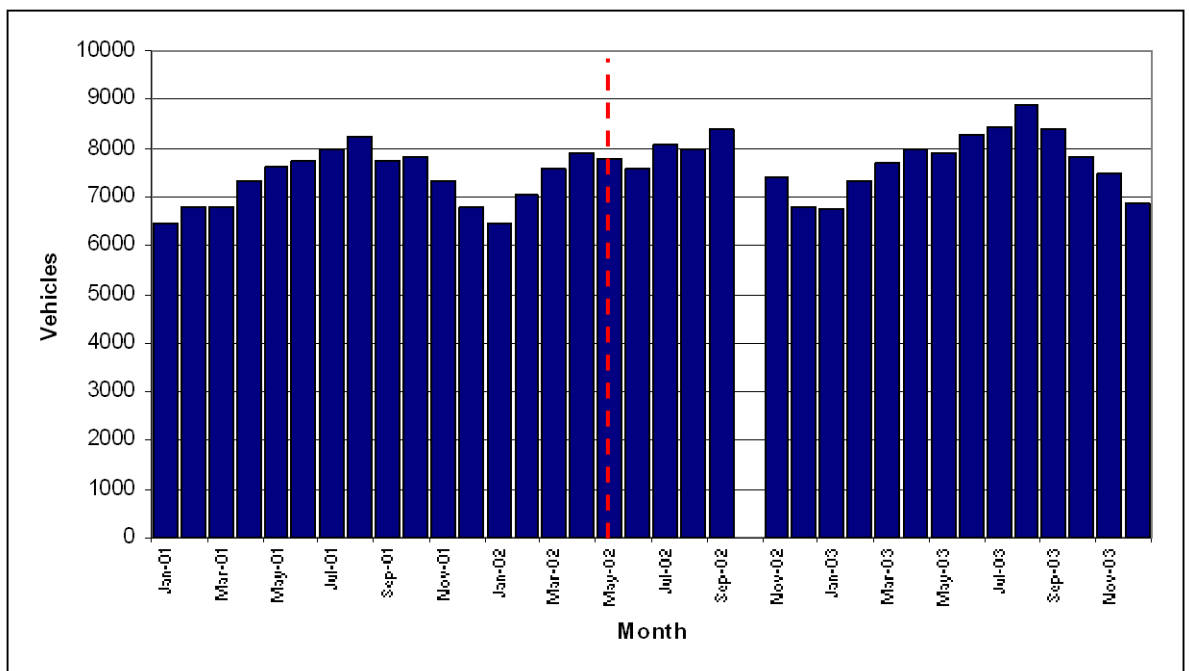


Figure C2– Monthly Variation in Average Daily Traffic at Rudyard/Poolend

From Figure C2 it appears that traffic flows have increased post opening when compared with pre opening. This increase is in line with NRTF for example the 24 hour 7 day average for 2001 was 7379 vehicles whilst in 2003 it was 7817 vehicles, a rise of 6% over two years. Figure C2 also shows that there is a reasonable seasonal variation in traffic flow.

The main points to note from the traffic flow section are:

- ◆ The largest average daily traffic occurs on the 35km route occur in Macclesfield;
- ◆ Average daily Flows in Hazel Grove and Macclesfield are approximately double those to the North of Leek; and
- ◆ Traffic has grown at 6% over two years (3% a year) to the north of Leek.

Annex D – Analysis of Journey Time Data

Journey Times - Pre Opening (Scott Wilson)

Pre-opening Scott Wilson's journey time calculations were based on average observed spot speeds and changes in speed limits.

Predictions were based on the assumption that average speed in the new proposed limits was 5% below the speed limit. Pre opening predictions of time increase were undertaken for 11 sections of the A523 which are shown in Table D1.

Table D1 – Original Scott Wilson Estimate of Increased Journey Times

| Road Section | Proposed Speed Limit | Increased Length (miles) | Existing Average Speed (mph) | Assumed Proposed Average Speed (mph) | AADT 1996 | Increase Time (Mins) | Estimated AADT 2001 Low Growth | Estimated AADT 2001 High Growth | Annual Time Increase Low Growth (hours) | Annual Time Increase High Growth (hours) |
|------------------------|----------------------|--------------------------|------------------------------|--------------------------------------|-----------|----------------------|--------------------------------|---------------------------------|---|--|
| North Leek | 40 | 0.15 | 40.63 | 38 | 12,323 | 0.015 | 13,692 | 13,826 | 1,243 | 1,255 |
| Rushton Spencer | 40 | 0.05 | 50 | 38 | 3,125 | 0.020 | 3,472 | 3,506 | 433 | 437 |
| Bosley | 40 | 1.5 | 47.533 | 38 | 8,194 | 0.476 | 9,104 | 9,194 | 26,373 | 26,631 |
| Fool Nook | 50 | 0.04 | 60 | 47.5 | 9,501 | 0.010 | 10,557 | 10,660 | 651 | 657 |
| Macclesfield South | 40 | 0.62 | 44.13 | 38 | 13,040 | 0.135 | 14,489 | 14,631 | 11,892 | 12,008 |
| Macclesfield Relief Rd | 30 | 0.02 | 40 | 28.5 | 12,113 | 0.015 | 13,458 | 13,590 | 1,201 | 1,213 |
| Prestbury to Poynton | 50 | 2.88 | 41.73 | 47.5 | 17,360 | 0.000 | 19,289 | 19,478 | 0 | 0 |
| Poynton South 1 | 40 | 0.15 | 41.68 | 38 | 17,360 | 0.021 | 19,289 | 19,478 | 2,490 | 2,515 |
| Poynton South 2 | 30 | 0.06 | 38 | 28.5 | 17,360 | 0.033 | 19,289 | 19,478 | 3,914 | 3,953 |
| Hazel Grove 1 | 40 | 0.63 | 44.47 | 38 | 23,586 | 0.144 | 26,207 | 26,463 | 23,014 | 23,240 |
| Hazel Grove 2 | 30 | 0.03 | 38 | 28.5 | 23,586 | 0.018 | 26,207 | 26,463 | 2,868 | 2,896 |
| Total | | | | | | | | | 74,079 | 74,805 |

Table D1 shows that pre opening it was predicted that the number of vehicle hours on the network would increase by 74079 hours low growth and 74805 hours high growth, after the implementation of the traffic safety measures. This is based on the assumption that lower speed limits would lead to lower speeds being exhibited hence longer journey times and additional hours on the network.

The figures shown in Table D1 were recalculated using 2003 AADTs and this is included as part of Table D2 within the next section

Journey Times – Post Opening

Post Opening journey times were evaluated using two methods Method 1 – Finch Assumption, Method 2 – Cheshire Spot Speed Surveys whose description follows and the results of this are shown in Table D2.

Method One – Finch Assumption

Title of Paper: Speed, Speed Limits and Accidents
Authors: Finch DJ, Kornpfner P, Lockwood CR and Maycock G (1994)
Project Reference: TRL Project Report PR 58. Crowthorne: TRL Limited.

The work indicated that a reduction in speed limit, all else remaining unchanged, can be expected broadly to result in a reduction in mean speed of about a quarter of the difference between the two limits. Using this 'rule of thumb' a 2.5 miles/h reduction in mean speed would be expected to be achieved from a change in speed limit from 60 to 50 miles/h.

For example a 60mph speed limit applied at North Leek, was reduced to 40 mph after the implementation of the traffic safety measures. This equates to a 20 mph reduction in speed limit which according to the Finch assumption will reduce average speeds by 5mph. Therefore the 40.63 mph average speed exhibited pre opening will reduce to a 35.63 mph average speed post opening.

The results of the evaluation using the Finch assumption are shown in Table D2.

Method Two – Cheshire Speed Surveys

Cheshire County Council provided Atkins with some spot speed data obtained from surveys undertaken in the week beginning 01/03/04.

Cheshire provided data from three survey sites, two of which corresponded to two of the eleven survey sites used in the pre opening evaluation contained within the PAR. The two sites were namely Bosley and Poynton South 1. Hence the speed survey data from these two sites was used to factor the other sites to provide post opening speed data used in the economic evaluation (see section 5).

It should be noted that for the Cheshire calculation the Prestbury to Poynton section was discounted this was due to a large negative effect and that it had no predicted impact pre opening

Pre opening Scott Wilson predicted a journey time increase of approximately 74,000 additional hours a year. When this was recalculated for 2003 using 2003 AADTS this time increase decreased to 55,749 additional hours a year. This demonstrates that the factors

used in growing the AADTs in Scott Wilson's assessment were greater than the actual growth hence an overestimation of approximately 20,000 hours.

Post opening calculation using the Finch assumption added 45,211 additional hours a year onto the scheme length whilst post opening calculations using Cheshire spot speed surveys added 35,345 additional hours a year onto the scheme length.

In conclusion the scheme added less additional hours onto the route than was predicted pre opening. Hence the scheme has had less disbenefit than predicted.

Table D2 – Post Opening Increased Journey Times

| Road Section | Actual Speed Limit | Increased Length (miles) | Pre Opening Average Speed (mph) | Post Opening Speed Finch (mph) | Post Opening Speed Cheshire (mph) | AADT 2003 | Increase Time Scott Wilson | Increase Time Finch Assump. | Increase Time Cheshire | Annual Time Increase (hrs) 2003 AADT Scott Wilson's | Annual Time Increase (hrs) 2003 AADT Finch | Annual Time Increase (hrs) 2003 AADT Cheshire Speed Survey (10) |
|----------------------|--------------------|--------------------------|---------------------------------|--------------------------------|-----------------------------------|-----------|----------------------------|-----------------------------|------------------------|---|--|---|
| | | | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| North Leek | 40 | 0.15 | 40.63 | 36.63 | 39.65 | 13814 | 0.015 | 0.030 | 0.005 | 1254 | 2543 | 446 |
| Rushton Spencer | 40 | 0.05 | 50 | 45.00 | 39.65 | 3503 | 0.020 | 0.007 | 0.017 | 437 | 154 | 361 |
| Bosley | 40 | 1.5 | 47.533 | 42.53 | 42.55 | 9185 | 0.476 | 0.223 | 0.222 | 26608 | 12468 | 12422 |
| Fool Nook | 50 | 0.04 | 60 | 57.50 | 49.57 | 10651 | 0.010 | 0.002 | 0.008 | 657 | 109 | 525 |
| Macclesfield South | 40 | 0.62 | 44.13 | 41.63 | 39.65 | 14618 | 0.135 | 0.050 | 0.094 | 11998 | 4466 | 8394 |
| Macc. Re Rd | 30 | 0.02 | 40 | 37.50 | 29.74 | 13578 | 0.015 | 0.002 | 0.013 | 1212 | 200 | 1036 |
| Prestbury to Poynton | 50 | 2.88 | 41.73 | 39.20 | - | 19461 | 0.000 | 0.264 | - | 0 | 31280 | 0 |
| Poynton South 1 | 40 | 0.15 | 41.68 | 36.68 | 36.76 | 19461 | 0.021 | 0.030 | 0.029 | 2512 | 3537 | 3473 |
| Poynton South 2 | 30 | 0.06 | 38 | 35.50 | 29.74 | 19461 | 0.033 | 0.007 | 0.028 | 3949 | 834 | 3290 |
| Hazel Grove 1 | 40 | 0.63 | 44.47 | 42.00 | 39.65 | 26440 | 0.144 | 0.050 | 0.103 | 23219 | 8120 | 1491 |
| Hazel Grove 2 | 30 | 0.03 | 38 | 35.50 | 29.74 | 26440 | 0.018 | 0.004 | 0.015 | 2893 | 611 | 2410 |
| | | | | Total | | | | | | 74739 | 64322 | 33848 |

- (1) Scott Wilson's pre opening average speed.
- (2) Post Opening Speed using Finch Assumption.
- (3) Post Opening Speed using Cheshire Spot Speed Observations at Poynton South 1 and Bosley. Other speeds factored using proportion between Scott Wilsons observed and Poynton South 1 and Bosley.
- (4) 2003 AADT based on factoring 1996 actual observations by existing 2003 AADT at North Leek.
- (5) Time Increase using 2003 AADT and Scott Wilson.
- (6) Time Increase using 2003 AADT and Finch Assumption.
- (7) Time Increase using 2003 AADT and Cheshire Spot Speeds.
- (8) Annual Time increase in hours, pre opening/Scott Wilson's.
- (9) Annual time increase in hours, post opening/Finch Assumption.
- (10) Annual time increase in hours, post opening/Cheshire Spot Speed Surveys.

The main points to note from the traffic speeds section are:

- ◆ Post scheme opening the length of the 30/40/50 mph speed limit has approximately doubled when compared to pre scheme opening;
- ◆ Post scheme opening the length of the 60 mph speed limit (national speed limit) has approximately halved when compared to pre scheme opening;
- ◆ Post scheme opening the length of the 70 mph speed limit has remained unchanged when compared to pre scheme opening;
- ◆ Scott Wilson predicted a journey time increase, as a result of the new scheme, of 74,079 hours low growth and 74,805 hours high growth;
- ◆ Scott Wilson predictions were revised to an increase of 74379 additional hours with up to date post opening AADTs;
- ◆ Using the Finch Assumption it was calculated that an additional 64322 hours were added onto the route as a result of the scheme;
- ◆ Using actual Cheshire Speed Survey data it was calculated that an additional 33848 hours were added onto the route as a result of the scheme;
- ◆ Although the scheme added additional hours onto the network these were less than predicted;

Annex E - Original Scheme AST

Original Scheme AST

| | | | | | |
|---|--------------------------------|--|---|--|--|
| Proposal Name A523(T) Leek to Hazel Grove Traffic Safety Measures | | Option description Traffic Calming and Other Safety Measures along the A523 (T) corridor between Leek in Staffordshire and Hazel Grove in Stockport. | | Outturn Cost £1.800m Date: 2003 | |
| Problems | | Statement of problems: Over the last three years, there have been 305 recorded personal injury accidents along the A523 (T) between Leek and Hazel Grove, particularly at junctions. In many places the road has poor forward visibility and a substandard alignment with many sharp bends. Existing signage and road markings are inadequate and villages have little definition. | | | |
| Other Options | | List of other options that have been, or could be, tested. NONE | | | |
| OBJECTIVE | SUB-OBJECTIVE | QUALITATIVE IMPACTS | QUANTITATIVE MEASURE | ASSESSMENT | |
| ENVIRONMENT | Noise | Is there an impact? NO | Not Applicable | | |
| | Local Air Quality | Is there an impact? NO | Not Applicable | | |
| | Landscape | Is there an impact? NO | Not Applicable | | |
| | Biodiversity | Is there an impact? NO | Not Applicable | | |
| | Heritage | Is there an impact? NO | Not Applicable | | |
| | Water | Is there an impact? NO | Not Applicable | | |
| SAFETY | - | Is there an impact? YES | Outturn 18 personal injury accidents saved per annum | PVB: £18.27m/£22.25m | |
| ECONOMY | Journey times & Veh. Op. Costs | Is there an impact? YES | Journey Time Increase Low Growth: -74,079 hours/year High Growth: -74,805 hours/year | PVB: -£8.40m/-£-10.40m | |
| | Cost | Is there an impact? YES | | £0.62m | |
| | Journey Time Reliability | Is there an impact? NO | Not Applicable | | |
| | Regeneration | Is there an impact? NO | Not Applicable | | |
| ACCESSIBILITY | Pedestrians and Others | Is there an impact? YES | Slight Beneficial | | |
| | Access to public transport | Is there an impact? YES | Slight Beneficial | | |
| | Community Severance | Is there an impact? YES | Slight Beneficial | | |
| INTEGRATION | - | Is there an impact? YES | Slight Beneficial | | |
| Version of: 04 September | | Cost benefit analysis (low / high) | Low PVB £9.87m PVC £0.62m NPV £9.25m BCR 15.91 High PVB £11.85m PVC £0.62m NPV £11.23m BCR 19.11 | | |

All costs and benefits are in 1994 prices discounted to 1994 at 6%

Annex F - Atkins EST

Atkins EST

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| Proposal Name A523(T) Leek to Hazel Grove Traffic Safety Measures | | Option description Traffic Calming and Other Safety Measures along the A523 (T) corridor between Leek in Staffordshire and Hazel Grove in Stockport. | | Outturn Cost £1.800m Date: 2003 |
| Problems | | <i>Statement of problems:</i> Over the last three years, there have been 305 recorded personal injury accidents along the A523 (T) between Leek and Hazel Grove, particularly at junctions. In many places the road has poor forward visibility and a substandard alignment with many sharp bends. Existing signage and road markings are inadequate and villages have little definition. | | |
| Other Options | | <i>List of other options that have been, or could be, tested.</i> NONE | | |
| OBJECTIVE | SUB-OBJECTIVE | QUALITATIVE IMPACTS | QUANTITATIVE MEASURE | ASSESSMENT |
| ENVIRONMENT | Noise | <i>Is there an impact?</i> NO | Neutral/Beneficial | |
| | Local Air Quality | <i>Is there an impact?</i> NO | Beneficial | |
| | Landscape | <i>Is there an impact?</i> NO | Not Applicable | |
| | Biodiversity | <i>Is there an impact?</i> NO | Not Applicable | |
| | Heritage | <i>Is there an impact?</i> NO | Not Applicable | |
| | Water | <i>Is there an impact?</i> NO | Not Applicable | |
| SAFETY | - | <i>Is there an impact?</i> YES | 522 to 606 Accidents Saved | PVB: £15.39m/£18.74m |
| ECONOMY | Journey times & Veh. Op. Costs | <i>Is there an impact?</i> YES | Journey Time Increase of 74739 hours in opening year | PVB: -£8.05m/-£10.4m |
| | Cost | <i>Is there an impact?</i> YES | | PVC: £0.91m |
| | Journey Time Reliability | <i>Is there an impact?</i> NO | Not Applicable | |
| | Regeneration | <i>Is there an impact?</i> NO | Not Applicable | |
| ACCESSIBILITY | Pedestrians and Others | <i>Is there an impact?</i> YES | Slight Beneficial | |
| | Access to public transport | <i>Is there an impact?</i> YES | Not Assessed | |
| | Community Severance | <i>Is there an impact?</i> YES | Slight Beneficial | |
| INTEGRATION | - | <i>Is there an impact?</i> YES | Not Assessed | |
| Version of: 04 September | | Cost benefit analysis (low / high) | Low PVB £6.89m PVC £0.91m NPV £5.98m BCR 7.57 High PVB £8.34m PVC £0.91m NPV £7.43m BCR 9.16 | |

All costs and benefits are in 1994 prices discounted to 1994 at 6%