

Post Opening Project Evaluation

A66 TEMPLE SOWERBY BYPASS & IMPROVEMENTS AT WINDERWATH

One Year After Study



August 2009

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Contents

Section	Page
Glossary	5
Executive Summary	8
1. Introduction	11
Scheme Location	11
The Scheme	12
Objectives	12
Scheme History	13
The POPE Report	13
Structure of the Report	13
Sources	14
2. Traffic Impact	15
Data Sources	15
Traffic Volumes	16
Journey Times	21
3. Safety	26
Introduction	26
Data Sources	26
Personal Injury Accidents	26
Security	33
4. Economy	34
Introduction	34
Monetary Benefit	34
Time Benefit	35
Accident Benefit	35
Scheme Costs	35
5. Environmental Impacts	38
Introduction	38
Noise	38
Local Air Quality	38
Greenhouse Gases	38
Landscape and Townscape	39
Biodiversity	40
Heritage of Historic Resources	41
Water	41
Physical Fitness	42
Journey Ambience	42
6. Accessibility and Integration	44
Accessibility	44
Integration	47
7. Appraisal Summary Table	49

8. Conclusions 52

List of Tables

Table 2.1 – Traffic Volumes (AWT)	17
Table 2.2 – Predicted and Actual Volumes (2008 AADT)	21
Table 2.3 – Journey Time Comparisons Using A66 Bypass	22
Table 2.4 – Predicted and Actual Time Savings on A66 (Minutes)	23
Table 3.1 – Accidents and Casualties in the Study Area	29
Table 3.2 – Accidents and Casualties within the Limits of the Scheme.	30
Table 3.3 – Predicted and Observed Annual PIA Savings	30
Table 3.4 – Accident Rates	31
Table 3.5 – National Average Accident Rates	31
Table 3.6 – Severity of Accidents	32
Table 3.7 – Before and After Accident Categories	32
Table 4.1 – Time Saving and Monetary Benefit	35
Table 4.2 – Accident Saving and Monetary Benefit	35
Table 4.3 – Predicted and Actual Costs (£ million)	36
Table 4.4 - Scheme Costs and Benefits (2002 Base)	36
Table 4.5 – Route Stress	37
Table 5.1 – Tonnes of Carbon Emitted in 2008	39
Table 7.1 – Appraisal Summary Table	50
Table 8.1 – Fulfilment of Scheme Objectives	53
Table A.1 – Traffic Volumes (AWT)	54
Table B.1 – Journey Times Via Bypass(min)	55
Table B.2 – Journey Times Via Temple Sowerby (min)	55
Table C.1 – Standard List of Information Requested and Received	56
Table C.2 – Summary of Environmental Consultation Responses	57
Table C.3 – Forecast and observed traffic flows for the A66	60
Table C.4 – Tonnes of Carbon Emitted in 2008	62

List of Figures

Figure 1.1 – Location of A66 Temple Sowerby Bypass	11
Figure 1.2 - Layout of A66 Temple Sowerby Bypass	12
Figure 2.1 – Count Sites near Temple Sowerby	15
Figure 2.2 – Count Sites in the Wider Area	16
Figure 2.3 – Before and After Traffic Volumes (AWT)	18
Figure 2.4 – Before-and-After Traffic Volumes (AWT) in the Wider Area	19
Figure 2.5 – Turning Movements (12-hour)	20
Figure 2.6 – Journey Time Route	22
Figure 3.1 – Accident Study Area	27
Figure 3.2 – Locations of Accidents over Five Years Before Scheme Construction	28
Figure 3.3 – Locations of Accidents over One Year After Scheme Opening	28
Figure 3.4 – Lay-by Included in the Scheme	33
Figure 6.1 – Treatment of the Old A66	44
Figure 6.2 – Pedestrian Underpass for Diverted Field Paths	46
Figure 6.3 – Effect of the Scheme on Paths, Tracks, and Bridleways	46

Figure C.1 – Noise barrier above the PROW underpass visible in distance	60
Figure C.2 – Steep slopes with extensive land drains and wildflower seeding at Cliburn Road junction	64
Figure C.3 – Planting establishing well adjacent to eastbound cycle track	65
Figure C.4 – Failed feathered oak along the westbound cycle track (ch3825 – ch4480)	65
Figure C.5 – Well established marginal vegetation and wildflowers at balancing pond adjacent to Cliburn Road link road	66
Figure C.6 – Earth bund and mitigation planting adjacent to Illings View screen road but reduce views of wider landscape	66
Figure C.7 – The new bridge crossing the River Eden is constructed from steel and concrete with a metal balustrade. The view from the PROW along the riverbank has been adversely affected	67
Figure C.8 – Mammal crossing near Cliburn Road junction	69
Figure C.9 – Drain north of Ash Hill Farm	73
Figure C.10 – Green bridge carrying the bridleway over the bypass	75
Figure C.11 – Existing A66 showing de-trunking measures	75

Glossary

The following table details the acronyms and specialist terms used within the context of this report

Term	Definition
AADT	Annual Average Daily Traffic. Average of 24 hour flows, seven days a week, for all days within the year.
AAWT	Annual Average Weekday Traffic. As AADT but for five days, (Monday to Friday) only.
Accessibility	Accessibility can be defined as 'ease of reaching'. The accessibility objective is concerned with increasing the ability with which people in different locations, and with differing availability of transport, can reach different types of facility.
AM	denoting the morning peak period
AGLV	Area of Great Landscape Value
AST	Appraisal Summary Table. This records the impacts of the scheme according to the Government's five key objects for transport, as defined in DfT guidance contained on its Transport Analysis Guidance web pages, WebTAG
ATC	Automatic Traffic Count, a machine which measures traffic flow at a point in the road.
AWT	Average Weekday Traffic. Average of Monday to Friday 24 hour flows.
BCR	Benefit Cost Ratio. The ratio between the monetised benefits and costs of a scheme, used as a measure of value for money in economic terms
COBA	COst Benefit Analysis – a computer program which compares the costs of providing road schemes with the benefits derived by road users (in terms of time, vehicle operating costs and accidents), and expresses the results in terms of a monetary valuation. The COBA model uses the fixed trip matrix.
DfT	Department for Transport
Discounting	Discounting is a technique used to compare costs and benefits that occur in different time periods and is the process of adjusting future cash flows to their present values to reflect the time value of money, e.g. £1 worth of benefits now is worth more than £1 in the future. A standard base year needs to be used which is 2002 for the appraisal used in this report.
EST	Evaluation Summary Table. In POPE studies, this is a summary of the evaluations of the TAG objectives using a similar format to the forecasts in the AST.
HATRIS	Highways Agency Traffic Information System

HEMP	Handover Environmental Management Plan
HGV	Heavy Goods Vehicle.
Highways Agency	An Executive Agency of the Department for Transport, responsible for operating, maintaining and improving the strategic road network in England.
IP	Inter Peak, the time between the AM and PM peaks
Light vehicle	Not a HGV. For traffic flow data, it is a vehicle less than 5.2m in length.
MAC	Managing Agent Contractor. A company appointed by the Highways Agency to maintain trunk roads in a defined area.
NATA	New Approach to Transport Appraisal. Used since 1998.
NMU	Non-Motorised User. Pedestrians, cyclists and equestrians.
NRTF	National Road Traffic Forecast. This document defines the latest forecasts produced by the Department of the Environment, Transport and the Regions of the growth in the volume of motor traffic. The most recent one is NRTF97 and the one previous was NRTF89.
PIA	Personal Injury Accident. A road traffic accident in which at least one person required medical treatment.
PIA/mvkm	PIA/mvkm is the number of PIAs per million vehicle kilometres where 'vehicle kilometres' are the number of vehicles using a section of the road multiplied by the length of the road.
PM	Evening peak period
POPE	Post Opening Project Evaluation, before & after monitoring of all major highway schemes in England.
PROW	Public Right of Way
Route Stress	This is used as a proxy for journey time reliability. It is described as the stress level of a road and is calculated as the ratio of flow to capacity: AADT / CRF.
Rule of Half	A technique for calculating time benefit where a scheme results in extra traffic, in which benefits of the additional travel are worth half the saving per trip for existing travellers.
Screenline	An imaginary line drawn across a transport corridor used to determine flows between areas on either side. Each road crossed by the screenline is monitored by a traffic count (ATC).
Seasonality	Seasonality is the variation in traffic behaviour across the year due to varying daylight levels, weather conditions, school holidays, etc.
Severance	Community severance is the separation of adjacent areas by road or heavy traffic, causing negative impact on non-motorised users,

	particularly pedestrians.
SSSI	Site of Special Scientific Interest. Designated for biological or geological importance.
STATS19	A database of injury accident statistics recorded by police officers attending accidents
TPI	Targeted Programme of Improvements. The Highways Agency's programme of investment in improvements to the Trunk road and Motorway road network, comprising schemes each costing more than £5m. Now known as Major Schemes Programme.
Vehicle hours	Vehicle hours refers to the total time spent by all vehicles using a road and is expressed normally as a yearly value. For example, if 10,000 vehicles a day used a route with a 6 minute journey time, then the route's vehicle hours for the year would be 365,000.
vpd	Vehicles Per Day
webTAG	Department for Transport's website for guidance on the conduct of transport studies at http://www.webtag.org.uk/

Executive Summary

Scheme Title	A66 Temple Sowerby Bypass and Improvements at Winderwath
Opening Date	October 2007
POPE Stage	One Year After

Scheme Description

A66 Temple Sowerby Bypass and Improvements at Winderwath officially opened on 18 October 2007. Key components of the scheme included construction of:

- A three mile new dual carriageway, bypassing the village of Temple Sowerby.
- Link roads connecting the bypass to the local road network by means of bridges at each end of the scheme.
- A new bridge carrying the bypass over River Eden.
- An overbridge for public bridleway and underpasses for diverted public footpath and farm track.

After bypass opening, the old A66 was transferred to local authority control, and the speed limit reduced from 40 mph to 30 mph.

Objectives (1998 Roads Review)	Objective Achieved?
• Provide dual carriageway bypass to cater for predicted future traffic growth.	Yes
• Remove through traffic from the village.	Yes
• Reduce noise in village.	Yes
• Reduce severance in village.	Yes
• Enhance safety for all road users including pedestrians.	Too early to conclude

Key Findings

- The objectives of the A66 Temple Sowerby Bypass to cater for future traffic growth, remove traffic from the village and to reduce noise and severance have been achieved, but it is too early to assess the impacts on safety with any statistical confidence.
- In the study area used for the appraisal there has been a slight accident saving, but it is less than predicted.
- Post opening flows match predictions well for the new and old A66, but are less accurate for minor side roads (although in absolute numbers differences are low). The differences are likely to be due to subtle inaccuracies in modelling local turning movements at the appraisal stage.
- Journey time savings using the bypass are as predicted. Journey times on the old A66 are similar to before.
- Post opening flows match predictions well for the new and old A66, but are less accurate for minor side roads (although in absolute numbers differences are low). The differences are likely to be due to subtle inaccuracies in modelling local turning movements at the appraisal stage.

- Journey time savings using the bypass are as predicted. Journey times on the old A66 are similar to before.
- Travel time benefits are higher than predicted, but accident savings are lower than predicted, leading to a BCR exactly the same as predicted; Actual scheme cost is only very marginally higher than predicted,
- Environmental impacts are generally as expected with most of the mitigation measures establishing well.
- The landscape elements of the 'green bridge' (planted verges) require additional maintenance.
- There are benefits to pedestrians and cyclists in the village with reduced severance.
- The scheme conforms to and supports regional, county and district transport policies.

Summary of Scheme Impacts

Traffic

- The average weekday traffic volume on the bypass is about 15,900 vpd.
- The flow remaining on the old A6 is approximately 900 vpd, representing a fall of about 94% compared with before the bypass was built.
- The flows on the new A66 and bypassed section are within 10% of predictions;
- There are greater percentage differences on the four link roads, although the absolute values are small. The differences are likely to be due to difficulties in modelling local turning movements.
- The combined flow on the new and old A66 is now 9% greater than the flow previously on the old road. This is above background growth for the area. This is probably due to local reassignment from minor roads not covered by traffic surveys, together with traffic generated by new developments in Penrith. There appears to have been no significant reassignment of traffic to the A66 from the A685, which is an alternative route to the M6 motorway.
- Journey time savings of about 2 to 3 minutes are experienced by through traffic using the bypass, closely in accordance with predictions. Journey time savings on the old A66 are similar to before.

Safety

- In the five years before scheme construction there was an average of 4.8 accidents per year.
- There were 4 accidents during the one year after scheme opening, giving a reduction of 0.8 accidents per year. This is less than the predicted savings of 2.5 accidents in the first year. *[Note that the prediction was based on default national values due to the introduction of traffic calming in Temple Sowerby shortly before the scheme forecasting was carried out, which was believed to have invalidated the use of local historical accident data obtained before that time.]*
- There were no personal injury accidents on either the new section of the A66 or the old road which was bypassed. Pre-scheme there were an average of 4.6 a year.
- The accident rate has fallen from 0.127 PIA/mvkm before to 0.105 PIA/mvkm after.
- The changes in accident numbers are too small at this one year after stage to be able to evaluate the statistical significance of the change, and hence at this stage we cannot confidently state that the data provides a reliable indication of the improvement to safety in the long term.

Environment

- As traffic flows on the bypass are broadly in line with those in the ES forecasts, it is likely that local noise and air quality impacts are as expected, including a substantial beneficial improvement in the village centre due to the significant reduction in traffic on the old A66.
- Increase of 10% in carbon emissions in the first year. This is in good agreement with the forecast of 9.5%;
- Impacts on the other environmental objectives are generally as expected and mitigation measures have been implemented as planned.
- At the time of the site visit it appeared that the landscape elements of the ‘green bridge’ required additional maintenance and attention.
- Further targeting of aerial photography anomalies and permanent monitoring of the topsoil strip would have been preferred by the County Archaeologist.

Accessibility

- Severance in the village has reduced due to the transfer of traffic to the bypass. There has been a benefit to non-motorised users, particularly as traffic calming has been implemented in the village.
- Access to the transport system has been unaffected, with bus services continuing to run through the village, and no change to the timetable.

Integration

- As expected, the scheme had had no impact on transport interchange
- The scheme was integrated with and contributes to the land-use policies at the Regional, County, and District levels contained in: Regional Spatial Strategy (RSS) for the North West (2003), the Cumbria Structure Plan (1995), Cumbria and Lake District Structure Plan (2006) and The Eden Local Plan (1996).

Summary of Economic Performance

	Costs in £m 2002 Prices discounted to 2002 at 3.5%	
	Pre-opening Forecast	Post-scheme re-forecast
Journey Time Benefit	£47.6m	£64.8m
Safety Benefits	£20.3m	£6.5m
Total 60 Year Benefits (PVB)	£67.8m	£71.3m
Costs (2002) prices	£27.3m	£28.3m
Benefit Cost Ratio (BCR)	2.5	2.5

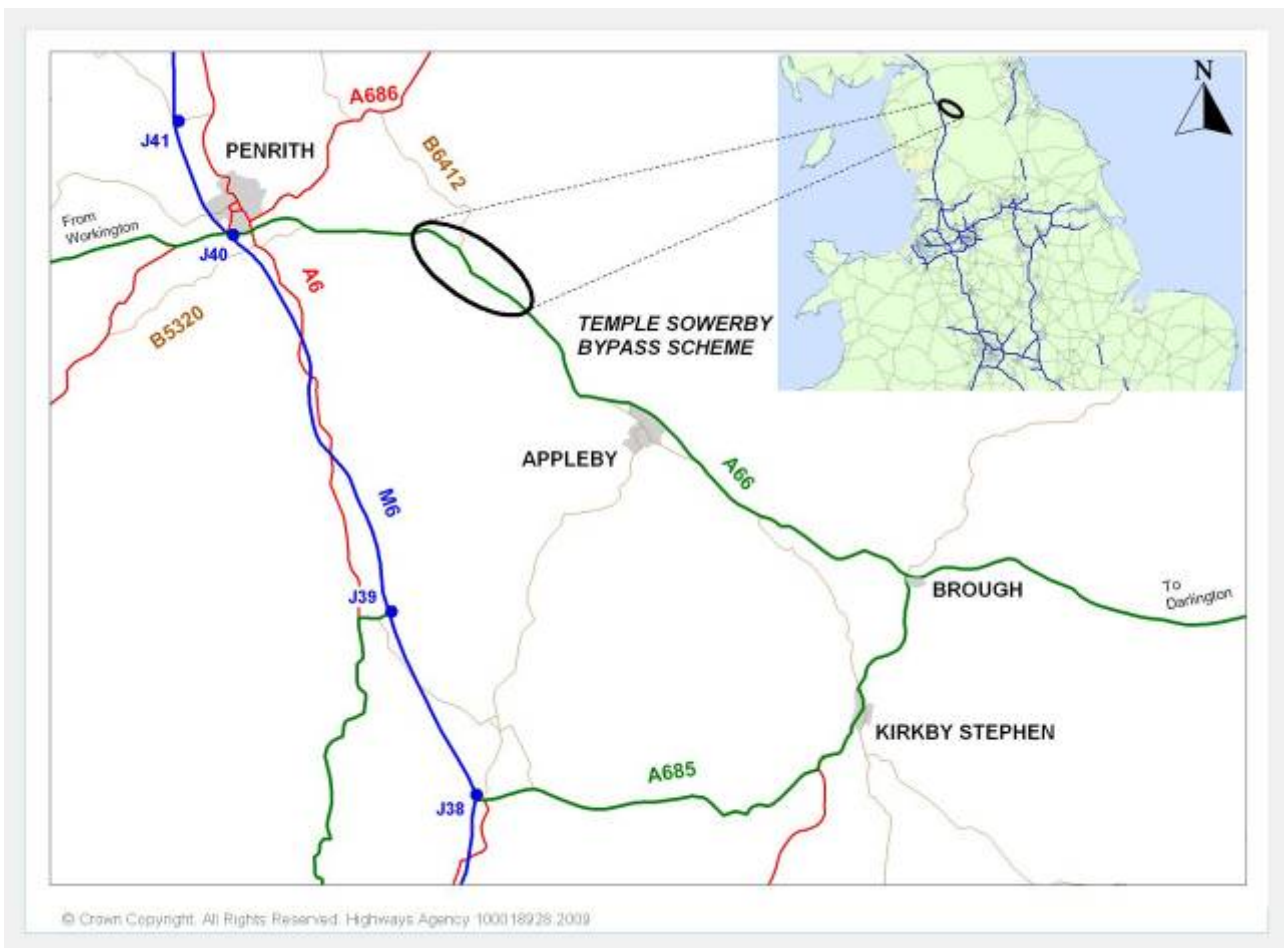
- Journey time benefits are 36% more than predicted. This is attributed to a larger than expected increase in local traffic, and a greater than predicted inter-peak time saving.
- Accident benefits at £6.5m are considerably lower than the forecast.
- The higher total benefits and slightly higher costs result in the BCR being exactly the same as expected at 2.5, representing good value for money.

1. Introduction

Scheme Location

- 1.1 The A66 Temple Sowerby Bypass and Improvement at Winderwath¹ officially opened on 18 October 2007, providing 4.9 km (3 miles) of dual carriageway bypassing the village of Temple Sowerby and Winderwath Farm in Cumbria. The location of the scheme and its context in the road network is shown in Figure 1.1.

Figure 1.1 – Location of A66 Temple Sowerby Bypass



- 1.2 The A66 is an east-west route, running between Middlesborough in Teesside and Workington on the Cumbria coast. It is partly single and partly dual-carriageway. Between Brough and Penrith, it is largely single-carriageway, apart from the existing Appleby bypass, and the new Temple Sowerby bypass. The A66 is one of the few major roads crossing the Pennines in northern England and links two important north-south routes; the A1 in the east and the M6 in the west.
- 1.3 The scheme falls entirely within the District of Eden and the County of Cumbria. It is covered by Highways Agency Area 13, and the Managing Agent Contractor is Amey Mouchel.

¹ In the remainder of this report the name of the scheme will be abbreviated to 'A66 Temple Sowerby Bypass'

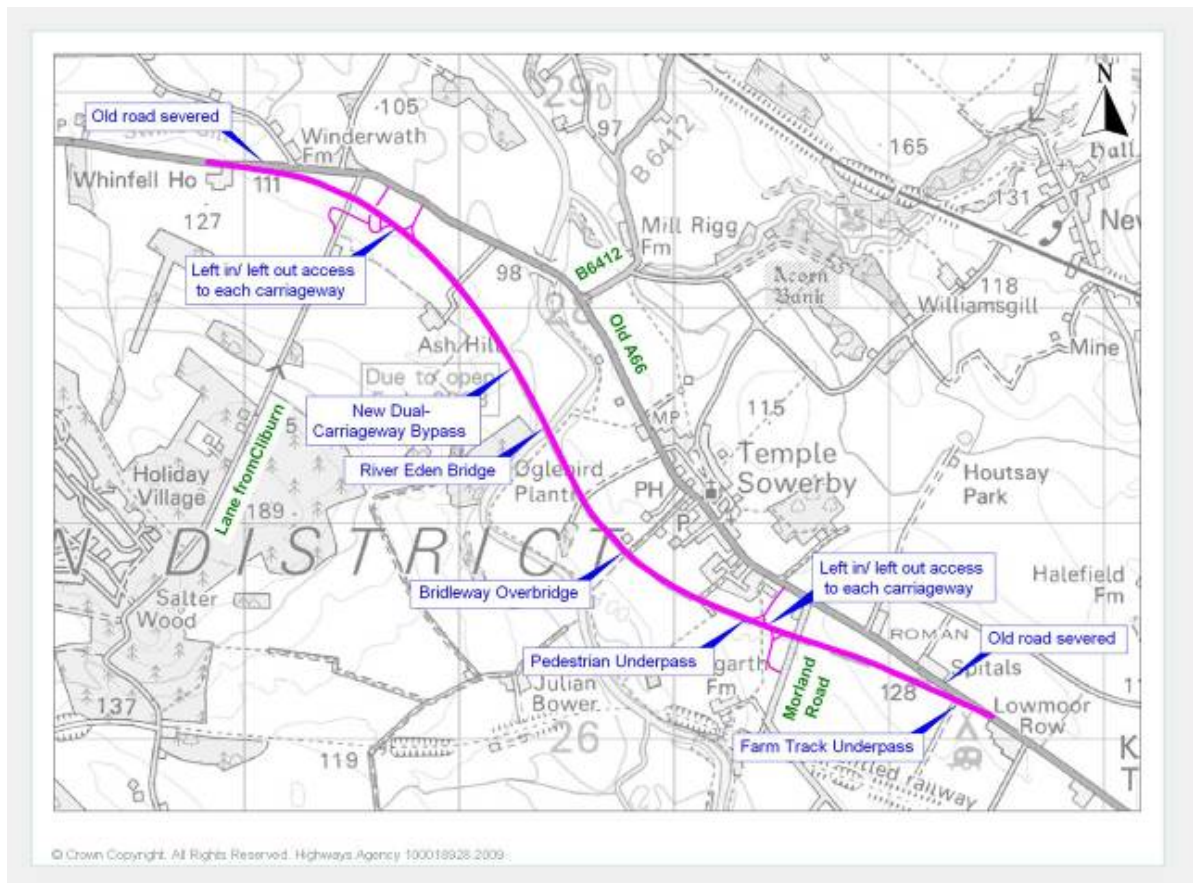
The Scheme

1.4 The scheme consisted of:

- A new dual carriageway passing south of Temple Sowerby and the former A66, including a bridge over the River Eden;
- Two grade separated, left on left off, connections with the existing network (one to the east and one to the west);
- An overbridge carrying a public bridleway southwest from the village;
- A pedestrian underpass west of Moreland Road; and
- An underpass for a private farm track at Spitals.

1.5 The scheme layout is shown in Figure 1.2.

Figure 1.2 - Layout of A66 Temple Sowerby Bypass



Objectives

1.6 The scheme objectives as given in the Roads Review 1998 were to:

- **Provide a dual carriageway bypass to cater for future predicted traffic growth;**
- **Remove through traffic from the village;**
- **Reduce noise;**
- **Reduce severance; and**
- **Enhance safety for all road users including pedestrians.**

Scheme History

- 1.7 A scheme was proposed in 1974, and later withdrawn for budgetary reasons. In response to safety concerns and local lobbying the scheme was reintroduced into the Roads Programme in 1985. Public consultation in June 1993 was followed by a preferred route announcement in September 1994. The scheme entered the Major Schemes Programme (then known as the Targeted Programme of Improvements) in April 2002. A Public Inquiry took place in February 2003, with the Decision being announced in July 2003. Construction started in February 2006, under Early Contractor Involvement (ECI), and the route was opened to traffic in October 2007.

The POPE Report

- 1.8 The Highways Agency is committed to carrying out post-opening evaluations of its Major Schemes, to identify how far the predicted objectives and benefits have been achieved. This report represents the One-Year After report for the A66 Temple Sowerby Bypass, and is prepared under the Post-Opening Project Evaluation (POPE) Commission. The report builds on an earlier Traffic Impact Study, dated June 2008.

- 1.9 This report sets out a number of evaluations:

- 'Before' and 'After' traffic volumes on the A66 and adjacent roads, and a comparison with predictions;
- A comparison of 'Before' and 'After' journey times;
- An analysis of changes in accidents;
- The outturn economic benefits, based on the changes in traffic volumes, journey times, and accidents;
- A comparison of the outturn cost with the budgeted cost;
- A comparison of the environmental impacts with those predicted; and
- A review of the original Appraisal Summary Table (AST) in the form of a new Evaluation Summary Table (EST).

Structure of the Report

- 1.10 The remainder of this report is structured as follows:

- **Section 2** discusses the traffic flows, journey times, and comparisons with forecasts;
- **Section 3** considers safety;
- **Section 4** derives updated economic benefits based on vehicle-time and accident savings and compares these with forecasts;
- **Section 5** gives a summary of the environmental evaluation;
- **Section 6** considers accessibility and integration; presents the original Appraisal Summary Table (AST), and then re-evaluates the outcomes with an Evaluation Summary Table (EST);
- **Section 7** summarises the main conclusions of the report;

Sources

1.11 The following sources were used in compiling this report:

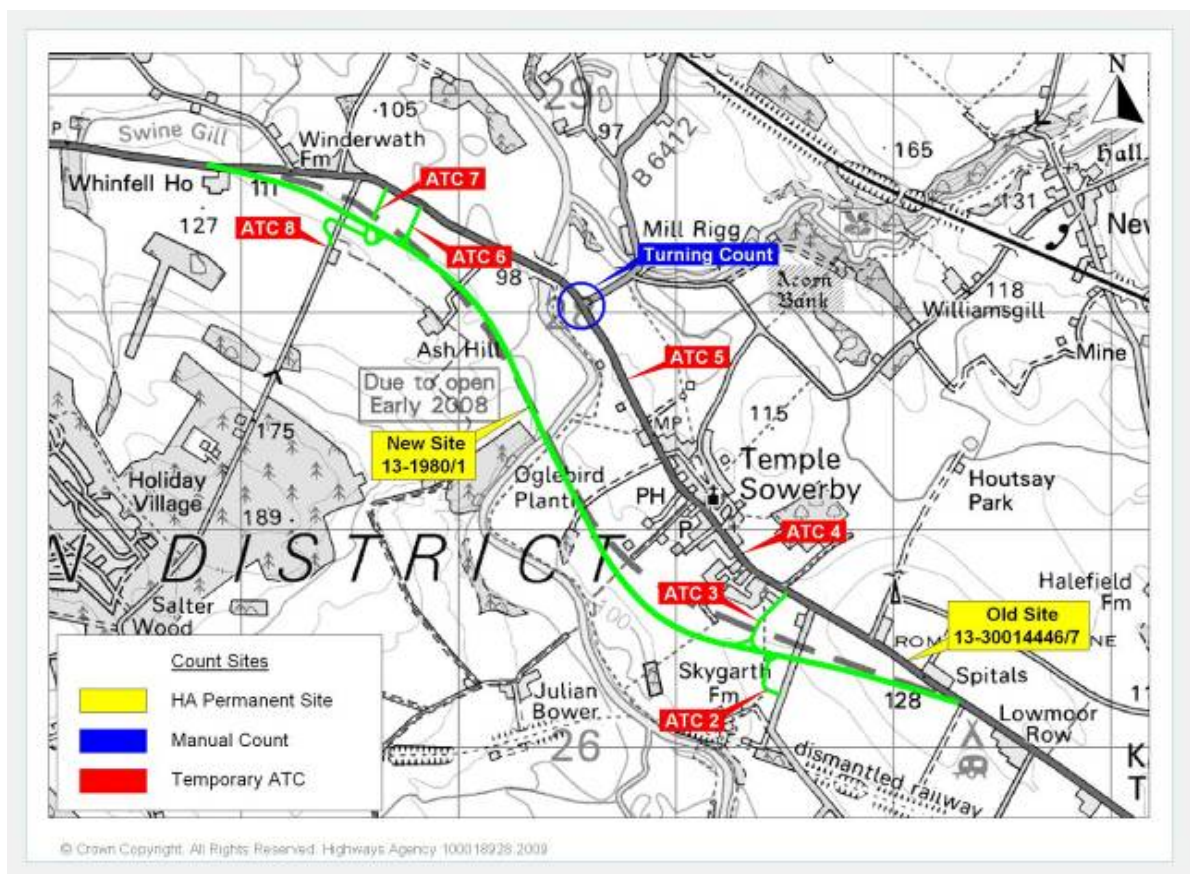
- Highways Agency traffic data held on the TRADS database for motorways and trunk roads in England;
- Cumbria County Council traffic count and accident data;
- Traffic surveys commissioned specifically for this study;
- Traffic Survey and Data Report, January 2001;
- Local Model Validation and Forecasting Report, September 2001;
- Economic Assessment Report, April 2002;
- COBA Files, March 2002;
- The Environmental Statement, June 2002;
- Appraisal Summary Table, August 2005
- Statutory environmental consultees (Natural England, English Heritage and the Environment Agency); and
- Site visits by Atkins transport planners and environmental specialists.

2. Traffic Impact

Data Sources

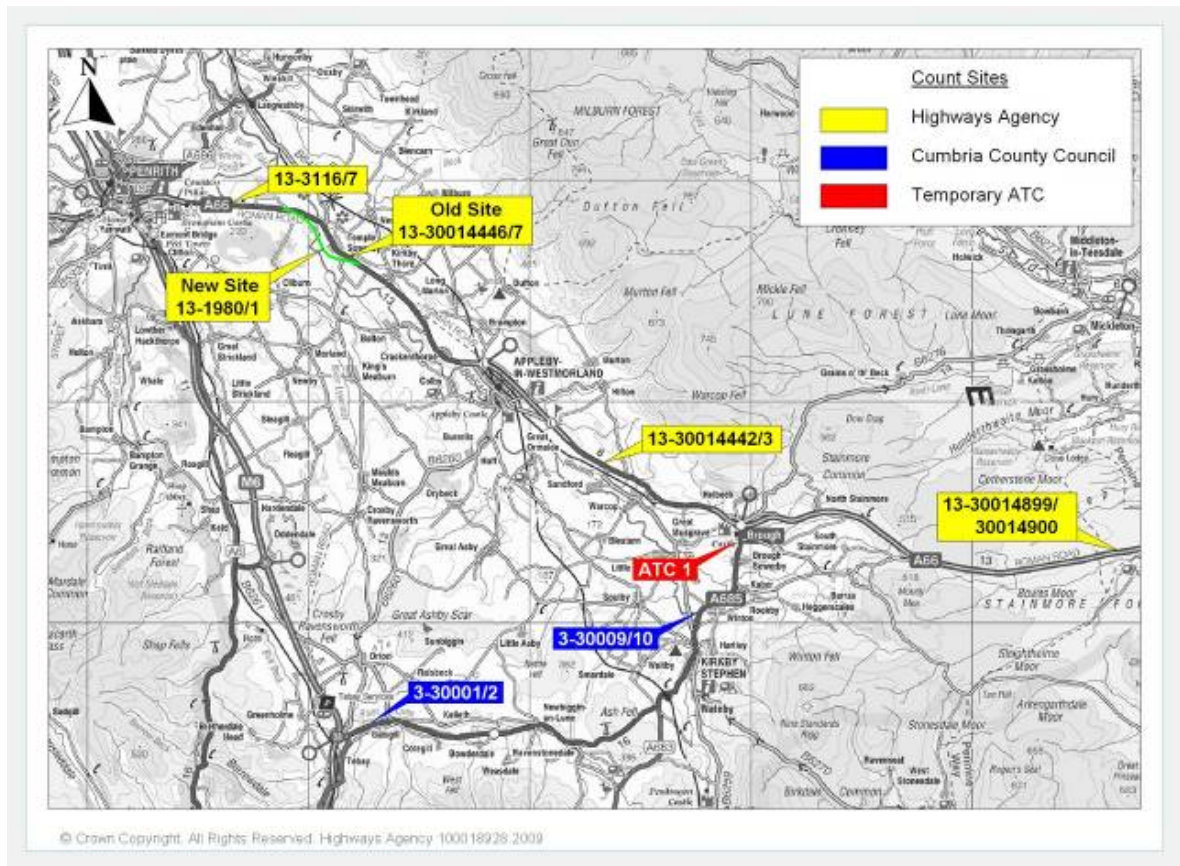
- 2.1 Traffic counts have been obtained for before the scheme was constructed, immediately after opening and One Year After opening. Data sources were the Highways Agency HATRIS database, the Cumbria County Council TRADS database and temporary counts commissioned for the purpose of this study. In addition to volume counts, turning counts were undertaken at the junction of the B6412 with the A66 northwest of Temple Sowerby.
- 2.2 The locations of count sites around Temple Sowerby are shown in Figure 2.1.

Figure 2.1 – Count Sites near Temple Sowerby



- 2.3 As well as counts undertaken in the vicinity of Temple Sowerby, counts were also obtained for the wider network; including the A66 east of Penrith, the A66 east of Appleby, and the A685 south of Brough. The locations of these counts are shown in Figure 2.2.

Figure 2.2 – Count Sites in the Wider Area



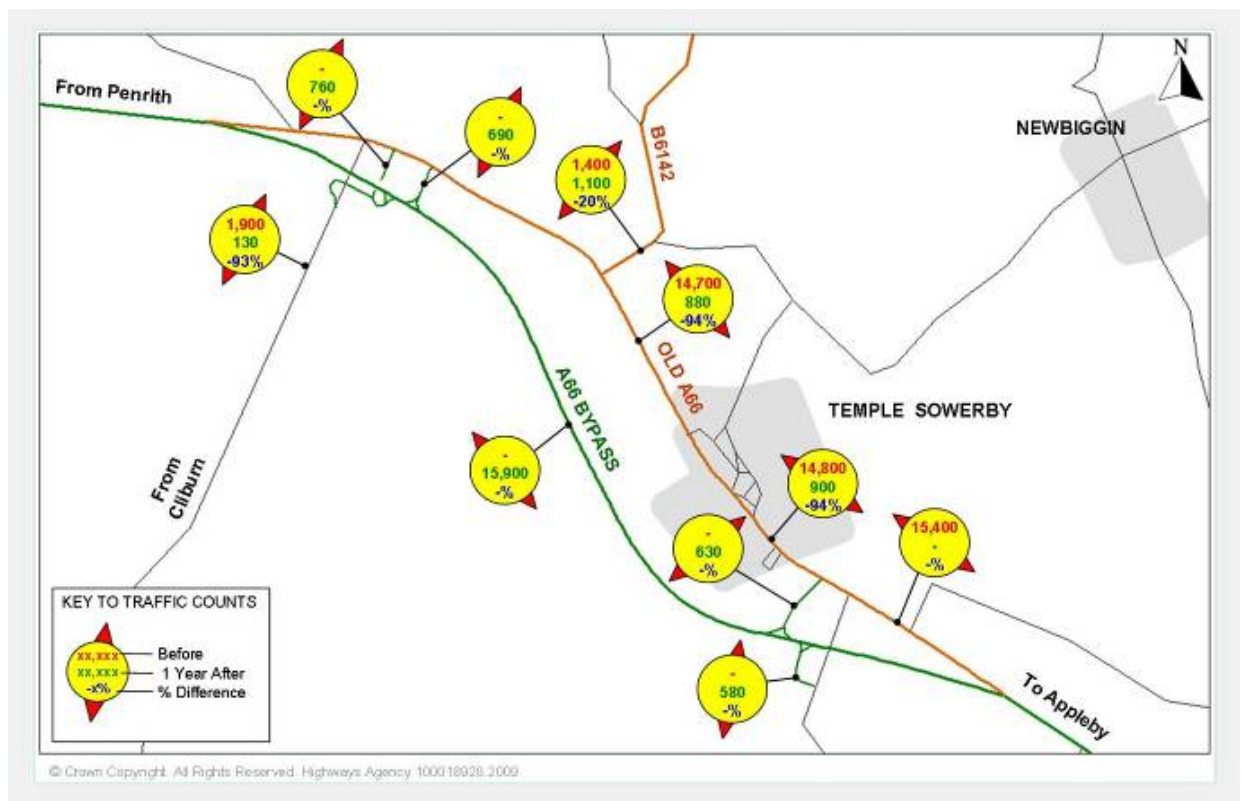
Traffic Volumes

- 2.4 The average weekday traffic volumes (AWT) are shown in Table 2.1 and Figure 2.3. The counts are shown without adjustment for seasonal or long term background variation. Seasonal correction is not considered necessary as examination of long-term counts shows that traffic volumes on the A66 are virtually identical in March and October. Background growth will be taken into account when comparing actual counts with predictions, and in calculating vehicle-time changes for economic evaluation.

Table 2.1 – Traffic Volumes (AWT)

Count Location	Reference	Before		Immediately After		One Year After	
		Date	24hr AWT	Date	24hr AWT	Date	24hr AWT
A66 E of Penrith	HA 13 – 3116/7	Oct 05	15,700	Oct 07	18,200	Oct 08	17,000
A66 E of Temple Sowerby	HA 13 – 30014446/7	Oct 05	15,400	-	-		-
A66 Temple Sowerby Bypass	HA 13- 1980/1	-	-	Oct 07	13,300	Oct 08	15,900
A66 E of Appleby	HA 13 – 30014442/3	Oct 05	13,500	Oct 07	14,800	Oct 08	13,800
A66 W of Bowes	HA 14 – 30014899/4900	Oct 05	16,200	Oct 07	17,200	Oct 08	16,500
A685 E of Tebay	CCC 3 – 30001/2	Mar 06	5,400	Oct 07	6,100	Oct 08	5,500
A685 N of Kirkby Stephen	CCC 3 – 30009/10	Oct 05	7,200	Oct 07	7,000	Oct 08	7,100
A685 S of Brough	ATC 1	Mar 06	5,900	Oct 07	5,800	Oct 08	6,000
Bypass WB Link, E of village	ATC 2	-		Oct 07	550	Oct 08	590
Bypass EB Link, E of village	ATC 3	-		Oct 07	600	Oct 08	630
A66 E of Chapel Street	ATC 4	Mar 06	14,800	Oct 07	1,300	Oct 08	910
A66 E of B6412	ATC 5	Mar 06	14,700	Oct 07	1,200	Oct 08	880
Bypass WB Link, W of village	ATC 6	-		Oct 07	640	Oct 08	690
Bypass EB Link, W of village	ATC 7	-		Oct 07	730	Oct 08	760
Lane to Cliburn, S of A66	ATC 8	Mar 06	1,900	Oct 07	160	Oct 08	130

Figure 2.3 – Before and After Traffic Volumes (AWT)



2.5 The key points regarding traffic volumes are:

- The average weekday flow on the old A66, before the bypass, was about 15,000 vehicles per day (vpd) – which was predominantly through traffic;
- The flow on the new A66 bypass is 15,900 vpd - the combined flow on the new and old roads is now 9% higher than previously using the old road alone;
- The old A66 through Temple Sowerby after the bypass now carries about 900 vpd, a reduction of 94% -the remaining vehicles will be local traffic only, through traffic having diverted to the bypass;
- Flows on the four one-way link roads connecting the old A66 with the bypass range from 580 – 760 vpd;
- A 93% reduction has been recorded on the lane to Cliburn from the A66, but this is unrelated to the bypass construction -at the time of the before count, this lane was used as the access to Whinfell Forest Holiday Village from the A66. The entrance has now however moved approximately 2 km further west and the lane is now used by traffic mainly accessing Cliburn village; and
- A 20% reduction is recorded on the B6412, joining the old A66 northwest of Temple Sowerby - this may also be related to the changed access arrangements to the holiday village, with traffic from the north finding it more convenient to use the A686 (joining the A66 further west) instead of the B6412.

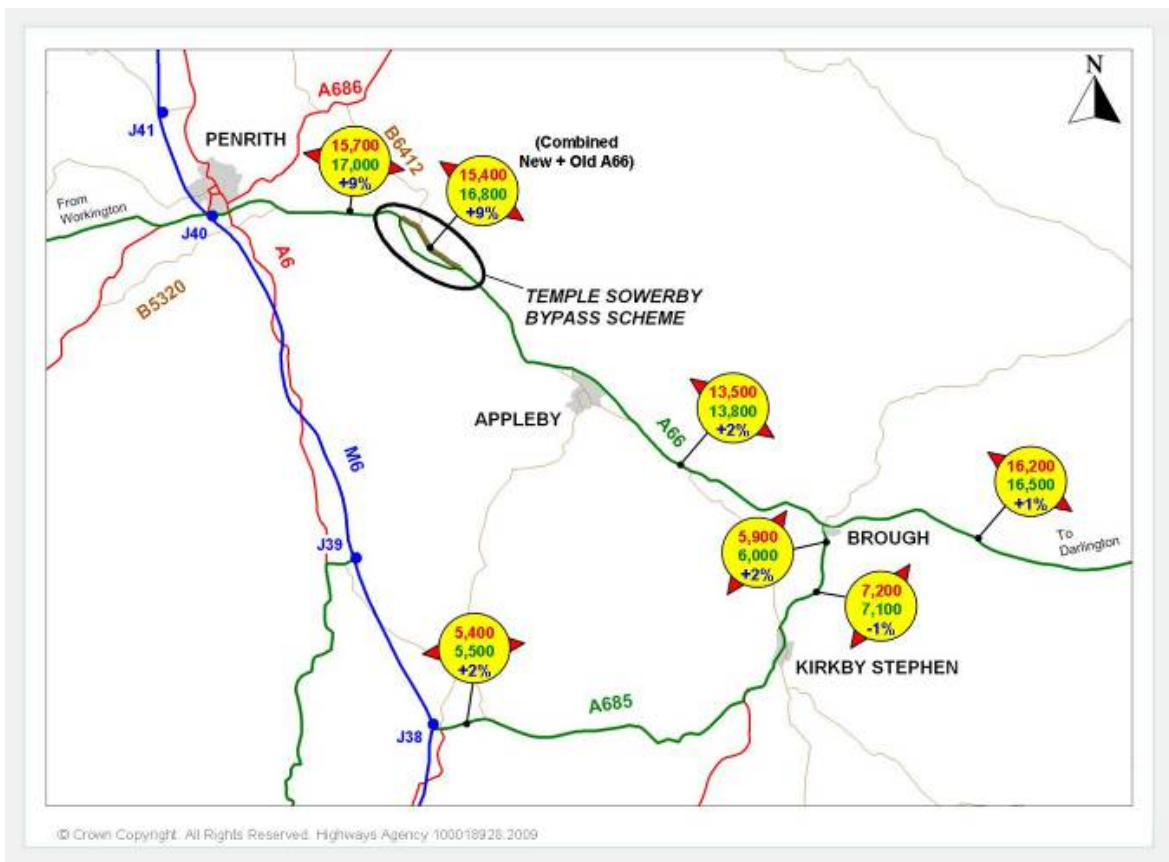
2.6 DfT statistics show that between 2005 and 2008 the growth of vehicle-kilometres travelled in Cumbria was 3.2%, compared with 3.5% in England as a whole¹. Thus the

¹ This is based on DfT Road Traffic Statistics for Local Authorities 1993-2007, with extrapolated values for 2008.

growth in traffic in the A66 corridor at Temple Sowerby has been considerably greater than would be expected from normal background growth.

- 2.7 Before and after flows at more distant sites on the A66, as well as the A685, are shown in Figure 2.4. In general, increases over this period have been no more than 2%. Furthermore, Table 2.1 shows that at some sites, traffic levels were higher immediately after scheme opening than they were a year later.
- 2.8 There appears to have been no significant reassignment of traffic to the A66 from the A685, which is an alternative route to the M6 motorway. The higher than average growth around Temple Sowerby is probably due to local reassignment from minor roads not covered by traffic surveys, together with traffic generated by new developments in Penrith.

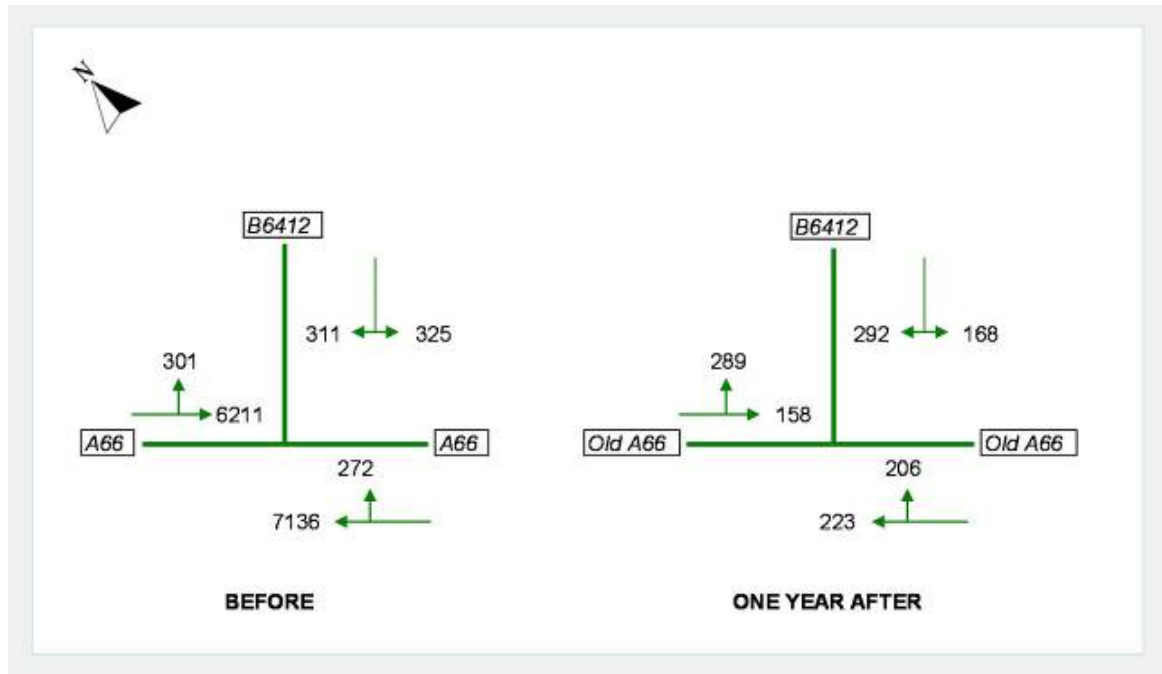
Figure 2.4 – Before-and-After Traffic Volumes (AWT) in the Wider Area



Turning Counts

- 2.9 Manual 12-hour turning counts were undertaken at the B6412 junction before the scheme was built (Friday 17th March 2006), and after (Thursday 5th March 2009). The 12-hour total turning movements are summarised in Figure 2.5.

Figure 2.5 – Turning Movements (12-hour)



- 2.10 The largest change is obviously the reduction in through traffic using the old A66. More traffic from the B6412 now turns right (west) than turns left, and more traffic enters the B6412 from the west than from the east. The signing strategy directs traffic between the A66 bypass and the B6412, via the Cliburn Road junction, to the west of Temple Sowerby, rather than through the village itself. The results suggest that only a minority of vehicles using the junction are travelling to or from the village.

Heavy Vehicles

- 2.11 Information on heavy vehicles flows is available from two sources.
- Automatic counts, in which classification is based on vehicle length; and.
 - Manual counts, with vehicle type being categorised visually.
- 2.12 The HA's permanent monitoring site on the old A66, before the scheme, counted an average weekday volume of 5,400 heavy vehicles over 24 hours, representing 34% of the total flow. This was based on a vehicle length of 5.2 metres.
- 2.13 One year after opening, the average weekday heavy vehicle flow on the bypass was 4,800 over 24 hours, representing 30% of the total vehicle flow, based on the same vehicle length. This method does not measure the after flow on the old A66 directly. It does however indicate that almost five thousand heavy vehicles per day that would have travelled through the village are now on the bypass.
- 2.14 East of B6412, the manual survey in the before period counted 2,600 heavy vehicles (19% of total flow) over 12 hours on the old A66. One year after only 26 heavy vehicles (3% of total flow) were recorded. The bypass has therefore resulted in 99% of heavy vehicles transferring away from the village to the bypass.

Volume Comparison with Predictions

- 2.15 Predicted and actual flows on links around Temple Sowerby are shown in Table 2.2. The figures are 2008 AADTs. The predicted flows are the central case from the COBA high and low growth scenarios, adjusted to 2008 using factors from COBA. The 'actual do-minimum' represents the before traffic flows factored to 2008 levels, based on observed regional growth.

Table 2.2 – Predicted and Actual Volumes (2008 AADT)

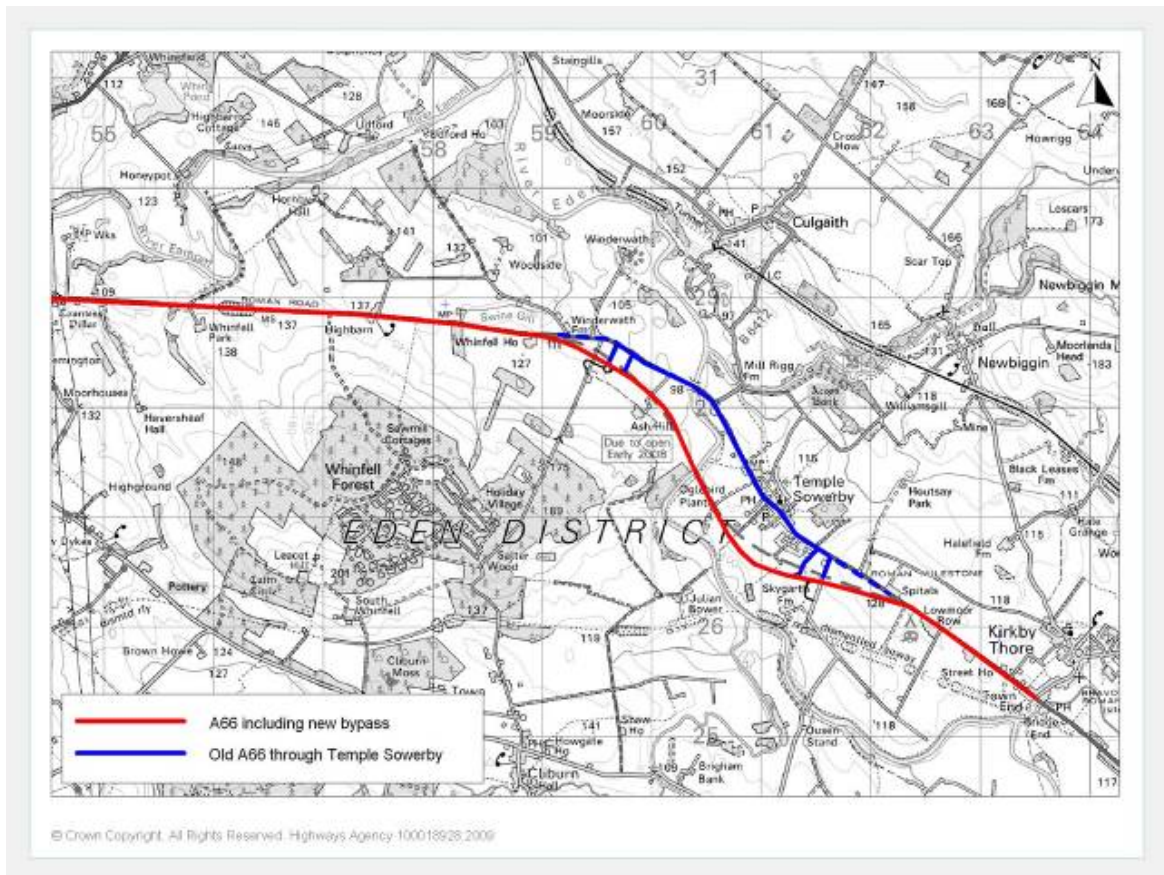
Location	Predicted		Actual		Difference	
	Before	After	Before	After	Before	After
A66 E of Temple Sowerby	15,000	800	13,800	830	-8%	4%
A66 W of Temple Sowerby	15,200	1,000	13,800	800	-9%	-21%
A66 Temple Sowerby Bypass		14,200		15,000		6%
Bypass WB link E of village		870		520		-40%
Bypass EB link, E of village		420		570		36%
Bypass EB link, W of Village		780		650		-17%
Bypass WB link, W of village		570		710		25%

- 2.16 From Table 2.2 it can be seen that before flows on the old A66 were slightly lower than predicted, but within 10%. On the bypass after, flows are also within 10% of the predictions. The percentage differences on the connecting link roads are larger, although the absolute numbers are relatively small. The differences are likely to be due to difficulties in modelling local turning movements. In general the predictions may be considered good. The proportion using the bypass was correctly predicted to be 95% of the combined flow.

Journey Times

- 2.17 Journey time runs were surveyed at three stages
- Before scheme construction (March 2006),
 - Immediately after opening (October 2007), and
 - Approximately one year after opening (March 2008).
- 2.18 These surveys were undertaken using the moving observer method. At least six runs in each direction were undertaken in each of the following time periods:
- AM Peak (07:30 – 09:00);
 - Interpeak (10:00 – 15:00), and
 - PM Peak (16:30 – 18:00).
- 2.19 The routes surveyed are shown in Figure 2.6 and included:
- The A66 between the junction with Main Street, Kirkby Thore, and the junction with the B6262, east of Penrith, and
 - The old A66 through Temple Sowerby.

Figure 2.6 – Journey Time Route



2.20 The detailed timings for each link are not reported in this chapter, but are used in the calculation of journey time benefits in Section 4. They do show however the average time saved as a result of the bypass and Table 2.3 shows the route times in each time period and the saving compared with the before situation.

Table 2.3 – Journey Time Comparisons Using A66 Bypass

Direction	Period	A66 Journey Time (minutes)		
		Old A66 Before	A66 Bypass 1 Year After	Saving 1 Year After
Westbound	AM Peak	10.1	7.4	2.7
	Inter-peak	10.0	6.8	3.2
	PM Peak	10.2	7.3	2.9
Eastbound	AM Peak	10.0	7.1	2.9
	Inter-Peak	9.7	7.1	2.6
	PM Peak	10.1	7.5	2.6

2.21 The key points shown in Table 2.3 are:

- The average route time was approximately 10 minutes in all time periods, before scheme construction.
- One year after opening the journey time using the bypass had fallen to approximately 7 minutes, a saving of 2 – 3 minutes.

2.22 The former route of the A66 through the village is only linked to the new trunk road network via the new access roads. The speed limit of the old road was reduced from 40 mph to 30 mph as part of the detrunking process. Overall these changes make the bypass a considerably more attractive route than the former A66.

2.23 Journey time surveys on the old road have shown little change compared to the before period. They are not detailed here because it is clear that little traffic uses this route. The average times can be found in Appendix B.

Journey Time Comparison with Prediction

2.24 A comparison of the predicted and actual time saving on the A66 along the length of the COBA network, is shown in Table 2.4. The ‘predicted’ times are the central case from low and high growth COBA scenarios, for peak and interpeak¹. The ‘actual times’ are those surveyed, with interpolation between timing points to match the COBA extent.

Table 2.4 – Predicted and Actual Time Savings on A66 (Minutes)

	Predicted		Actual	
	Peak	Interpeak	Peak	Interpeak
Before	7.3	6.7	6.9	6.7
After	4.9	4.8	4.6	4.4
Saving	2.4	1.9	2.4	2.4

2.25 Table 2.4 shows predicted times closely matching actual times, as might be expected for such a short and simple route. The interpeak time savings were slightly under-predicted.

Journey Speed

2.26 A comparison of average speeds has been made for three sections of the A66: southeast of the scheme, through the extent of the scheme itself, and northwest of the scheme. The ‘Before’ and ‘After’ speeds, averaged for all time periods and both directions, is given in Table 2.5 below.

Table 2.5 – Speeds on A66 from Journey Time Surveys

	Average 2-Way Speed (kph)	
	Before	After
SE of the scheme	73	78
Through scheme	54	111
NW of the scheme	70	79

¹ Based on COBA flow group 2 for interpeak, and flow group 4 for the peak.

- 2.27 It is apparent that the bypass has permitted a doubling of vehicle speed, from 54 kph 'Before', to 111 kph 'After', so that it has changed from the slowest of the three sections, to the fastest, as would be expected. Small increases are also experienced on the unimproved A66, on either side of the scheme.
- 2.28 Vehicle speeds are also available from the permanent (HATRIS) and temporary traffic count sites. These are spot speeds, and hence differ from the average speeds over lengths of road, which were derived from journey time surveys. Spot speeds from certain count sites are summarised in Figure 2.7. These are two-way average weekday speeds over 12 hours.

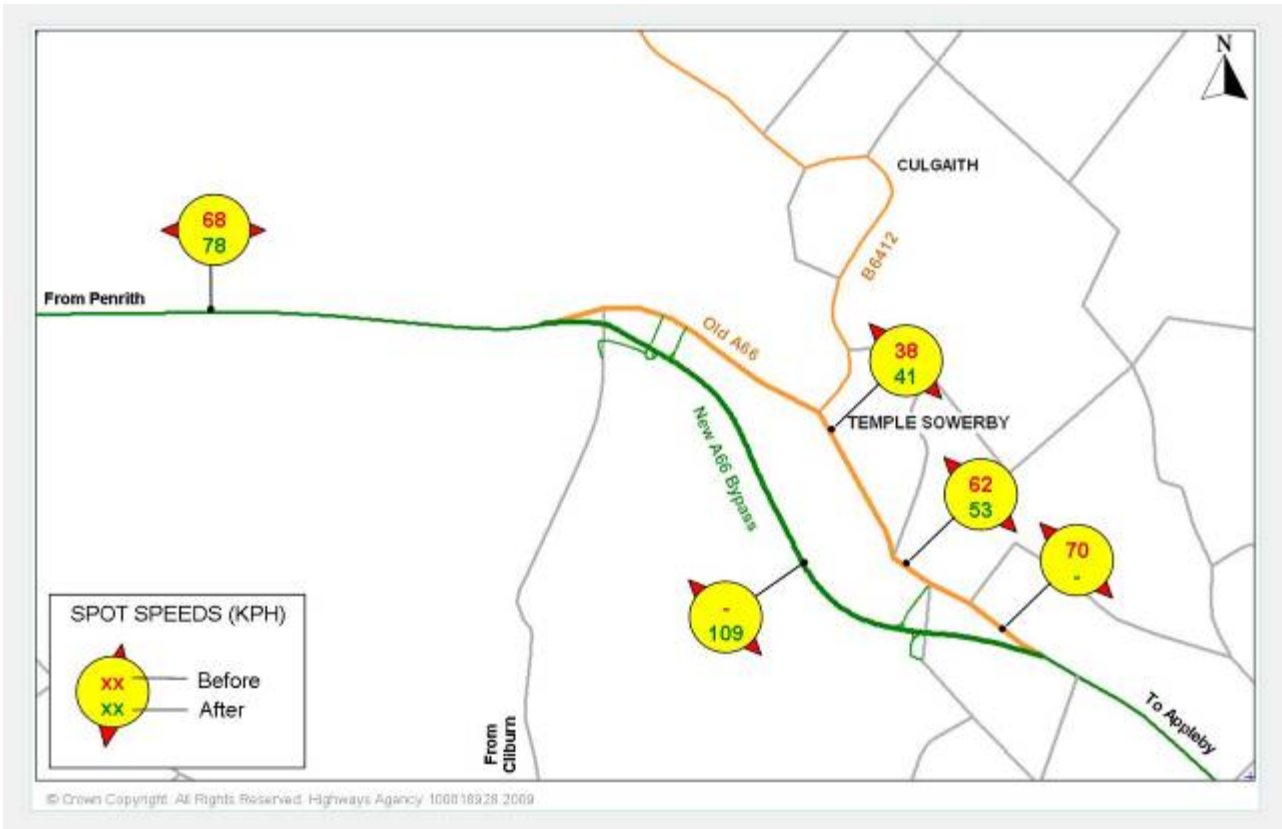


Figure 2.7 – Spot Speeds (kph)

- 2.29 These figures tend to confirm the journey time speeds, particularly for the bypass, and for the unimproved A66 west of the bypass, where a speed increase has occurred. However, at the site in Temple Sowerby village itself, the speed is shown as having fallen, whereas results from the journey time survey indicated an improvement in time over the length of the bypassed road.

Main Traffic Conclusions

- The average weekday volume on the bypass is about 15,900 vpd. The flow remaining on the old A6 is now about 900 vpd, representing a fall of about 94% compared with before the bypass was built;
- Flows on the four link roads connecting the bypass with the old A66 range from 580 to 760 vpd;
- The flows on the new A66 and bypassed section are within 10% of predictions. There are greater percentage differences on the four link roads, although the absolute values are small;
- The combined flow on the new and old A66 is now 9% greater than the flow previously on the old road. A similar increase over three years has been recorded on the A66 about 2 km west of the scheme, but this is larger than the rises experienced at more distant sites; and
- Journey time savings of about 2 to 3 minutes are experienced by through traffic using the bypass, closely in accordance with predictions.

3. Safety

Introduction

3.1 One of the main objectives of this scheme was to enhance safety for all road users; including pedestrians on this section of the A66. This section of the report presents an evaluation of how the scheme is performing against the NATA safety objective.

3.2 WebTAG states that this objective is:

- To reduce the loss of life, injuries and damage to property resulting from transport accidents and crime.

3.3 Within the WebTAG Safety Objective there are two sub-objectives:

- to reduce **accidents**
- to improve **security**

Data Sources

3.4 In order to evaluate the impact on safety, records of personal injury accidents (PIA's) were obtained from Capita Symonds Ltd, which holds the data on behalf of Cumbria County Council. The data is based on the records of PIA's recorded in the STATS19 data collected by the local police when attending accidents.

3.5 It should be noted that at this data may not have been validated by the DfT, and may be subject to change. The requirement for up-to-date and site-specific information was a consideration in the use of unvalidated data. As it is sourced from local processing units through the HA's managing agent contractors, it is considered to be sufficiently robust for use in this context.

3.6 The periods covered are:

- Five complete years before the start of scheme construction (2001-2005), and
- One complete year after scheme opening (2008).

3.7 It is normal in accident studies to work with a minimum of three years' data. Clearly, this is not yet available for the scheme's post opening period. Therefore the findings of this One Year After study should be regarded as a preliminary indication and more definitive results will be included in the Five Year After report.

Personal Injury Accidents

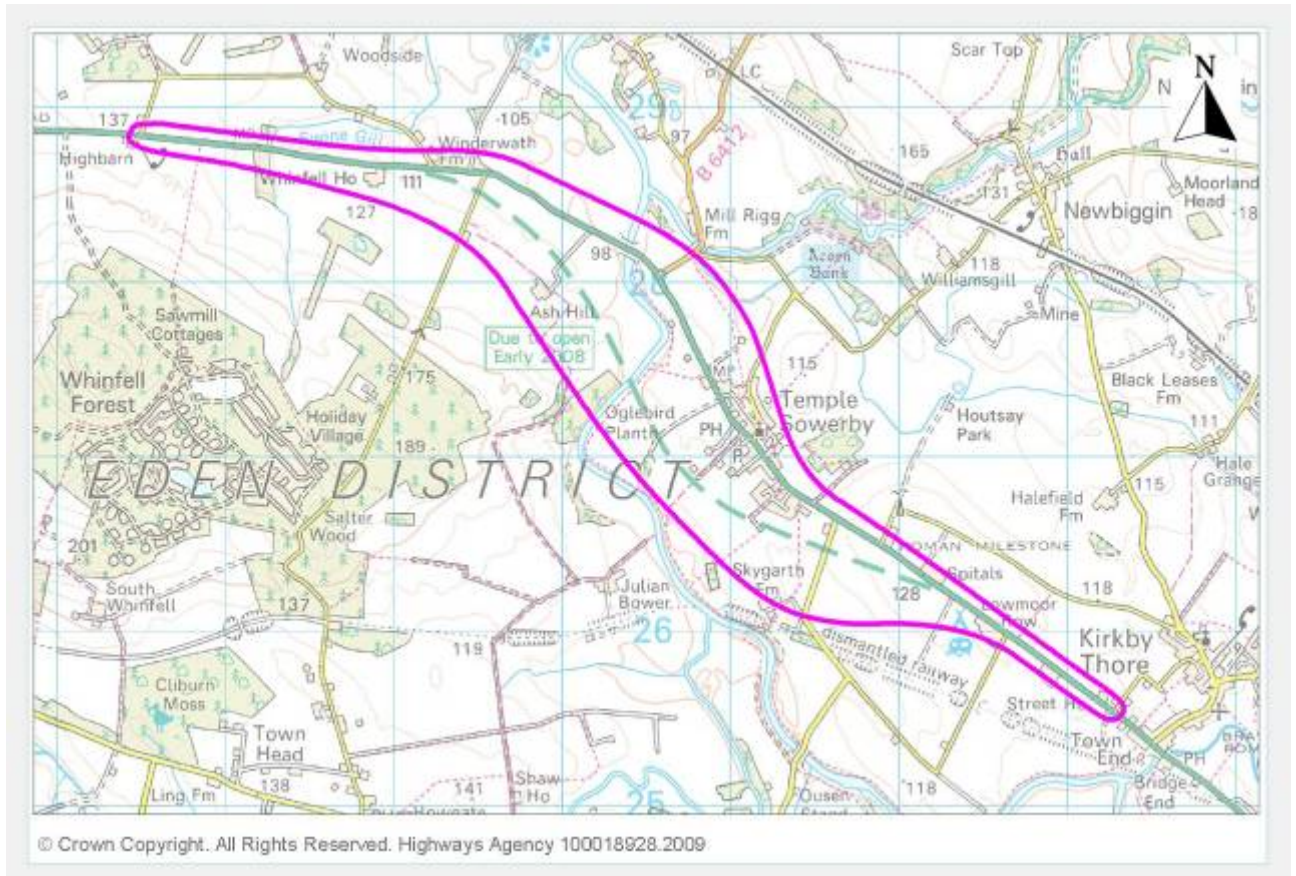
Locations of Accidents

3.8 The study area for the accident data corresponds with the network of links used in the COBA model developed for the scheme's appraisal, thereby enabling comparison between the numbers of observed accident and the predictions from the COBA model.

3.9 The network comprises the new and old A66 between 'Highbarn' in the northwest, to Piper Lane, Kirkby Thore in the southeast, together with lengths of side road. The study area includes stretches of the

3.10 A66 beyond the scheme limit at either end, and is shown highlighted in Figure 3.1.

Figure 3.1 – Accident Study Area



3.11 The locations of accidents in the five years before scheme construction are shown in Figure 3.2, and in the one year after period in Figure 3.3. They are coloured according to severity as shown in the key.

3.12 The key points regarding the locations of accidents as shown in the maps are:

Five Years Before

- There was a concentration of accidents on the A66 north of the village, between the River Eden bridge and the B6412;
- There were also several accidents in the centre of Temple Sowerby, and at junctions with minor roads; and
- All but one of the accidents in the study area in the five years prior to opening occurred within the length of the A66 that is now bypassed by this scheme.

One Year After

- No accidents occurred on:
 - The new A66 bypass; or
 - The bypassed section of the old road.
 - In the year following scheme opening, there were four accidents in the study area,
- All four accidents in the study area occurred beyond the actual limits of the scheme.

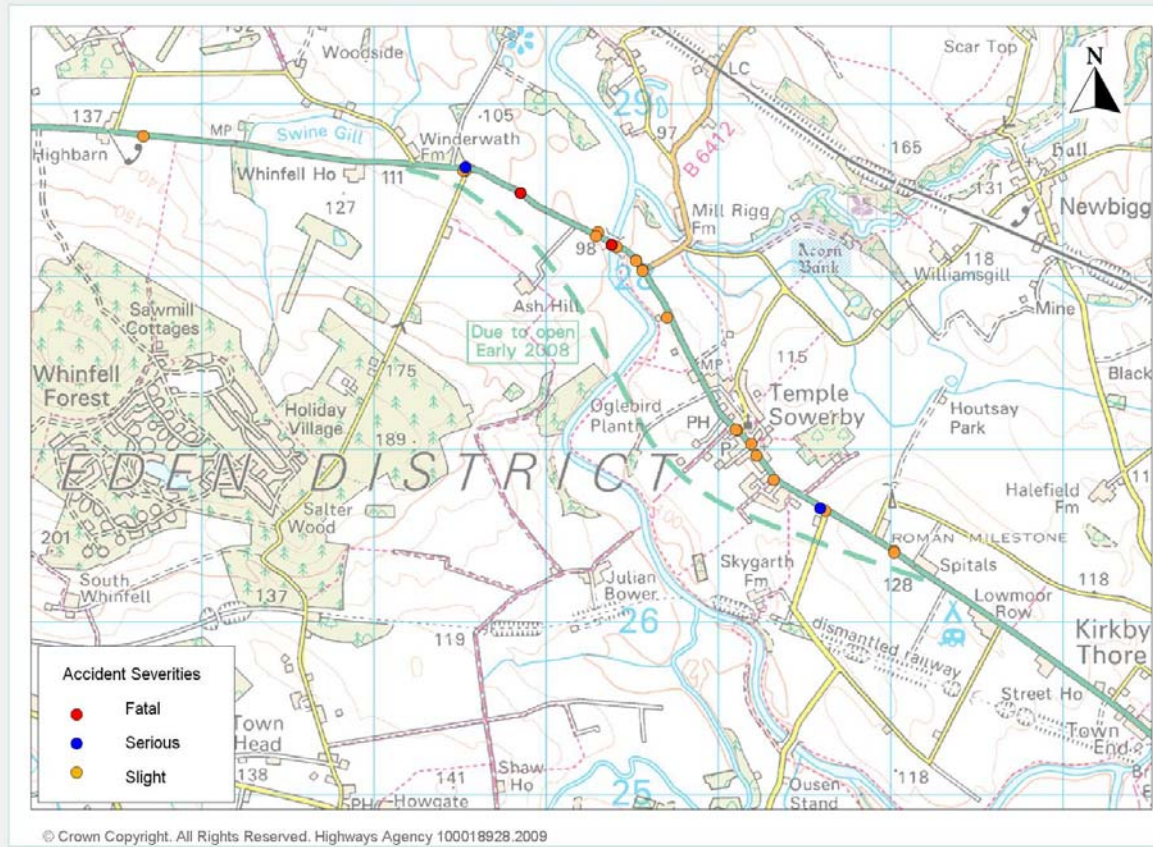


Figure 3.2 – Locations of Accidents over Five Years Before Scheme Construction

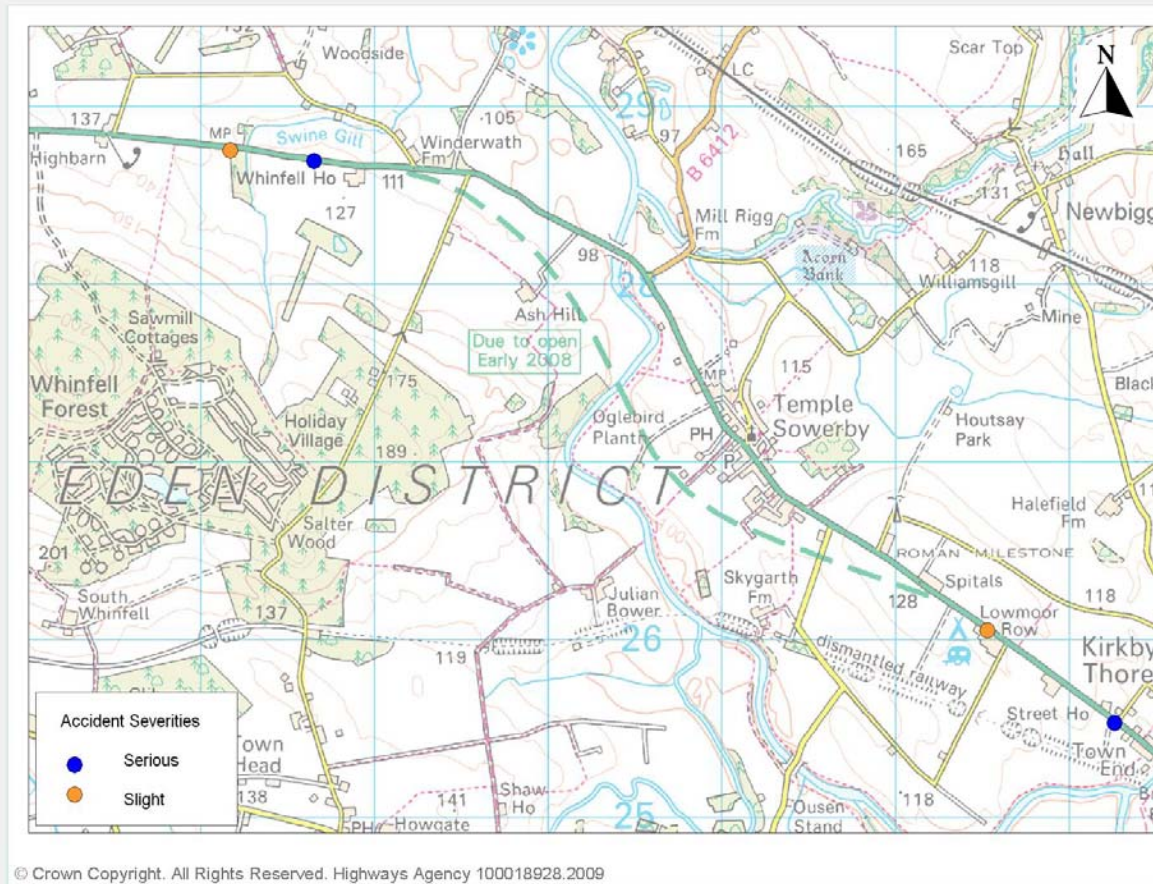


Figure 3.3 – Locations of Accidents over One Year After Scheme Opening

Numbers of Accidents and Casualties

3.13 The numbers and severities of accidents within the whole study area, corresponding to the COBA network, are shown in Table 3.1.

Table 3.1 – Accidents and Casualties in the Study Area

	Year	Accidents				Casualties			
		Slight	Serious	Fatal	Total	Slight	Serious	Fatal	Total
Before	2001	3	0	0	3	6	0	0	6
	2002	4	1	2	7	16	2	2	20
	2003	2	1	0	3	8	1	0	9
	2004	6	0	0	6	10	0	0	10
	2005	5	0	0	5	10	0	0	10
	Total	20	2	2	24	50	3	2	55
	Av per Yr	4.0	0.4	0.4	4.8	10.0	0.6	0.4	11.0
After	2008	2	2	0	4	12	6	0	18

3.14 The key points shown by this data are:

- There were 24 person injury accidents in the study area during the five years before scheme construction. This represents an average of 4.8 accidents per year;
- For comparison, there were 4 accidents during the one year after scheme opening, giving a reduction of 0.8 accidents per year. Although it should be noted, as shown in Figure 3.3, none of the accidents in the post opening period took place on the bypass or the old A66 through Temple Sowerby; and
- The corresponding numbers of casualties were 11 p.a. before and 18 after. It should however be noted that one of the accidents in the after period on the single carriageway section involved a head-on collision between a car and a bus, in which there were 15 casualties.

3.15 While the above figures relate to the entire study area, it is also of interest to consider data within the actual scheme limits; i.e. the new section of the A66 and the bypassed old road.

3.16 The equivalent figures are shown in Table 3.2.

3.17 The key points regarding the accident and casualty numbers on new section of the A66 and the bypassed old road are:

- Table 3.2 shows that before scheme construction, there were nearly 5 accidents per year and over 10 casualties per year, on the length A66 that would be bypassed.
- In the one year after scheme completion, no accidents took place on the bypass or the bypassed old road. Therefore in this sub-area, the accident rate has fallen from an average of 4.6 per year to zero.

3.18 For the purpose of calculating economic benefit, the accident saving on the entire COBA network will be used, even though this is relatively unfavourable compared with the

saving in the limited sub-area. This is to match the area used for predictions, and so compare like with like.

Table 3.2 – Accidents and Casualties within the Limits of the Scheme.

	Year	Accidents				Casualties			
		Slight	Serious	Fatal	Total	Slight	Serious	Fatal	Total
Before	2001	3	0	0	3	6	0	0	6
	2002	4	1	2	7	16	2	2	20
	2003	2	1	0	3	8	1	0	9
	2004	5	0	0	5	7	0	0	7
	2005	5	0	0	5	10	0	0	10
	Total	19	2	2	23	47	3	2	52
	Av per Yr	3.8	0.4	0.4	4.6	9.4	0.6	0.4	10.4
After	2008	0	0	0	0	0	0	0	0

Test of Statistical Significance of Results

- 3.19 To assess the statistical significance of changes in accident rates following an improvement, it is common in accident studies to use the chi-squared test. The purpose of the Chi Squared test is to compare the observed number of accidents with an expected value. The test result then establishes whether the change is significant or likely to have occurred by chance.
- 3.20 In the case of the data for this scheme the numbers are too small for the test to be valid, and it has not therefore been undertaken.

Comparison with Predictions

- 3.21 The observed annual saving may be compared with the COBA prediction. Table 3.3 shows the predicted and actual accident savings on the whole network. The COBA figures are the sum of link and junction accidents for 2008.

Table 3.3 – Predicted and Observed Annual PIA Savings

	COBA			Actual
	Low	High	Central	
Before	6.6	7.1	6.9	4.8
After	4.4	4.3	4.4	4.0
Saving	2.2	2.8	2.5	0.8

- 3.22 The COBA model prediction was based on national default values by road type due to the introduction of traffic calming in Temple Sowerby, shortly before the scheme forecasting was carried out, which was believed to have invalidated the use of local historical accident data obtained before that time.

3.23 Table 3.3 shows that the actual before period figures are lower than those predicted, while the after period value is very similar. The actual saving of 0.8 accidents is only 32% of the predicted value.

Changes in Accident Rates and Severities

3.24 A proper comparison of accident rates takes into account the changing level of traffic. This is done by using the measure personal injury accidents per million vehicle-kilometres (PIA/mvkm). This is shown in Table 3.4 for the old route of the A66 in the study area before, and the new route of the A66 after (including the bypass for much of its length). The bypassed road after is not included.

Table 3.4 – Accident Rates

	PIA/Yr	Distance (km)	AADT	m v km	PIA/mvkm
Before	4.8	7.0	14790	37.788	0.127
After	4.0	7.0	14980	38.274	0.105

3.25 It should be noted from Table 3.4 that the accident rate on the old A66 was 0.127 PIA/mvkm. In the first year after bypass opening, this fell to 0.105 PIA/ mvkm. For comparison, national average rates in 2008 are listed in Table 3.5. It is apparent that during the before period, the accident rate within the study area was actually better than average for older single carriageway A-roads, irrespective of the speed limit. The national average rate for modern dual carriageways is lower, and the after rate of 0.105 equates to this value. The section of A66 in the study area consists of 4.9 km of modern dual carriageway, and 2.5 km of older single carriageway.

Table 3.5 – National Average Accident Rates

Road Type	PIA/mvkm
Older S2 A-Roads (30-40 mph limit)	0.742
Older S2 A-Roads (50-70mph limit)	0.306
Modern D2 Road with 1m hard strip	0.105

3.26 A measure used in accident studies is the Severity Index, defined as the ratio of serious and fatal accidents to the total number. This is shown in Table 3.6 for the before and after accidents in the study area.

3.27 The index was 0.167 in the before period, based on accidents in the study area over five years. It has risen to 0.500 after, because half the accidents were classed as serious. It should be noted, however, that this is based on a total of only four accidents in a single year.

Table 3.6 – Severity of Accidents

	Accidents per Year	
	Before	After
Slight	4.0	2.0
Serious	0.4	2.0
Fatal	0.4	0.0
Total	4.8	4.0
Severity Index	0.167	0.500

Impact on Accident Types

3.28 Road improvements may be expected to affect the types of accidents occurring as well as their frequencies. Table 3.7 shows numbers of accidents occurring before and after in six categories.

Table 3.7 – Before and After Accident Categories

Accident Category	Before		After	
	Average / year	%	Average / year	%
Head-on Collision	1.0	21%	2.0	50%
Shunt at junction/ access	1.4	29%	2.0	50%
Shunt elsewhere	1.6	33%	0.0	0%
Other junction collision	0.2	4%	0.0	0%
Single vehicle loss of control	0.4	8%	0.0	0%
Vehicle collision with pedestrian	0.2	4%	0.0	0%
Total	4.8	100%	4.0	100%

3.29 From Table 3.7 it can be noted that the majority of the accidents in the before period were rear shunts. Taking into account those that occurred at junctions and those that occurred between junctions, shunts accounted for nearly two-thirds of all accidents. Head-on collisions formed the next largest category. Only one such collision was the result of overtaking. The single accident involving a pedestrian occurred when a vehicle’s wing mirror struck someone walking along the pavement; and was not serious.

3.30 With regards to accidents in the one year after, it has already been noted that all four occurred beyond the limit of the bypass on the single carriageway sections. Two of these were shunts and two were head-on collisions. Neither of these occurred during overtaking and both were the result of one of the vehicles failing to keep within the correct carriageway markings. In the more serious case, a car strayed into the path of an oncoming bus and the ensuing collision resulted in 15 casualties.

- 3.31 There have been no accidents on the bypass or the bypassed road in the single year since scheme opening, although it would be wrong to extrapolate this good record into the future. A single year is too short a time to reach reliable conclusions, and these findings should be considered preliminary. The subject will be considered again in the Five Years After study, when more data will be available.

Security

- 3.32 Improving security was not a scheme objective. The AST, under this heading, states 'No change to existing situation'. Reference to WebTAG Unit 3.4.2, 'The Security Sub-Objective', suggests the only security indicators for a highways scheme which is relevant to this scheme are landscaping and visibility of the lay-bys included in the scheme as illustrated in Figure 3.4.

Figure 3.4 – Lay-by Included in the Scheme



Main Safety Conclusions

- In the first year after scheme opening, there were no personal injury accidents on the new section of either the A66 or the old road which was bypassed.
- Improving safety was one of the key objectives of the scheme with an expected saving of 2.5 accidents in the opening year.
- Comparing accident numbers before and after in the same area used in the appraisal gives an opening year saving of less than one.
- The accident rate has fallen from 0.127 PIA/mvkm before to 0.105 PIA/mvkm after.
- The changes in accident numbers are too small at this one year after stage to be able to evaluate the statistical significance of the change, and hence at this stage we cannot confidently state that the data provides a reliable indication of the improvement to safety in the long term.

4. Economy

Introduction

- 4.1 The original appraisal of the scheme included a forecast of the economic impacts of the scheme over 30 years, made with COBA11.1. This is fully detailed in the *A66 Temple Sowerby and Improvements at Winderwath Scheme Assessment Report* (April 2002). Figures from that assessment were used in the Appraisal Summary table (AST).
- 4.2 The area included in the appraisal model is shown in Figure 3.1 in the Safety section of this report.
- 4.3 Subsequent to the 2002 assessment, a separate note was prepared: *A66 Temple Sowerby Bypass Technical Note 1 Rev 1 – Update of Economic Assessment (Draft)*. This note included updates in line with in the revised guidance in the Green Book of 2004 including:
- A new COBA 11.6 run with the appraisal period extended to 60 years;
 - Price base updated to 2002;
 - Discount rate revised to 3.5% for first 30 years and 3.0% thereafter; and
 - Substantially increased predictions for construction and land costs, including an optimism bias.
- 4.4 The 2005 update is used as the basis for evaluation in this chapter. Unfortunately the revised model and supporting information used to produce the forecast benefits for the 2005 update could not be obtained. Hence this POPE evaluation has re-run the original COBA 11.1files with program COBA version 11.6, to obtain the necessary detail .

Monetary Benefit

- 4.5 The POPE methodology for re-evaluating monetary benefit uses observed data, from which it is possible to re-evaluate the two most important components of economic benefit, namely:
- Vehicle-time savings; and
 - Accident Savings
- 4.6 Annual vehicle-hours have been measured from traffic count and journey time surveys on key links in the network, in both the before and after situations. All the traffic counts have been factored to October 2008. The vehicle-time is calculated from the product of volume multiplied by journey time. Because there is now additional traffic in the corridor, after allowing for background growth, the Rule of Half has been employed, giving the extra travellers half the benefit of the time saving for existing travellers on the route.
- 4.7 The COBA model, as described above, was run with the option of showing 2008 journey times in order calculate the predicted vehicle-hour savings on the same links as for those observed. From this, it is possible to derive the observed:predicted ratio of vehicle-hour savings. This ratio is applied to the predicted 60-year monetary benefit of time savings, to give a new re-forecast of the time benefit, based on observed data (this may be referred to as the 'actual' benefit for brevity).

- 4.8 Monetised accident benefits are treated in exactly the same way, with the ratio of observed: predicted accident savings being used to adjust the predicted 30-year accident benefit.

Time Benefit

- 4.9 As shown in Table 4.1, the COBA model prediction that 166,966 vehicle-hours would be saved in 2008. The actual saving is 227,243 vehicle-hours, or 36% greater than the predicted value. This is because of the increase in traffic, and the greater than predicted interpeak time saving. The 60-year market-price benefit corresponding to the predicted time saving was £47.6 million. Scaling this up by 36% gives an 'actual' monetary benefit of £64.8 million.

Table 4.1 – Time Saving and Monetary Benefit

	Vehicle-hours Saved in 2008	Benefit in 60 years (£m)
COBA	166,966	47.6
Actual	227,243	64.8

Accident Benefit

- 4.10 The COBA prediction was that 2.5 accidents would be saved in 2008. The actual saving of 0.8 accidents is 32% of the 'central case' COBA prediction. The 60-year monetary benefit corresponding to the predicted accident saving was £20.2 million. Scaling this down by 32% gives an 'Actual' accident benefit of £6.5 million.
- 4.11 The accident benefit is shown in Table 4.2. Note this is based on only one year's data after opening, and remains to be confirmed by more data at the Five Years After stage.

Table 4.2 – Accident Saving and Monetary Benefit

	Accidents Saved in 2008	Benefit in 60 years (£m)
COBA	2.5	20.2
Actual	0.8	6.5

Scheme Costs

- 4.12 The Highways Agency has provided the information that the scheme cost was £36.76 million, as spent up to August 2008. This figure includes works, land, preparation and supervision and is the sum of expenditure from 2000 to 2008.
- 4.13 In order to compare predicted and outturn costs, and to give consistency with other scheme evaluations in POPE studies, it is customary to convert all costs to a common 2002 price base. On this basis, the outturn cost was £32.3 million.

Comparison with Predictions

- 4.14 Revised predicted costs are contained in the 2005 Update Note, at 2005 prices. When re-based to 2002, the total predicted scheme cost would be £31.9 million. Thus the

actual cost is only very marginally higher than predicted. These predicted and actual figures are shown in the 'undiscounted' row of Table 4.3.

Table 4.3 – Predicted and Actual Costs (£ million)

	Predicted	Actual
Undiscounted	31.9	32.3
Discounted	27.3	28.3

4.15 The table also gives discounted costs (to 2002 at 3.5% p.a.). These are only used when comparing present costs with a future stream of benefits. It will be noted that this gives a larger difference between predicted and actual costs. The reason lies in the assumed construction profile (years in which the money is spent) not matching the actual profile.

Benefit Cost Ratio

4.16 Table 4.4 summarises the results discussed above. The cost is the discounted construction cost, while the benefit is the sum of the discounted time and accident benefits. Note that the forecast also considered vehicle operating costs and maintenance savings, but these are numerically small, and have been ignored in this evaluation.

Table 4.4 - Scheme Costs and Benefits (2002 Base)

	Predicted (£m) ¹	Actual (£m)
Cost	27.3	28.3
Journey Time Benefits	47.6	64.8
Accident Benefits	20.2	6.5
Total Benefits	67.8	71.3
Benefit / Cost Ratio	2.5	2.5

4.17 A scheme's value for money is measured by the benefit cost ratio (BCR). In the present case, while there are different proportions of benefits from time and accident savings, the BCR is evaluated at 2.5, exactly the same as predicted for these elements combined. Thus the scheme provides a good economic return over the 60-year appraisal period, as predicted.

4.18 It should be noted that the BCR ignores non-monetised impacts. In NATA assessments, the impact on environmental, accessibility and integration objectives must be assessed but are not monetised. The evaluation of these is covered in the following sections.

Reliability

4.19 The AST quotes Route Stress as a proxy for Reliability. This is essentially a measure of volume:capacity, and values between 75% and 125% are considered to be related to Reliability. As shown in Table 4.5, in the AST, this was predicted to fall from 72% to

¹ From Update Note (2005)

21%. Therefore, it can be seen that before and after values of Route Stress fell below the level they where they represent a measure of Reliability.

Table 4.5 – Route Stress

	Before	After
Predicted	72%	21%
Actual	66%	18%

4.20 A new calculation based on actual traffic conditions gives Route Stress values of 66% before and 18% after. These values are slightly lower than predicted, but do confirm there has been a considerable improvement.

Wider Economic Impacts

4.21 As stated in the AST, the scheme improves a strategic trans-Pennine route, but does not serve a designated regeneration area.

4.22 In Temple Sowerby itself, there is a hotel, garage and pub and no other businesses which could be affected by the bypass. At the time of this study, the pub was closed for business. It is unclear however whether this is related to the lack of passing trade since the bypass has been built, or the general economic down-turn which as caused the closure of many pubs all over the UK.

Main Economy Conclusions
<ul style="list-style-type: none"> • The outturn cost was £28.3 million, at 2002 prices discounted to 2002, which is marginally higher than predicted. • The re-evaluated benefit arising from vehicle-time savings is £64.8 million over 60 years, which is 36% higher than predicted; • The re-evaluated benefit arising from accident savings is £6.5 million over 60 years, which is 68% lower than predicted. This is based on only one year’s data after opening, and remains to be confirmed by more data at the Five Years After stage. • The Benefit Cost Ratio (BCR) based on time and accident savings is 2.5. This is as predicted.

5. Environmental Impacts

Introduction

- 5.1 This section is a summary of the evaluation of how the scheme is performing against the environmental sub-objectives for highways schemes as defined in WebTAG. The full environmental evaluation appears in Annex C.

Noise

- 5.2 Based on no significant changes in observed traffic flows on the bypass compared to the Environmental Statement (ES) forecasts, it is likely that local noise and air quality impacts are **as expected**, including a substantial beneficial improvement in the village centre due to the significant reduction in traffic on the old A66.
- 5.3 The earth mounding and cuttings have generally been constructed in accordance with the ES. As the Ash Hill Farm accommodation bridge, proposed in the ES, was not required there are no embankments in this area, but it is not considered that this will have had any impact on noise levels.
- 5.4 In the ES, no noise barriers were required as part of the scheme mitigation. As a result of an objection at the Public Inquiry a noise barrier has been erected adjacent to the eastbound carriageway above the Public Right of Way (PROW) 368006 underpass.

Local Air Quality

- 5.5 Due to the significant reduction in traffic on the old A66, it is likely that local air quality impacts are **as expected**, including a substantial beneficial improvement in the village centre for all five pollutants.
- 5.6 The results of the local authority assessment should be included in the FYA report.

Greenhouse Gases

- 5.7 For transport, the most significant greenhouse gas is carbon dioxide, and by current guidelines this is reported in terms of tonnes of carbon. The AST gave a prediction in terms of carbon dioxide, for the years 2005 and 2020. The AST figures have been converted to the carbon equivalent, and directly interpolated to 2008, giving a predicted increase of 343 tonnes, as shown below in Table 5.1.
- 5.8 POPE evaluations are based on COBA version 11.7, where possible. This is the only version of the program that calculates carbon emissions. The scheme forecasting employed COBA version 11.1, and with a few modifications to the input format, it has been possible to re-run the data in version 11.7, for the year 2008. The results are shown the 'POPE' columns of the Table 5.1.
- 5.9 In the 'predicted' case, the original traffic flows were retained, giving an increase of 312 tonnes of carbon. The 'actual' case is based on observed flows, giving an increase of 350 tonnes for the COBA network. The increase arises from the fact that the scheme allows higher traffic speeds, in the range where carbon emission increases with speed.

Table 5.1 – Tonnes of Carbon Emitted in 2008

	AST	POPE	
		Predicted	Actual
Without Scheme	2,732	3,278	3,405
With Scheme	3,075	3,590	3,755
Increase	343	312	350

- 5.10 The 'actual' increase is close, but slightly greater than prediction. This is however, to be expected, because traffic flows have proved to be similar to predictions, but slightly greater on the A66.

Landscape and Townscape

- 5.11 Landscape areas would appear to have been implemented in line with the ES design, and therefore **as expected**. It is understood that some changes have been necessary as the detailed design was developed; including:

- Scattered trees were omitted from Cliburn Road junction because the slopes were too steep, and extensive land drains were required as part of the engineering design. The absence of scattered trees in this location has not adversely affected the landscape or visual effect;
- Additional balancing ponds were built adjacent to the east bound / existing A66 connector road and adjacent to the west bound / Morland Road intersection. The additional ponds have not adversely affected the landscape or visual effect, and may have improved biodiversity; and
- An underpass was constructed to connect Vicarage Lane and the PROW 368066 south of the bypass. This has not adversely affected the overall landscape or visual effect, although the concrete finish of the structure is not sympathetic to local building materials (red sandstone).

- 5.12 At the time of the site visit, most planting appeared to be establishing very well. Grass within plots had been cut and weed free circles were clearly visible around each plant. Trees were well protected with plastic tubes, all upright and in good condition. Offsite planting has also been undertaken as expected. Redundant lengths of side roads have been broken out and planted as expected.

- 5.13 Six feathered oaks along the westbound cycle track (ch3825 – ch4480) had failed. Replacement planting is specified to be undertaken as part of the contract aftercare programme. Noxious weeds were evident in the hedgerow along Cliburn Road, but otherwise weed control was very good.

- 5.14 All areas that had been seeded with wildflowers were in flower, although the majority of plants flowering at that time were ox-eye daisy and bird's foot trefoil. The details of seed mixes were not available at the time of writing, but should be obtained at FYA to help evaluate establishment of biodiversity measures.

- 5.15 The balancing ponds all contained water, and the marginal planting was establishing well, including yellow flag, purple loosestrife, rushes and forget-me-nots.

- 5.16 The earthworks and ground modelling have successfully reduced views of traffic from Illings View, houses to the east of Eden Garage, Croft Lane and the new estate at Vicarage Lane, although views across open farmland to the south have been adversely affected as anticipated.
- 5.17 The 'green bridge' connecting Acton Lodge bridleway with the bridleway to the south has been paved with a permeable concrete paving. Narrow verges have been constructed along the edge of the bridge, planted with dog rose. The plants are showing signs of considerable stress, due to lack of water and plant nutrients, and weeds are prevalent. It is likely that extensive replanting will be necessary, and the lack of available water and plant nutrients addressed.
- 5.18 The new bridge crossing the River Eden is constructed from steel and concrete with a metal parapet. The view from the PROW along the riverbank has been adversely affected as expected.
- 5.19 Considerable lengths of dry stone walls have been constructed and restored, and are a valuable landscape element.
- 5.20 It is understood that the maintenance of verges was handed over to the Managing Agent Contractor (MAC) in spring 2008; landscape areas remain the responsibility of the landscape contractor until December 2010.
- 5.21 The reduction in traffic flow through Temple Sowerby, and the de-trunking measures that have been carried out on the existing A66, including reducing the width of the road by extending the grass verges and reducing the speed limit to 30mph, have reduced the impact of the road on the townscape and on the setting of the conservation area and listed buildings as expected.
- 5.22 A Handover Environmental Management Plan (HEMP) will be issued towards the end of the three year aftercare period and a copy should be made available for the FYA report. It is too soon to evaluate the longer term establishment of the landscape planting and this should be considered as part of the FYA study.

Biodiversity

- 5.23 It is understood that the River Eden is designated as a candidate Special Area of Conservation (cSAC) and Site of Special Scientific Interest (SSSI) due to being clean and relatively unmodified. It contains many important or protected species including otter, white-clawed crayfish, Atlantic salmon, floating water crowfoot communities, brook lamprey, river lamprey, sea lamprey and bullhead. It was not however expected that the scheme would have any impact on these species.
- 5.24 Ecological monitoring was undertaken during the construction phase and the 2007 report noted that there were no impacts on the river; however no post opening information has been made available. The post-opening report was requested, but is understood to be still in preparation. Ongoing badger and bat monitoring is to be carried out during the three year after care period (2008 -2010), and a copy of the report should be made available for the FYA report.
- 5.25 Apart from the river Eden most of the area crossed by the bypass was noted to have few features of nature conservation value.
- 5.26 New and replacement habitats have been created within the highway boundary as expected, including hedgerows for bat and badger connectivity, woodland, ponds, species rich grassland and dry stone walls.

- 5.27 Shrub planting on the 'green bridge' was intended to aid bat and badger connectivity, but the planting is not performing well.
- 5.28 Two mammal crossings have been constructed. It was however too dry at the time of the site visit to determine whether the tunnels are in use. Animals could also make use of the other underpasses. Animal mortality information was not available from the MAC.
- 5.29 Extensive lengths of badger fences have been erected and all were in good condition at the time of the site visit.
- 5.30 Balancing ponds were well vegetated with marginal plants.
- 5.31 The species rich grassland areas were flowering well, but appeared to consist of only a few species. The details of seed mixes were not available at the time of writing, but should be obtained at FYA to help evaluate establishment of biodiversity measures.
- 5.32 Very little information has been made available on which to fully evaluate the impacts of the scheme on biodiversity and the effectiveness of the mitigation measures and these aspects should be considered in more detail at FYA. However based on the evidence to hand, the biodiversity indicators have been scored **as expected**. It is suggested that consultation could be extended at FYA to include the local wildlife trust who might have knowledge of the area. The HEMP should also be available by then and might include information relating to any ongoing monitoring to be undertaken as part of the scheme.

Heritage of Historic Resources

- 5.33 The Roman milestone has been enclosed by metal railings, with an interpretation board, although it is understood that these works were carried out by the MAC, but not as part of the scheme.
- 5.34 The de-trunking works to the existing A66 included reducing the width of the road by extending the grass verges, removing the central red surface treatment and reducing the speed limit to 30mph.
- 5.35 Based on the unpublished reports provided, it is considered that the impacts on cultural heritage and archaeology are **as expected**.
- 5.36 The published archaeology report had not been provided to the County Archaeologist at the time of the consultation, although a draft has been prepared. A copy of the published report should be made available to POPE for the FYA report.

Water

- 5.37 All 5 balancing ponds contained water at the time of the site visit, and vegetation was well established.
- 5.38 All drainage channels noted during the site visit were clear of vegetation.
- 5.39 The 'As Built' drawings indicate that additional land drains have been constructed on the slopes at the Cliburn Road junction.
- 5.40 Pollution control measures have been included in the balancing ponds.
- 5.41 No information has been made available which would suggest that the highway drainage measures are working other than as intended, or that there have been any pollution incidents. The Environment Agency considers that balancing ponds and measures to mitigate flood risk are satisfactory, and is pleased with the design of the River Eden bridge. Based on the information available it is assumed that the impacts on the water sub-objective are **as expected**.

Physical Fitness

- 5.42 Existing footpaths and bridleway connections have been maintained **as expected**.
- 5.43 The existing bridleway from Temple Sowerby to the River Eden has been accommodated on a new overbridge and severed footpaths have been diverted across the bridge and through a pedestrian underpass west of Morland Road.
- 5.44 In agreement with the landowner, the accommodation bridge to Ash Hill Farm has not been constructed. Access is now gained along a gravel track (also a bridleway) off Cliburn Road.
- 5.45 Loss of tranquillity along the footpaths and bridleway is as expected, particularly close to the River Eden bridge.
- 5.46 Removal of 95% of traffic from the existing A66 in Temple Sowerby has reduced severance and is likely to improve access to local facilities, improve safety of non-motorised traffic and result in a greater proportion of local movements on foot or bicycle.
- 5.47 De-trunking measures have been carried out, including local narrowing of the carriageway, introducing a 30mph speed limit and painting road markings.
- 5.48 Brown directional signs are in place for Winderwath Gardens and Acorn House, but not for the hotel or village pub (which is closed).
- 5.49 The village pub has closed and is for sale, however, a local resident stated that the pub had been in decline for some time, and that the closure was unlikely to have been as a consequence of the reduction in through traffic.
- 5.50** No information has been made available for this study with regard to pedestrian or equestrian use of the overbridge, other PROW or the cycle provision; a non-motorised user (NMU) survey has not been undertaken and no new surveys have been carried out specifically for POPE. It is not therefore possible to quantify whether there has been a change in the number or length of trips. However based on the evidence to date, physical fitness has been score '**as expected**'.

Journey Ambience

- 5.51 It is considered that the impact of the scheme on journey ambience is generally **as expected** for driver views and driver stress.
- 5.52 The bypass has reduced delays and improved journey time reliability as discussed in the traffic analysis in section 2. Facilities within Temple Sowerby are easily accessible from the bypass and the reduction in traffic on the old A66 has improved the experience for drivers.

Key Points From Section 5 – Environment

Environmental impacts are generally as expected.

- **Noise and Air quality** – Based on no significant changes in observed traffic flows on the bypass compared to ES forecasts, it is likely that local noise and air quality impacts are as expected, including a substantial beneficial improvement in the village centre due to the significant reduction in traffic on the old A66.
- **Greenhouse gas emissions** slightly worse than expected.
- **Landscape** – As expected earthworks and planting partially screen sensitive adjacent properties, but reduce long distance views. Planting is establishing well and ongoing establishment of the new landscape planting and replacement habitats should be considered at FYA.

At the time of the site visit it appeared that the landscape elements of the ‘green bridge’ require additional maintenance and attention.

- **Townscape** – The reduction in traffic flow and de-trunking measures in Temple Sowerby have reduced the impact on townscape.
- **Biodiversity** – limited information available to fully evaluate although impacts are likely to be as expected. The HEMP and the results of ongoing monitoring should be available for the FYA report would help inform this future evaluation.
- **Heritage** – Based on the information provided it is considered that the impacts on cultural heritage and archaeology are as expected. The published archaeology report had not been provided to the County Archaeologist at the time of the consultation.

Further targeting of aerial photography anomalies and permanent monitoring of the topsoil strip would be preferred by the County Archaeologist on future schemes.

- **Water** – Based on the information available it is assumed that the impacts on the water sub-objective are as expected
- **Physical fitness** – Non-motorised user access has been retained across the bypass via the overbridge and underpass. Removal of through traffic has improved the environment for pedestrians and cyclists in Temple Sowerby.
- **Journey ambience** – Driver stress and views from the road are as expected.

6. Accessibility and Integration

Accessibility

Option Values

- 6.1 This sub-objective is concerned with the availability of transport options which may not be routinely used by a traveller, but which may be needed in unexpected circumstances. The AST stated that the scheme would bring no change to existing conditions provided bus operators continue to route through the village.
- 6.2 There has been no alteration to the bus service through Temple Sowerby since the bypass was opened. Route 563 runs along the A66 between Appleby and Penrith seven times a day (Monday to Saturday), stopping in Temple Sowerby village. The service is operated by Grand Prix Coaches Ltd. The operations manager has stated that having to make the slip-road detours at each end of the village has added about two minutes to the journey time, but this has been accommodated within the existing timetable. This statement however appears to conflict with the journey time comparisons reported in section 2, which found no change for vehicles (cars) using the old route.
- 6.3 There are no long-distance bus or coach services using the A66 bypass which might have benefited from the increase in journey times for through traffic resulting from the scheme.
- 6.4 The bus service is the only public transport alternative to the car in Temple Sowerby. As there has been no change to the frequency or timetable; the evaluation is that Option Values have not been affected by the scheme.

Figure 6.1 – Treatment of the Old A66



Severance

Forecast

- 6.5 The AST forecast of the impact on the severance sub-objective was that the scheme would remove existing severance issues in and around the village, local footpaths and farm units.

Evaluation

- 6.6 The removal of 95% of traffic from the old A66 in Temple Sowerby has reduced severance and improved access to community facilities. During the site visit a comment was received from a local resident that more children go to the village green to play now that they can now reach it safely.
- 6.7 As part of the scheme, speed and capacity reduction measures have been put in place on the old A66 in Temple Sowerby. These include local narrowing of the carriageway, introduction of a 30 mph speed limit, and re-painting road markings (Figure 6.1).
- 6.8 The bypass crosses a former driveway from the old A66 to Ash Hill Farm, near the northwest end of the scheme. Access is now gained via a gravel drive, which is also a public bridleway, leading off the lane to Cliburn.
- 6.9 As shown in Figure 6.2, at the southeast end of the scheme, access between Spitals Farm and fields south of the A66 has been maintained by the provision of an underpass for a private farm track.
- 6.10 A public bridleway runs between the centre of Temple Sowerby and the River Eden. It has been provided with an overbridge, maintaining access at the expense of some loss of tranquillity.
- 6.11 Two other rural public footpaths linking the south end of the village with the River Eden have been intersected by the bypass. These are now diverted to a pedestrian underpass west of the Morland Road junction.
- 6.12 A public footpath follows the northeast bank of the River Eden. The new Eden bridge crosses over this path, therefore it has not been affected, except for an increase in noise and visual intrusion.
- 6.13 There are cycleways at each end of the scheme, between the grade separated road junctions and the tie-ins of the new bypass with the existing A66. These are designed to permit cyclists on the A66 to transfer easily to the old road through the village. Thus severance for non-motorised travellers in Temple Sowerby has improved. This is however offset in some cases by a reduction in amenity for users of footpaths affected by the scheme. The locations of features described are illustrated in Figure 6.3.

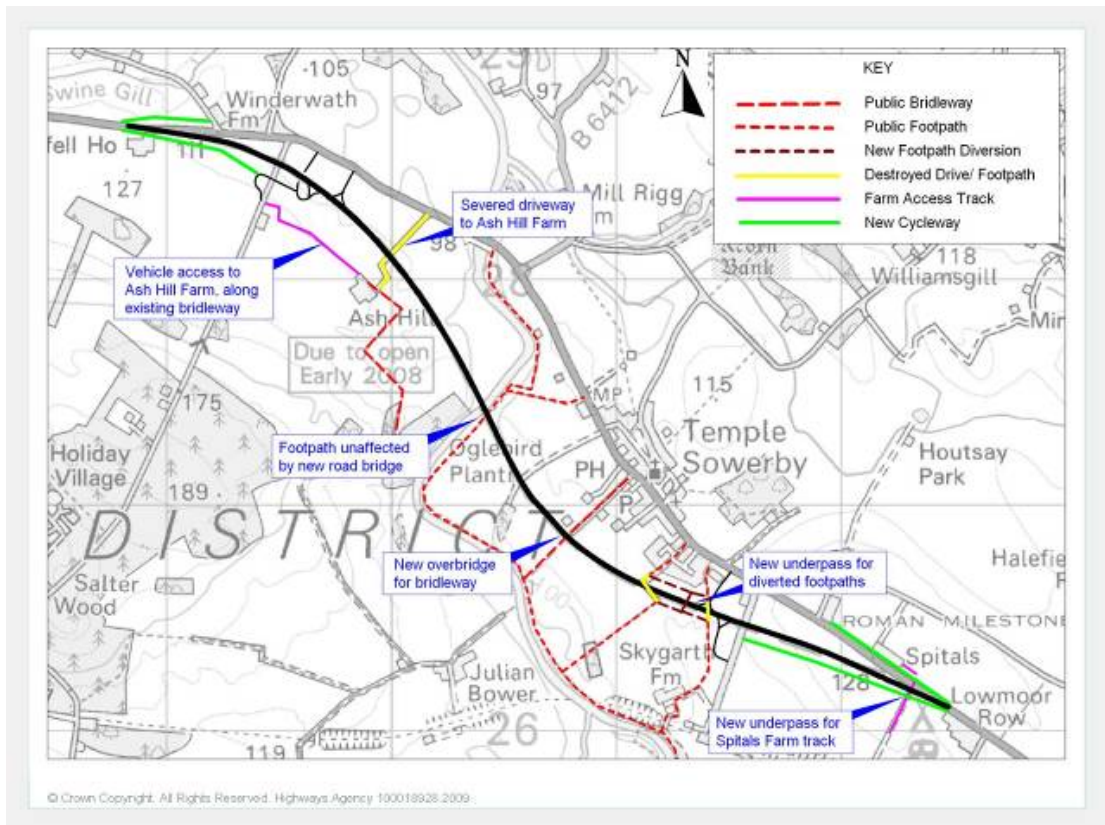
Access to the Transport System

- 6.14 The AST predicted no change to existing conditions, subject to bus operators continuing to route through the village. As described for Option Values above, such routing has been maintained, and there has been no change in access to the transport system.

Figure 6.2 – Pedestrian Underpass for Diverted Field Paths



Figure 6.3 – Effect of the Scheme on Paths, Tracks, and Bridleways



Integration

Transport Interchange

- 6.15 The AST stated that no rail link was provided, and bus services would continue to serve the village. This has been verified; therefore access to the transport system has not been affected.

Land Use Policy

- 6.16 The AST stated that the scheme was consistent with Regional Guidance, the County Structure Plan, and the Eden Local Plan.
- 6.17 The planning system is tiered. The levels relevant to this scheme are regional (Northwest of England), county (Cumbria) and local (District of Eden). The current hierarchy is specified in the Planning and Compulsory Purchase Act (2004), but the planning documents in force at the time of scheme preparation pre-date this Act. Some earlier policies were 'saved' for inclusion in later documents.
- 6.18 The former Regional Planning Guidance for the North West (RPG13) has been replaced by a Regional Spatial Strategy (RSS) for the North West. Transport matters are dealt with in the Regional Transport Strategy (2003).
- 6.19 The current RSS categorises the A66 as an 'Other Route of National Importance' (a tier below Strategic Routes). Specific improvement proposals are not given.
- 6.20 The Cumbria Structure Plan (1995) was in force at the time of scheme preparation. It provided an overall strategy for development in the county, and identified the A66 as one of the long-distance transport routes which should be improved by 2006. It also required that any new roads should be integrated with their surroundings.
- 6.21 County planning is now guided by the Cumbria and Lake District Structure Plan, adopted 2006. Policy T24 provides for the improvement of the A66 east of Penrith. The Temple Sowerby bypass itself is listed amongst eleven schemes (including both highway and public transport) to be given high priority.
- 6.22 The Eden Local Plan (1996) was in force at the time of scheme preparation, and provided more detailed guidance in that part of the District of Eden falling outside the Lake District National Park. Policies PT1 & PT2 supported plans by the DfT and Cumbria County Council to improve the A66 east of Penrith. It acknowledged the existence of proposals to build a bypass for Temple Sowerby, and undertook to safeguard the routes then under consideration from other development.
- 6.23 The Eden Local Plan expired in 2003, but Policies PT1 and PT2 were saved for retention in the new Eden Local Development Framework, which replaced it.
- 6.24 These facts demonstrate that the scheme was integrated with land-use policies at the Regional, County, and District levels.

Other Government Policies

- 6.25 The AST stated that no other government policies were relevant to the scheme. This being so, the evaluation is that the impact has been **neutral**.

Main Accessibility and Integration Conclusions

- Option values have been unaffected, with bus services continuing to run through the village, and no change to the timetable.
- Severance has reduced because 95% of traffic has been diverted from the village to the bypass. There has been a benefit to non-motorised users, particularly as traffic calming has been implemented in the village, which is not outweighed by the loss of amenity for users of some footpaths.
- There has been no change to Access to the Transport System or Transport Interchange.
- The scheme conforms to regional, county, and district transport policies.

7. Appraisal Summary Table

- 7.1 An Appraisal Summary Table (AST) is a one-page summary of the predicted economic, environmental, and social impacts of a major road scheme. The AST for this scheme is reproduced in Table 7.1.
- 7.2 The Evaluation Summary Table (EST) has been devised for the POPE process to record a summary of the actual scheme impacts. Where possible the EST mirrors the appearance and process of the AST, to permit comparison between the two. The EST for this scheme is given in Table 7.2.

Table 7.1 – Appraisal Summary Table

A46 Temple Sowerby Bypass		Description	Problems	PVC £13.033m/£13.007m
CRITERIA	SUB-CRITERIA	QUALITATIVE IMPACTS	QUANTITATIVE MEASURE	ASSESSMENT
ENVIRONMENT	Noise	c 90% reduction in traffic in village centre results in significant reduction in traffic noise in the village, in 2020 147 properties experience a reduction in traffic noise at 129 of which the reduction is more than 5d(A). 45 properties in the south east of the village and along the route experience an increase in traffic noise at 25 of which the increase is greater than 5dB(A)	No of people likely to be annoyed by traffic noise in the long term 2020: 47 cf 91 do minimum.	Estimated reduction in population likely to be annoyed by noise in 2020:44
	Local air quality	Predicted NO ₂ and PM ₁₀ concentrations are well below national objectives at all properties. Properties adversely affected are at either end of the scheme where it rejoins the A66. Annual mean NO ₂ and PM ₁₀ concentrations at properties directly facing the existing A66 are significantly reduced	No properties where it quality is improved: NO ₂ 165 improved; 20 worse PM ₁₀ 175 improved; 7 worse	Change in concentrations weighted by the number of properties exposed: PM ₁₀ -341.5 NO ₁₀ -2825.4
	Greenhouse gases	Minor increase in emissions due to introduction of a new length of road and higher traffic speeds on the bypass than through the village.	2005: Tonnes of CO ₂ 10550.8, cf 9400.4 do minimum 2020: Tonnes of CO ₂ 14158.8, cf 12489.8 do minimum	Tonnes of CO ₂ +1153.4 Tonnes of CO ₂ +1669.0
	Landscape	New route cuts across rolling farmland behind village in cutting and on embankment. Adverse effect at bridge crossing the scenic River Eden. Additional balancing pond will not alter the assessment.	N/A	Score: Moderate Adverse
	Townscape	Will largely remove visual impact of traffic through Temple Sowerby Village	N/A	Score: Slight beneficial
	Heritage of Historic Resources	Improved context and amenity for Temple Sowerby Conservation area and listed buildings. Slight adverse impacts on other sites could be adequately mitigated through evaluation, investigating and recording.	N/A	Score: Moderate beneficial
	Biodiversity	Severance impacts on bats, badgers, hedgerows and some loss of mature trees minimised by landscaping. Low risk of construction impacts on River Eden (SSSI, SAC) and species. Minor or neutral impact on other ecological receptors.		Score: Minor Adverse
	Water Environment	Slight adverse impact of structures during flood flow in River Eden. Risk of pollution of high quality river from road drainage mitigated by provision of 5 settlement ponds, an improvement over existing conditions.	N/A	Score: Slight beneficial
	Physical fitness	No change compared to current situation		Score: Neutral
	Journey ambience	Slight change in views with neutral impact. Moderately beneficial effect on traveller stress due to avoidance of village.	N/A	Score: Neutral
SAFETY	Accidents	Reduction in number of road traffic accidents is expected due to operational characteristics of dual carriageway and removal of through traffic from Temple Sowerby village	Accidents low/ high 76.2/ 85.3 Deaths low/ high 3.4/ 4.1 Serious low/ high 17.7/ 19.9 Slight low/ high 92.9/ 98.2	PVB (Resource costs) £3.709m (low growth) £4.183m (high growth)
	Security	No change to the existing condition	-	Score: Neutral
ECONOMY	Transport Economic Efficiency	Journey time savings for the movements of people and freight particularly under future traffic demand as a result of bypassing Temple Sowerby.	Opening Year low / high Vehicle hours saved (2 way) 92,052 / 93,197 Peak time saving (mins) (1 way) 1.22 / 1.27 off peak time saving (mins) (1 way) 0.97 / 0.98	NPV(£m) Low/ high Users: £13.161m / £18.712m Private Providers: £0.055m / £0.080m Public Providers: £-13.033 / £-13.088 Other Government: £1.363 / £1.402m
	Reliability	Improved reliability as proposed 2 lane carriageway will provide uninterrupted traffic flow bypassing the village of Temple Sowerby.	Route stress: Before: 72% After: 21%	Score: Neutral
	Wider Economic Impacts	Improvements to strategic trans-Pennine route.	Does not serve designated regeneration area	Score :No
ACCESSIBILITY	Option values	No change compared to existing conditions, provided bus operators continue to route through the village	N/A	Score: Neutral
	Severance	Removal of existing severance issues in and around Temple Sowerby village, local footpath and road network and severance of farm units. Primarily of local importance therefore assessment score of slight beneficial. Slight adverse effects on footpaths does not outweigh the slight beneficial impact assessed.	N/A	Score: Slight Beneficial
	Access to Transport System	No change in existing conditions subject to bus operators continuing to route through the village	N/A	Score: Neutral
INTEGRATION	Transport Interchange	Scheme provides no rail link and buses will continue to serve village.	N/A	Score: Neutral
	Land Use Policy	Scheme is consistent with County Structure Plan, Eden Local Plan and Regional Guidance. Changes to Planning Policy documents have not altered previous assessment.	N/A	Score: Beneficial
	Other Government Policies	No other government Policies area relevant to this scheme.	N/A	Score :Neutral

Table 7.2 – Evaluation Summary Table

A46 Temple Sowerby Bypass		4.9 km Dual carriageway bypass		Cost: £32m
CRITERIA	SUB-CRITERIA	QUALITATIVE IMPACTS	QUANTITATIVE MEASURE	ASSESSMENT
ENVIRONMENT	Noise	Benefits to local noise climate in Temple Sowerby due to significant reductions in through traffic. Traffic on the bypass similar to forecast and noise from traffic likely to be as expected	-	As expected
	Local air quality	Reductions in through traffic will have benefited local air quality through the village. Traffic flows similar to forecasts on the bypass and air quality likely to be as expected	-	As expected
	Greenhouse gases	Increase in emission due to higher traffic speed	Additional 350 tonnes of carbon (not CO ₂) in 2008	Slightly worse than expected
	Landscape	Mitigation measures included into the scheme and planting establishing well although it will take time to mature and provide full screening of traffic. Further review at FYA	-	As expected
	Townscape	Reduction in through traffic in the village and local traffic calming measures have improved townscape	-	As expected
	Heritage of Historic Resources	Impacts on listed buildings and conservation area beneficial as expected. Archaeology report had not been made publicly available at time of consultation although it would appear that impacts are as expected based on consultation	-	As expected
	Biodiversity	Limited information available to fully evaluate, however mitigation measures in place and impacts are likely to be as expected. Further study at FYA suggested	-	As expected
	Water Environment	New drainage measures in place. EA considers that balancing ponds and measures to mitigate flood risk are satisfactory, and is pleased with the design of the River Eden bridge	-	As expected
	Physical fitness	PROW maintained across bypass as expected and reduction in through traffic has improved environment for pedestrians and cyclists within the village	-	As expected
	Journey ambience	Improvement to journey ambience for through traffic no longer needing to slow/stop through village and free flowing traffic on the bypass. Views from the road across attractive landscape as expected.	-	As expected
SAFETY	Accidents	Slight reduction in accidents in the COBA area, but too few accidents in total to test statistical significance.	Accidents Deaths Serious Slight 24 1 6 29	PVB £6.5m 23% of PVC
	Security	No impact	-	Neutral
ECONOMY	Transport Economic Efficiency	Journey time savings for through traffic.	Peak Interpeak 2.4 min 2.4 min	PVB £64.8m 229% of PVC
	Cost	-	-	PVC £28.3m
	Reliability	Improved reliability due to increase in road capacity	Route stress: Before: 66% After: 18%	-
	Wider Economic Impacts	Improves a strategic trans-Pennine route, but does not serve a regeneration area.	-	As expected
ACCESSIBILITY	Option values	No impact, as bus service remains unchanged	-	Neutral as expected
	Severance	Improvement due to diversion of 95% of traffic from Temple Sowerby to the bypass	-	As expected
	Access to Transport System	No impact, as bus service remains unchanged	-	Neutral as expected
INTEGRATION	Transport Interchange	No impact, as no rail link provided and bus service remains unchanged	-	Neutral as expected
	Land Use Policy	Consistent with transport policies	-	As expected
	Other Govt Policies	No impact	-	Neutral as expected

8. Conclusions

Introduction

- 8.1 The A66 Temple Sowerby bypass officially opened on 18 October 2007. This section draws together the main conclusions about the impacts of the bypass one year after opening.

Traffic Impact

- 8.2 One year after opening, the average weekday volume on the bypass is about 15,900 vpd. Traffic has fallen by 94% on the old A66 through the village, to about 900 vpd. The observed traffic flows are close to predictions.
- 8.3 Journey time savings of about 2 to 3 minutes are experienced by through traffic using the bypass, similar to the predicted saving. Average speed has doubled from about 54 kph to about 111 kph. Slightly higher speeds are also observed on the existing A66 beyond the scheme.

Safety

- 8.4 No injury accidents have occurred on the bypass or the old A66 in Temple Sowerby in the year since the scheme opened. However, on the COBA network, which extends beyond the scheme limits, there have been four accidents, representing an average annual decrease of only 17%. However, one year is too short a time to draw firm conclusions.

Economy

- 8.5 The cost of the scheme was £28.3 million. From the POPE methodology, the 60-year benefit from time savings is £64.8 million (36% higher than expected) and the accident benefit is £6.5 million (68% less than predicted). The BCR is 2.5.

Environment

- 8.6 Environment impacts are generally as expected. Earthworks and planting partially screen sensitive adjacent properties, but reduce long distance views. The landscape elements of the 'green bridge' require additional maintenance and attention
- 8.7 As a result of increased speeds, opening year carbon emission has increased by 350 tonnes (about 10%) on the COBA network, a slightly higher value than predicted.
- 8.8 The reduction in traffic flow and the de-trunking measures in Temple Sowerby have reduced the impact on townscape. An published archaeology report had not been provided to the County Archaeologist at the time of the consultation.
- 8.9 Further targeting of aerial photography anomalies and entire monitoring of the topsoil strip would be preferred by the County Archaeologist on future schemes.

Accessibility

- 8.10 Severance in the village has reduced, owing to the transfer of 94% of the traffic from the old A66 to the bypass. Other aspects of Accessibility and Integration have remained unchanged.
- 8.11 The following table shows how the scheme objectives have been fulfilled.

Table 8.1 – Fulfilment of Scheme Objectives

Objective	Achieved?
Provide a dual carriageway bypass to cater for predicted traffic growth	Yes
Remove through traffic from the village	Yes
Reduce noise	Yes (in village)
Reduce severance	Yes (in village)
Enhance safety for all road users including pedestrians	Numbers too small to detect significant reduction at one-year-after stage

Appendix A – Traffic Volumes

Table A.1 – Traffic Volumes (AWT)

Count Location	Easting	Northing	Before	Immediately After	1 Year After
A66 E of Penrith	356401	528884	15,700	18,200	17,000
A66 E of Temple Sowerby	362048	526380	15,400		
A66 Temple Sowerby Bypass	360294	527673	-	13,300	15,900
A66 E of Appleby	372776	517438	13,500	14,800	13,800
A66 W of Bowes	398543	513486	16,200	17,200	16,500
A685 E of Tebay	362464	505154	5,400	6,100	5,500
A685 N of Kirkby Stephen	379239	511980	7,200	7,000	7,100
A685 S of Brough	379500	513800	5,900	5,800	6,000
Bypass WB Link, E of village	361410	526290		550	580
Bypass EB Link, E of village	361430	526610		600	630
A66 E of Chapel Street	361360	526790	14,800	1,300	910
A66 E of B6412	360730	527760	14,700	1,200	880
Bypass WB Link, W of village	359790	528420		640	690
Bypass EB Link, W of village	359620	528480	760	730	760
Lane to Cliburn, S of A66	359450	528380	130	160	130

Appendix B – Journey Times

Table B.1 – Journey Times Via Bypass(min)

Timing Points	Westbound			Eastbound		
	AM	IP	PM	AM	IP	PM
1-2	4.15	4.33	4.55	1.32	1.35	1.33
2-3	1.30	1.25	1.23	3.28	3.42	3.60
3-4	0.45	0.48	0.48	0.50	0.38	0.42
4-5	1.50	1.45	1.48	1.58	1.40	1.43
5-6	0.48	0.38	0.42	0.47	0.48	0.47
6-7	3.68	3.27	3.67	1.25	1.37	1.53
7-8	1.82	1.55	1.48	5.13	4.90	5.38
TOTAL	13.38	12.73	13.32	13.55	13.32	14.15

Table B.2 – Journey Times Via Temple Sowerby (min)

Timing Points	Westbound			Eastbound		
	AM	IP	PM	AM	IP	PM
8-7	0.50	0.50	0.50	0.53	0.55	0.53
7-6	0.78	0.80	0.80	0.32	0.30	0.30
6-5	0.92	0.92	0.92	0.75	0.80	0.80
5-4	1.02	1.02	1.02	1.18	1.18	1.18
4-3	0.82	0.82	0.82	0.68	0.70	0.70
3-2	0.50	0.50	0.50	0.37	0.33	0.38
2-1	0.45	0.45	0.45	0.62	0.63	0.62
Total	4.98	4.98	5.00	4.45	4.50	4.52

Appendix C – Environment

C.1 Introduction

C.1.1 This section is the evaluation of how the scheme is performing against the environmental sub-objectives for highways schemes as defined in WebTAG.

C.2 Data Collection

C.2.1 The Data Collection process consisted of four main stages:

- Site Inspection;
- Undertaking Consultations with statutory environmental bodies; and
- Consultation with the local authority.

Obtaining and Analysing Data

C.2.2 Copies of the following documents have been used in the compilation of this section of the report:

- Appraisal Summary Table;
- A66 Temple Sowerby Bypass and Improvements at Winderwath Environmental Statement June 2002 Volume 1 Scheme Information and Summary of Assessment, Volume 2 Detailed Assessment;
- Landscape As-Built Drawings (Draft) 16.02.09;
- A66 Temple Sowerby Bypass and Improvements at Winderwath Summary Landscape and Ecology Aftercare Plan (LEAP Summary);
- A66 Temple Sowerby Bypass and Improvements at Winderwath Ecological Update Report, December 2007 (Construction Phase); and
- De-Trunking Works to Existing A66 through Temple Sowerby Drawings.

C.2.3 The full list of background information requested and received to help with the compilation of this report is included in Table C.1 below.

Table C.1 – Standard List of Information Requested and Received

Box 1 Item	Information Provided
Environmental Statement	Provided by HA
Appraisal Summary Table	Provided by HA
Any amendments, updates or addendums to the ES or any relevant further studies or reports. Any significant changes to the scheme since the ES.	None provided
'As Built' drawings for landscape, ecological mitigation measures, drainage, fencing, earthworks etc.	Draft Landscape As Built drawings
Landscape and Ecology Management Plans	Summary of LEAP provided

Construction Environment Management Plan	CEMP provided
Relevant contact names, of people with knowledge of the scheme, at: the statutory consultees (Environment Agency, English Heritage and Natural England); the local authorities; the designer or environmental coordinators for the scheme and for the MAC; and, any other relevant specialist consultees that were contacted.	Provided by HA and directly by POPE team Environment Agency Eden DC, Conservation and Design: Bridget Eden DC, Environmental Health: Cumbria CC, Countryside Access, Cumbria CC , Heritage: MAC, Amey Mouchel: MAC, Amey Mouchel.
Archaeological reports (popular and academic)	Unpublished reports provided
List of properties eligible for noise insulation	None
List of Part 1 Claims regarding noise, air quality or lighting (from HA National Part 1 Team)	Too early in the claims process and will be provided for FYA report
Results of any post opening survey or monitoring work e.g. ecology surveys, water quality surveys pre- and post- construction	A66 Temple Sowerby Bypass and Improvements at Winderwath Ecological Update Report, December 2007 (Construction Phase);
Animal mortality data, pre and post scheme construction	None currently available from MAC
Any scheme newsletters or publicity material for the scheme	Available on HA web page
Copy of the Non-motorised User (NMU) post opening survey	Not undertaken
Information may be available regarding environmental enhancements to streetscape/townscape for bypassed settlements	De-Trunking Works to Existing A66 Through Temple Sowerby Drawings

Site Inspection

C.2.4 A site inspection of the scheme took place in June 2009.

Consultations

C.2.5 Three statutory environmental organisations (Natural England, English Heritage and the Environment Agency) and the local authorities have been contacted regarding their views on the impacts they perceive the road scheme has had on the environment, and whether they feel that the mitigation measures implemented have been effective.

C.2.6 Table C.2 lists the organisations contacted, their area of interest, and the responses received.

Table C.2 – Summary of Environmental Consultation Responses

Organisation	Field of Interest	Comments
Natural England contacted via telephone and email	Biodiversity & Landscape	Unable to comment due to a lack of resources within the timeframe for responses to be returned (18 working days)

Organisation	Field of Interest	Comments
English Heritage contacted via email	Heritage	Passed enquiry to Cumbria CC
Environment Agency contacted via telephone and email	Water	Unable to make detailed comments. Pleased with design/delivery of bridge over River Eden.
Cumbria County Council contacted via email	General	Commented on public rights of way and heritage. No comments on landscape or biodiversity.
Eden District Council contacted via telephone and email	General	No comments on water or emissions. No complaints received from public. Comments on Temple Sowerby conservation area.

C.2.7 The Highways Agency Part 1 Team has been contacted regarding part 1 claims and it is understood that it is too early in the claims period to say how many will be successful and it is suggested that this information should be made available for the FYA report.

C.2.8 The MAC was also consulted with regard to animal mortality figures, but no current annual figures were yet available. The MAC should be re-contacted for the FYA report.

Evaluation

C.2.9 The following environmental sub-objectives have been evaluated in this report:

- Noise,
- Local Air Quality,
- Greenhouse Gases,
- Landscape,
- Biodiversity,
- Heritage,
- Water Environment,
- Physical fitness; and
- Journey Ambience.

C.2.10 Three of the environmental sub-objectives (noise, local air quality and greenhouse gases) are directly related to traffic flows. The ES noted that the annual average daily traffic (AADT) two-way flow in the 'base year 2000' on the A66 at Temple Sowerby was 13,011 vehicles to the east of the Temple Sowerby and 13,212 to the west. Approximately 34% were HGVs. Traffic was expected to reduce within the village by about 93%.

C.2.11 The ES compared the future year traffic forecasts with and without the scheme. Observed after opening traffic flows on the new and old A66 flows in the opening year are within 10% of predictions. There are greater percentage differences on the four link roads, although the absolute values are small.

C.3 Noise

Forecast

- C.3.1 The AST predicted there would be about a 90% reduction in traffic in the village centre which would result in a significant reduction in traffic noise in the village. In 2020, 147 properties would experience a reduction in traffic noise and of those, for 129 it would be more than 5dB(A). 45 properties in the south east of the village and along the route would experience an increase in traffic noise and at 25 of these the increase would be greater than 5dB(A).
- C.3.2 The AST quantitative assessment predicted that the number of people likely to be annoyed by traffic noise in the design year (2020) would be 47, an estimated reduction of 44 (compared to the 'do minimum' of 91).
- C.3.3 The ES noted that the proposed earth mound along the edge of the bypass to the south-east of the village, and to the west by the construction of the bypass in a cutting, would provide additional mitigation to residential properties.
- C.3.4 The ES concluded that the effects of the scheme on the local noise climate would be:
- The operation of the scheme would result in an immediate reduction of 14 people bothered by traffic noise from the A66 in 2005, which was a fall from 82 in the baseline situation to 68 with the scheme in operation. In the long term in 2020 a reduction of 44 people likely to be bothered was predicted.
 - No properties would be eligible under the Noise Insulation Regulations;
 - A reduction in the number of people bothered by traffic induced vibration, of 33 in 2005 and 37 in 2020 was predicted due to the operation of the scheme.
 - The greatest reduction in the number of people bothered by noise would be in the number of people exposed to the highest noise levels over 60 dB(A).
 - Noise levels in the centre of Temple Sowerby at properties facing the existing A66 would fall by over 10 dB(A), a halving of the perceived noise level.
 - A number of properties on the southern edge of the village, and isolated properties along the route of the bypass would be closer to the scheme than the existing A66 and would therefore experience an increase in noise levels. The location of the bypass in a cutting and the use of earth mounding would minimise the noise impact at the majority of these properties.
 - A number of residential properties at each end of the scheme experienced high traffic noise levels due to the proximity of the A66. The operation of the scheme would have little impact on noise levels at these properties.

Consultation

- C.3.5 Cumbria CC commented that it was not aware of having received any complaints regarding noise.

Evaluation

- C.3.6 The earth mounding and cuttings have generally been constructed in accordance with the ES. As the Ash Hill Farm accommodation bridge was not required there are no embankments in this area but it is not thought that this will have had any impact on noise levels.

C.3.7 In the ES, no noise barriers were required as part of the scheme mitigation. However, a noise barrier has been erected adjacent to the eastbound carriageway above the PROW 368006 underpass, as a result of an objection at the Public Inquiry, see Figure C.1.

Figure C.1 – Noise barrier above the PROW underpass visible in distance



C.3.8 Table C.3 illustrates the A66 traffic flows as forecast in the ES, observed traffic flows for the Bypass and old A66 after opening and uplifted forecasts using standard traffic forecasting methods.

Table C.3 – Forecast and observed traffic flows for the A66

Year	AADT		
	East of Temple Sowerby	West of Temple Sowerby	New Bypass
Existing Flows in ES base year 2000	13,000	13,200	-
Predicted Flows in ES opening year 2005	740 to 770	950 to 1,000	13,200 to 13,800
Predicted Flows in ES uplifted to opening year 2007	760 to 800	980 to 1,000	13,500 to 14,400
Observed flows in 2007	820	800	14,800
Predicted Flows in ES design year 2020	890 to 1,000	1,100 to 1,300	15,900 to 18,300
Predicted Flows in ES design year uplifted to 2022	900 to 1,100	1,200 to 1,400	16,200 to 18,900
Updated predicted flows for design year 2022	980	950	17700

C.3.9 The key points shown by this traffic data are:

- Traffic along the old A66 through the village has significantly reduced. Traffic flows are within +1% of forecast east of Temple Sowerby and -18% west of the village. It is considered that the local noise climate will have improved as expected;
- Observed traffic flows on the bypass after opening indicate that flows are slightly higher (3%) than the uplifted high growth ES forecasts and it is likely that traffic

noise has increased for properties on the south east of the village and isolated properties along the route, in line with expectations; and

- The scheme itself has not led to an increase in traffic on the A66, the traffic counts between 2005 (before the scheme) and 2007 after opening indicate a 4 to 5% increase in traffic due to expected traffic growth.

C.4 Local Air Quality

Forecast

- C.4.1 The AST predicted that NO₂ and PM₁₀ concentrations are well below national objectives at all properties. Properties adversely affected are at either end of the scheme where it rejoins the existing A66. Annual mean NO₂ and PM₁₀ concentrations at properties directly facing onto A66 are significantly reduced.
- NO₂: 165 properties expected to experience improvement, 20 properties to experience deterioration.
 - PM₁₀: 178 properties expected to experience improvement, 7 properties to experience deterioration.
 - The assessment concluded that the change in concentrations weighted by the number of properties exposed was; PM₁₀ - 341.8, NO₂ - 2825.4.
- C.4.2 The ES noted that the background pollution concentrations in the vicinity of Temple Sowerby were very low due to the predominantly rural nature of the surrounding area and the large distances from significant sources of pollution, such as power stations and large urban areas.
- C.4.3 The ES concluded that the effects of the scheme on air quality would be;
- An improvement or no change in air quality at 165 properties and a worsening (very minor) at 20.
 - Significant reductions in pollution concentrations would occur at properties within Temple Sowerby, in particular properties that faced directly onto the road.
 - The predicted NO₂, PM₁₀, CO, benzene and 1,3 butadiene concentrations at all residential properties were well below the UK Air Quality Strategy objectives.
 - The higher average speeds on the Bypass than in the centre of the village was predicted to result in a slight increase in the total quantity of NO₂, CO₂, and CO produced by the route, and a slight decrease in PM₁₀ and NHMC, however, this was considered insignificant on a national scale.

Consultation

- C.4.4 Eden DC commented that it had no evidence of changes in air quality, but that the scheme will be included in an Air Quality Updating, Screening and Assessment to be undertaken in 2009, in terms of traffic flows and the effect on NO₂ and PM₁₀.

Evaluation

- C.4.5 Based on no significant changes in observed traffic flows on the bypass being close to the forecasts used in the ES, it is likely that local air quality impacts are as expected, including a substantial beneficial improvement in the village centre for all five pollutants, due to the significant reduction in traffic on the old A66.

C.4.6 The results of the local authority assessment should be included in the FYA report.

Greenhouse Gases

C.4.7 For transport, the most significant greenhouse gas is carbon dioxide, and by current guidelines this is reported in terms of tonnes of carbon. The AST gave a prediction in terms of carbon dioxide, for the years 2005 and 2020. The AST figures have been converted to the carbon equivalent, and directly interpolated to 2008, giving a predicted increase of 343 tonnes in the opening year, as shown below in Table C.4.

C.4.8 POPE evaluations are based on COBA version 11.7, where possible. This is the only version of the program that calculates carbon emissions. The scheme forecasting employed COBA version 11.1, and with a few modifications to the input format, it has been possible to re-run the data in version 11.7, for the year 2008. The results are shown the ‘POPE’ columns of the table.

C.4.9 In the ‘predicted’ case, the original traffic flows were retained, giving an increase of 312 tonnes of carbon. The ‘actual’ case is based on observed flows, and this gives an increase of 350 tonnes for the COBA network. The increase arises from the fact that the scheme allows higher traffic speeds, in the range where carbon emission increases with speed.

Table C.4 – Tonnes of Carbon Emitted in 2008

	AST	POPE	
		Predicted	Actual
Without Scheme	2732	3278	3405
With Scheme	3075	3590	3755
Increase	343	312	350

C.4.10 The ‘actual’ increase is close to prediction, but slightly greater. This is to be expected, because traffic flows have proved to be similar to predictions, but slightly greater on the A66.

C.5 Landscape and Townscape

Forecast

C.5.1 In the AST, the assessment of the schemes impact on the landscape sub-objective is that the new route would cut across rolling farmland behind the village, in cutting and on embankment. There would be an adverse effect at the bridge crossing of the scenic River Eden. Additional balancing ponds would not alter the assessment. A moderate adverse effect was predicted overall.

C.5.2 In the AST, the assessment of the schemes impact on the townscape sub-objective is that the route would largely remove visual impact of traffic through Temple Sowerby village. A slight beneficial effect was predicted overall.

C.5.3 The ES noted no landscape designations that would be affected by the proposals.

C.5.4 The Mitigation Strategy given in the ES was;

- Design of the river crossing to take advantage of the landform of the river terraces, to ensure at least partial screening of views from the surrounding areas.

- Additional planting to extend Oglebird Plantation to help absorb the scale of the new bridge.
- Woodland planting blocks to provide screening and to help the scheme integrate into the wider landscape.
- Areas of species rich grassland to improve biodiversity.
- Redundant lengths of side roads broken out and planted.
- Some loss of existing planting and hedges mitigated by new planting;
- Balancing ponds planted with marginal plants.
- Offsite planting to supplement screening for specific residential receptors.
- Reconstruction of redundant stone walls.

C.5.5 The ES stated that the effects of the scheme on landscape and townscape would be;

- Significant impacts associated with the construction of the large scale new river crossing over the Eden in a tranquil and visually enclosed location.
- Significant impacts associated with the introduction of the new road in the open landscape at Ash Hill.
- Significant impacts associated with the split level junction to be introduced at Morland Road.
- Overall moderately adverse effects identified in ES primarily due to the open character and elevated slopes of the agricultural landscape around Temple Sowerby, and the significant constraints that this placed upon opportunities to mitigate through planting.

C.5.6 Townscape Effects;

- Removal of traffic from the route of the existing A66 identified in ES as slight beneficial effect.

C.5.7 Visual effects;

- Significant visual impact associated with visibility of route alignment where it would pass over the open landscape of Ash Hill.
- Significant visual impact associated with loss of visual amenity in the vicinity of the River Eden crossing affecting the Riverside footpath and residential property at Edenbank.
- Significant visual impact associated with loss of panoramic views in the vicinity of the split level Morland Road junction that would become obscured by vegetated embankments.
- Overall moderate adverse effects identified in ES primarily due to existing open views in the area that would be either interrupted by the presence of the Bypass (primarily to the north west of the scheme) or blocked, significantly shortened or enclosed by the introduction of wooded embankments and false cuttings (primarily to the south east of the scheme).
- Viewpoints where impacts were predicted to be severe at Opening Year were; Ash Hill Farm, Croft Place, properties on existing A66 (east of Eden Garage, Illings View, Edenbank, new estate at Vicarage Lane, public footpath along River Eden.

Consultation

- C.5.8 Natural England and Cumbria CC both stated that they were unable to respond to the request for comments due to a lack of resources.

Evaluation

- C.5.9 Landscape areas would appear to have been implemented in line with the ES design. It is understood that some changes have been necessary as the detailed design was developed e.g.

- Scattered trees were omitted from Cliburn Road junction because the slopes were too steep, and extensive land drains were required as part of the engineering design Figure C.2 below. The absence of scattered trees in this location has not adversely affected the landscape or visual effect;

Figure C.2 – Steep slopes with extensive land drains and wildflower seeding at Cliburn Road junction



- Additional balancing ponds were built adjacent to the east bound / existing A66 connector road and adjacent to the west bound / Morland Road intersection. The additional ponds have not adversely affected the landscape or visual effect, and may have improved biodiversity;
 - The proposed farm accommodation overbridge for Ash Hill Farm was not built and planting was adapted accordingly. This has not adversely affected the landscape or visual effect, and
 - An underpass was constructed to connect Vicarage Lane and the PROW 368066 south of the bypass. This has not adversely affected the overall landscape or visual effect, although the concrete finish of the structure is not sympathetic to local building materials (red sandstone).
- C.5.10 At the time of the site visit, most planting appeared to be establishing very well. Grass within plots had been cut and weed free circles were clearly visible around each plant. Trees were well protected with plastic tubes, all upright and in good condition. See

Figure C.3. Offsite planting has also been undertaken as expected. Redundant lengths of side roads have been broken out and planted as expected.

Figure C.3 – Planting establishing well adjacent to eastbound cycle track



C.5.11 Six feathered oaks along the westbound cycle track (ch3825 – ch4480) had failed Figure C.4. Replacement planting is specified to be undertaken as part of the contract aftercare programme. Noxious weeds were evident in the hedgerow along Cliburn Road, but otherwise weed control was very good.

Figure C.4 – Failed feathered oak along the westbound cycle track (ch3825 – ch4480)



C.5.12 All areas that had been seeded with wildflowers were in flower at the time of the site visit, although the majority of plants flowering at that time were ox-eye daisy and bird's foot trefoil. The details of seed mixes were not available at the time of writing, but should be obtained at FYA to help evaluate establishment of biodiversity measures.

C.5.13 The balancing ponds all contained water, and the marginal planting was establishing well, including yellow flag, purple loosestrife, rushes and forget-me-nots. See

C.5.14

C.5.15 Figure C.5

Figure C.5 – Well established marginal vegetation and wildflowers at balancing pond adjacent to Cliburn Road link road



C.5.16 The earthworks and ground modelling have successfully reduced views of traffic from Illings View, houses to the east of Eden Garage, Croft Lane and the new estate at Vicarage Lane, although views across open farmland to the south have been adversely affected as anticipated. See Figure C.6.

Figure C.6 – Earth bund and mitigation planting adjacent to Illings View screen road but reduce views of wider landscape



C.5.17 The 'green bridge' connecting Acton Lodge bridleway with the bridleway to the south has been paved with a permeable concrete paving see Figure C.10 in Physical Fitness sub-section. Narrow verges have been constructed along the edge of the bridge, planted

with dog rose. The plants are showing signs of considerable stress, due to lack of water and plant nutrients, and weeds are prevalent. It is likely that extensive replanting will be necessary, and the lack of available water and plant nutrients addressed.

- C.5.18 The new bridge crossing the River Eden is constructed from steel and concrete with a metal parapet. The view from the PROW along the riverbank has been adversely affected as expected. See Figure C.7.

Figure C.7 – The new bridge crossing the River Eden is constructed from steel and concrete with a metal balustrade. The view from the PROW along the riverbank has been adversely affected



- C.5.19 Considerable lengths of dry stone walls have been constructed and restored, and are a valuable landscape element.
- C.5.20 It is understood that the maintenance of verges was handed over to the MAC in spring 2008; landscape areas remain the responsibility of the landscape contractor until December 2010.
- C.5.21 The reduction in traffic flow through Temple Sowerby, and the de-trunking measures that have been carried out on the existing A66, including reducing the width of the road by extending the grass verges and reducing the speed limit to 30mph, have reduced the impact of the road on the townscape and on the setting of the conservation area and listed buildings as expected.
- C.5.22 A summary of the Landscape and Ecology Management Plan was provided for the production of this report, but a Handover Environmental Management Plan (HEMP) will be issued towards the end of the three year aftercare period and a copy should be made available for the FYA report. It is too soon to evaluate the longer term establishment of the landscape planting and this should be considered as part of the FYA study.

C.6 Biodiversity

Forecast

- C.6.1 The AST stated that there would be severance impacts on bats, badgers hedgerows and some loss of mature trees minimised by landscaping, and that there was a low risk of construction impact on River Eden (SSSI, SAC) and species. There would minor or neutral impacts on other ecological receptors. The overall effect was assessed as minor adverse.
- C.6.2 The ES identified that designated sites (River Eden SSSI and SAC) would only be potentially affected by the scheme during the construction phase, and that any risk would be largely mitigated by good site practice. The overall impact on ecology and nature conservation was considered to be of low significance.
- C.6.3 Most of the effects associated with the operation of the scheme were identified as habitat fragmentation, including the following;
- Loss of individual trees with potential as bat roosts;
 - Loss or severance of existing hedgerows important navigation routes for bats some of which roost in properties in the village and fly down the river valley to feed;
- C.6.4 Mitigation measures would include;
- The new bridges and landscaping will help maintain links for bats and other wildlife to cross the bypass as well as providing new habitats for animals to forage;
 - Installation of badger fencing where necessary;
 - Measures to protect the river during highway construction and operation (see water section for details).

Consultation

- C.6.5 No consultation comments have been received from Natural England.
- C.6.6 Cumbria CC stated that it had no involvement, apart from providing some advice at the very beginning of the scheme, and therefore could not comment further.

Evaluation

- C.6.7 It is understood that the River Eden is designated as a candidate Special Area of Conservation (cSAC) and SSSI because it is clean and relatively unmodified with many important or protected species including otter, white-clawed crayfish, Atlantic salmon, floating water crowfoot communities, brook lamprey, river lamprey, sea lamprey and bullhead. It was not expected that the scheme would have any impact on these species. Ecological monitoring was undertaken during the construction phase and the 2007 report noted that there were no impacts on the River but no post opening information has been made available. Ongoing badger and bat monitoring is to be carried out during the three year after care period (2008 -2010), and a copy of the report should be made available for the FYA report.
- C.6.8 Apart from the river Eden most of the area crossed by the bypass was stated to have few features of nature conservation value.

- C.6.9 New and replacement habitats have been created within the highway boundary as expected, including hedgerows for bat and badger connectivity, woodland, ponds, species rich grassland and dry stone walls.
- C.6.10 Shrub planting on the 'green bridge' was intended to aid bat and badger connectivity, but the planting is not performing well.
- C.6.11 Two mammal crossings have been constructed. It was too dry at the time of the site visit to determine whether the tunnels are in use. Animals could also make use of the other underpasses. See Figure C.8. Animal mortality information was not available from the MAC.

Figure C.8 – Mammal crossing near Cliburn Road junction



- C.6.12 Extensive lengths of badger fences have been erected and all were in good condition at the time of the site visit.
- C.6.13 Balancing ponds were well vegetated with marginal plants.
- C.6.14 The species rich grassland areas were flowering well, but appeared to consist of only a few species. The details of seed mixes were not available at the time of writing, but should be obtained at FYA to help evaluate establishment of biodiversity measures.
- C.6.15 Very little information has been made available on which to fully evaluate the impacts of the scheme on biodiversity and the effectiveness of the mitigation measures and these aspects should be considered in more detail at FYA. It is suggested that consultation could be extended at FYA to include the local wildlife trust which might have knowledge of the area. The HEMP should also be available by then and might included information relating to any ongoing monitoring to be undertaken as part of the scheme.

C.7 Heritage of Historic Resources

Forecast

C.7.1 The AST stated that there would be an improved context and amenity for Temple Sowerby Conservation Area and Listed Buildings. Slight adverse impact on other sites could be adequately mitigated through evaluation, investigation and recording. It was predicted that there would be a moderate beneficial impact overall.

C.7.2 The ES stated that the damage caused to the archaeological resources could be mitigated by a programme of evaluation, investigation and recording in advance of construction. The study area contained:

- 2 scheduled monuments;
- 10 unscheduled archaeological sites;
- 13 records of unprovenanced early prehistoric finds;
- 27 listed buildings and a conservation area but no registered historic parks and gardens; and
- historic battlefields or unlisted buildings of architectural or historic interest.

C.7.3 Forecast effects of the scheme and mitigation strategy:

- Damage caused by the scheme to archaeological resources could be mitigated through a programme of evaluation, investigation and recording in advance of construction;
- Operation of the scheme was anticipated to have no direct physical impact upon any archaeological remains, but by decreasing the level and speed of the passing traffic, might result in a slight beneficial effect on the setting of the scheduled Roman milestone;
- By removing through traffic from the existing A66 corridor, and new screen planting, the scheme would have a slight beneficial effect on the listed building complex at Spitals Farm;
- Removal of through traffic from Temple Sowerby village would have a considerable benefit to the amenity of both the Conservation Area and those listed buildings along the existing A66. However, the road corridor would remain as a dominant and visually intrusive feature, and the bypass would have only a slight beneficial effect on the historic character and appearance of the Conservation Area and the setting of listed buildings along the A66 corridor; and
- Suggested measures to de-trunk the existing A66 within the village included removal of red surfacing treatment in the centre of the carriageway, provision of footways for pedestrians and reducing the scale of the existing road.

Consultation

C.7.4 English Heritage was unable to provide comments.

C.7.5 Eden District Council commented that the scheme has transformed the village, including a reduction in noise, the absence of continual heavy traffic enables the architectural quality of the buildings to be appreciated and the fragmentation and separation of the Conservation Area and the rest of the village has been removed.

C.7.6 Cumbria County Council commented that the density of archaeological remains was not high, so the impact on the historic environment was not significant and that there had been no unforeseen impacts on historic resources. The archaeological evaluation strategy was considered adequate, but further targeting of aerial photography anomalies and permanent monitoring of the topsoil strip would be preferred for future schemes. Regarding the reporting, publication and archiving of the archaeological work, it was noted that the draft report for publication in the local archaeological journal has not yet been completed.

Evaluation

C.7.7 The Roman milestone has been enclosed by metal railings, with an interpretation board, although it is understood that these works were carried out by the MAC, but not as part of the scheme.

C.7.8 The de-trunking works to the former A66 included reducing the width of the road by extending the grass verges, removing the central red surface treatment and reducing the speed limit to 30mph.

C.7.9 Based on the information provided, it is considered that the impacts on cultural heritage and archaeology are as expected.

C.7.10 The published Archaeology report had not been provided to the County Archaeologist at the time of the consultation. A copy of the published report should be made available to POPE for the FYA report.

C.8 Water Environment

Forecast

C.8.1 The AST stated that there would be a slight adverse impact of structures during flood flow of River Eden, that there would be a risk of pollution of a high quality river from road drainage, mitigated by provision of 5 settlement ponds, an improvement over existing conditions. A slight beneficial impact was predicted overall.

C.8.2 The ES noted that the scheme avoided physical interruption of, or damage to, any permanent hydrological features, with negligible effects expected on temporary hydrological features. By preventing rapid storm runoff from the road surface, the existing flood response characteristics of the main River Eden would be maintained. Treatment of the runoff waters, combined with spillage containment, would ensure that the quality of the River Eden and other hydrological features would not be adversely affected during the operation of the scheme. The River Eden would remain within the general quality assessment class A, RE1, with respect to the highway derived pollutants examined for the scheme. The overall effects of the scheme on water quality and drainage were expected to be negligible.

C.8.3 Forecast effects of the scheme and mitigation strategy:

- The operation of the scheme was not anticipated to have any adverse effects on existing hydrological features, drinking water abstractions or groundwater other than subsurface flows. Drainage via seasonally dry valleys would be maintained;
- Winter road salt would raise the conductivity of runoff, but because of mitigation measures in the drainage design, the effects of raised conductivity were calculated to be negligible;

- The drainage design would reduce the risk of major spillage incident to less than 1 in 300 years;
- The new embankment would reduce the storage of the floodplain by 0.1%, a negligible loss;
- The proposed bridge supports would cause some very localised impedance to flow during flood conditions, but the effects on the main river channel 50 – 100 m downstream were likely to be negligible;
- drainage culverts would be installed beneath the Scheme to maintain flows to existing hydrological features;
- measures to collect and treat carriageway runoff would include lined drains and balancing ponds, and
- the balancing ponds would provide interception and treatment of silts, heavy metals, and soluble pollutants (oils, greases and biodegradable organics) and would also attenuate sudden influxes of highway runoff from entering the river, and act as a storage facility in the event of a highway spillage.

Consultation

- C.8.4 The Environment Agency was unable to make detailed comments on how the scheme delivered compared with expectations, but was pleased with the design/delivery of the bridge over the River Eden and its set-back from the riverbanks. EA also observed that;
- the detention basins constructed to manage the runoff of surface water from the carriageway appear to be functioning as per the design brief;
 - the bridge design was such that it minimised the potential impact on the floodplain and since completion there have not been any major flood events in this part of the Eden catchment;
 - it is assumed that the bridge crossing has not had a major impact on flood risk elsewhere, and there have been no reports of flood risk problems associated with the scheme to date; and
 - The EA was not aware of any changes/improvements to the local watercourses that are a direct result of the scheme being constructed.

C.8.5 Eden District Council had no comments on water quality or drainage.

Evaluation

- C.8.6 All 5 balancing ponds contained water at the time of the site visit, and vegetation was well established.
- C.8.7 All drainage channels noted during the site visit were clear of vegetation. See Figure C.9.

Figure C.9 – Drain north of Ash Hill Farm



- C.8.8 The As Built drawings indicate that additional land drains have been constructed on the slopes at the Cliburn Road junction.
- C.8.9 Pollution control measures have been included in the balancing ponds.
- C.8.10 No information has been made available which would suggest that the highway drainage measures are working other than as intended or that there have been any pollution incidents. The EA considers that balancing ponds and measures to mitigate flood risk are satisfactory, and is pleased with the design of the River Eden bridge. Based on the information available it is assumed that the impacts on the water sub-objective are as expected.

C.9 Physical Fitness

Forecast

- C.9.1 The AST stated that there would be no change compared to the existing condition, with a neutral impact predicted overall.
- C.9.2 The ES noted that before the scheme was built the following facilities existed;
 - There were 8 footpaths and 3 bridleways in the area, as well as footways either side of the existing A66, although any walking along the A66 provided a hostile environment;
 - The Eden Valley was noted as popular with cyclists, but due to the severance caused by the existing A66, the Temple Sowerby area was often avoided;
 - The River Eden footpath provided part of the circular route from Acorn Bank (National Trust property), and

- An equestrian business used the bridleways to the west of the village, but there were limited opportunities for equestrians around Temple Sowerby, and there were problems crossing the A66.

C.9.3 Mitigation strategy and effects;

- A package of measures for de-trunking the existing A66 within Temple Sowerby village, including traffic calming, provision of footways or reducing the width of the existing road;
- Dedicated cycle tracks and signage at each end of the scheme to direct cyclists off the Bypass and on to the existing A66 through Temple Sowerby;
- Provision of under-bridges at Morland Road and Cliburn Road would facilitate pedestrian and cycle movements at each end of the Scheme;
- A 'green bridge' would be constructed to accommodate bridleway 368005. The bridge would have parapet rails of 1.8m for the safety of horse riders, a soil covered finish vegetated with grassland and shrubs planted to tie in with existing hedges to encourage use by badgers, bats and other wildlife.
- Directional brown tourist signs would be provided to offset the expected reduction in passing trade for the village pub, hotel, Winderwath Gardens and Acorn Bank.

Consultation

C.9.4 Cumbria County Council commented that public rights of way have been maintained across the bypass scheme as expected, but the following issues have been raised:

- Stoned routes through a corridor of post and rail fencing are not attractive, and more room could have been left to allow green verges to develop;
- The cycle route that leaves the A66 eastbound could have been designed to limit the speed of cyclists especially where it joins Morland Road;
- The changes in road level and planting will separate routes and provide an acoustic screen;
- More consultation with Parish and County Councils could have resulted in a more commodious scheme for users, and
- The draft side road order was drawn up before the Disability Discrimination Act 2005 was implemented, and subsequently the least restrictive barrier type was not installed.

C.9.5 Eden District Council expressed concern that a reduction in through traffic may threaten the vitality of the village, and the commercial viability of the village pub and hotel.

Evaluation

C.9.6 As expected, existing footpaths and bridleway connections have been maintained.

C.9.7 The existing bridleway from Temple Sowerby to the River Eden has been accommodated on a new overbridge, and severed footpaths have been diverted across the bridge and through a pedestrian underpass west of Morland Road.

Figure C.10 – Green bridge carrying the bridleway over the bypass



- C.9.8 In agreement with the landowner, the proposed accommodation bridge to Ash Hill Farm has not been constructed, but access is now gained along a gravel track (also a bridleway) off Cliburn Road.
- C.9.9 Loss of tranquillity along the footpaths and bridleway is as expected, particularly close to the River Eden bridge.
- C.9.10 Removal of 95% of traffic from the existing A66 in Temple Sowerby has reduced severance and is likely to improve access to local facilities, improve safety of non-motorised traffic and provides the potential for a greater proportion of local movements on foot or bicycle.
- C.9.11 De-trunking measures have been carried out, including local narrowing of the carriageway, introducing a 30mph speed limit and re-painting road markings.

Figure C.11 – Existing A66 showing de-trunking measures



- C.9.12 Brown directional signs are in place for Winderwath Gardens and Acorn House, but not for the hotel or village pub (which is closed).
- C.9.13 At the time of this study the village pub was not trading and the building was up for sale.
- C.9.14 No information has been made available for this study with regard to pedestrian or equestrian use of the overbridge, other PROW or the cycle provision; an NMU survey has not been undertaken and no new surveys have been carried out specifically for POPE. It is not therefore possible to quantify whether there has been a change in the number or length of trips.

C.10 Journey Ambience

Forecast

- C.10.1 The AST stated that there would be a slight change in views, with a neutral impact, and that there would be a moderately beneficial effect on traveller stress due to avoidance of the village. The impact was predicted to be neutral overall.
- C.10.2 The ES included an assessment of the impacts of the scheme on driver views and driver stress;
- Driver views – At the eastern end of the bypass where the road is elevated, there would be open views of Temple Sowerby. There would be long distance views of Oglebird Plantation and the larger plantation on the skyline. At the river crossing, there would be views along the river corridor. North of the river crossing, travellers would have views of the North Pennines and the north edge of Temple Sowerby. Although travellers' views would change as a result of the scheme bypassing the village, overall it was concluded that the impact would be neutral.
 - Driver stress – Stress levels for users of the scheme would be reduced from those experienced on the existing network because of the improved alignment, and better visibility and overtaking provision. In addition, there would be no frontages adjacent to the scheme, cyclists would be diverted away from the bypass, the speed limit would be 70mph and footpaths and bridleways would pass under or over the bypass. Overall it was concluded that travellers would benefit moderately from the scheme.
 - Traveller care was not considered in the ES.

Consultation

- C.10.3 During the consultation process a comment was received from a member of the public that journey time had decreased.

Evaluation

- C.10.4 It is considered that the impact of the scheme on journey ambience is generally as expected for driver views and driver stress.
- C.10.5 The bypass has reduced delays and improved journey time reliability as discussed in the traffic analysis in section 2. Facilities within Temple Sowerby are easily accessible from the bypass and the reduction in traffic on the old A66 has improved the experience for drivers.