HIGHWAYS AGENCY

Safe roads, reliable journeys, informed travellers

Post Opening Project Evaluation

A590 High and Low Newton Bypass

Five Years After Study

June 2014

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Executive Summary

Scheme Description

The A590 High and Low Newton Bypass is a Highways Agency major scheme to improve the A590 trunk road to the east of Barrow-in-Furness. It provides 2.4 miles of dual two lane carriageway, located west of the former route of the A590 through the villages of High and Low Newton and Ayside. It provides direct access to the Furness peninsula, the western coastal strip, and the southern Lake District attractions.

The scheme opened in April 2008 and this document summarises the findings of the five years after (FYA) post opening evaluation study completed in June 2014.

Scheme Objectives

The source of the below objectives is the Environmental Statement (1993) and the 1998 Roads Review.

Objectives	Objective Achieved?
Remove through traffic on the existing road in High and Low Newton.	✓
Provide a new high standard route with improved journey times for road users.	✓
Provide a road which enhances safety for road users.	✓
Provide good accessibility to the existing communities and to areas of industrial, commercial and tourist development.	✓

Key Findings

- There is a reduction of 97% on the former A590 route through High and Low Newton, indicating that the vast majority of traffic has reassigned to the bypass.
- Traffic forecasting underestimated traffic growth on the new A590 bypass, while overestimating that on the former A590 route.
- There has been a considerable reduction in journey times between the old A590 at pre-scheme stage, compared to the new A590 bypass at FYA stage.
- Collision numbers reduced from an annual average of 5.1 in the years before construction to 1.1 in the five years after opening.
- Overall it is considered that landscape planting is establishing well.
- On the bypass, despite deep cuttings, there are also open views from the road to the attractive Lake District landscape; traffic is free flowing with no congestion and improved journey times.

Summary of Scheme Impacts

Traffic

- Average daily traffic flows on the former A590 route through High and Low Newton have decreased from a pre-scheme level of 17,900 to 550 at the FYA stage, a decrease of 97%. On the bypass, average daily traffic flows are 16,950. This indicates that the vast majority of traffic has reassigned to the bypass.

- Traffic forecasting overestimated traffic growth on the new A590 bypass, while underestimating that on the former A590 route.
- In the AM and PM period, journey times improved by around three minutes on the route from the A590/B5277 roundabout to the Newby Bridge roundabout. During the inter-peak period, this saving was around two minutes.
- There was a greater journey time saving than forecast, largely because of an underestimation of the 'with scheme' journey times on the old road.
- Route stress on the new A590 bypass route and the old route are both low, indicating good journey time reliability, which is in line with predictions.

Safety

- On the key links, the observed reduction in collision rate is 0.08 collisions/mvkm, which is lower than the predicted value of 0.40 collisions/mvkm. This is largely due to the difference because the without scheme collision rate was lower than anticipated.
- In the area around the scheme, the average annual number of collisions has reduced from a pre-scheme level of five collisions to a post-scheme annual average of one.
- There were no fatal collisions and only one serious collision during the post opening period. Serious collisions have reduced by 80%, with slight collisions reducing by 75%. The collision severity index has reduced from 30% to 17%.
- Prior to scheme opening, collisions generally occurred along the whole length of the former A590 scheme length. Post-scheme opening, there were no collisions along the former route through High and Low Newton. Those on the new A590 bypass were largely dispersed along the route.
- Regarding personal security, the new route includes two lay-bys (one in each direction), each with an emergency telephone. The former A590, while not having any lay-by provision, did run through High and Low Newton where lighting is enhanced by nearby properties. There was also footpath provision between the two villages. The scheme is therefore considered to have a neutral impact.

Environment

- Based on traffic flows, impacts on noise and local air quality are generally as expected.
- The change in carbon emissions between the pre-scheme and post-scheme periods was slightly greater than forecast, though actual emissions are lower than forecast because the predictions overestimated the base level.
- Overall it is considered at the FYA stage that landscape planting is establishing well. Subject to ongoing successful establishment it should reach its landscape objectives for screening and integration into the local landscape by the design year (year 15) in most locations.
- At the FYA stage, wildflower grass areas are slow to establish and based on the bat monitoring reports it would appear that some of the bat mitigation measures may be less effective than had been hoped for.
- On the bypass, despite deep cuttings there are also open views from the road to the attractive Lake District landscape; traffic is free flowing with no congestion. Lay-bys have also been provided. These aspects all improve the driving experience.
- There remain some local concerns regarding the lack of signage from the bypass to facilities within the villages. This has been investigated by the Highways Agency, but the provision of additional signing has been found not to be justified.

Accessibility and Integration

- The scheme has not led to any change in public transport services or infrastructure, meaning there is an assessment of neutral for the impact of the A590 bypass on option values and access to the transport system.

- Regarding severance, there has been a moderate beneficial impact in the bypassed villages for the local population and tourists.
- In the residents' survey at One Year After stage, 83% of respondents found an improvement in the ease and safety of crossing the road, and 49% stated that they make more journeys on foot.
- The scheme is aligned with local, national and regional policies.

Summary of Scheme Economic Performance

All monetary figures in 2002 Prices and values		Forecast	Outturn Re-forecast
Journey Time Benefits		£68.2m	£74.2m
Safety Benefits		£28.2m	£14.5m
Total Present Value Benefits (PVB)		£92.4m	£88.7m
Total Present Value Costs (PVC)		£22.8m	£29.8m
Benefit Cost Ratio (BCR)	**Indirect Tax impact included in the Cost**	**4.1**	**3.0**
	Indirect Tax impact treated as a Benefit	**3.7**	**2.8**

- There was a greater reduction in journey times than expected, translating into the outturn re-forecast 60 year benefit being £6m higher than forecast at appraisal stage.
- There is a 60 year outturn collision benefit of £14.5m, £13.7m lower than what was originally forecast. This due to the collisions before construction being fewer than predicted so the net saving was lower.
- The overall Present Value Benefit is £88.7m, 4% lower than the benefit of £92.4m forecast at the appraisal stage.
- The Present Value Cost is £29.8m, 31% higher than the cost of £22.8m forecast at the appraisal stage.
- When the indirect taxation impact is included in the costs, the re-forecast Benefit Cost Ratio is 3.0, which is lower than the forecasted figure of 4.1 at appraisal stage. When indirect taxation is included in the benefit in line with the latest guidance, the re-forecast Benefit Cost Ratio is 2.8 compared to 3.7.
- Within local policy, the A590 is recognised as being important in enabling new development in Barrow and South Lakeland, and a way to enhance connectivity between Kendal and Ulverston. In local and wider policy, transport links in strategic locations are recognised as important to supporting economic development.

1. Introduction

Background

1.1 This report presents a Five Years After (FYA) opening evaluation of the A590 High and Low Newton Bypass scheme, which opened to traffic in April 2008. The evaluation has been prepared as part of the Highways Agency's (HA's) Post Opening Project Evaluation (POPE) programme. POPE is undertaken one year and five years after the opening of all major schemes.

1.2 The purpose of this report is to build upon the findings of the One Year After (OYA) study published in July 2010. The study presents an evaluation of the scheme's impact according to the DfT's objectives for transport: economy, safety, environment, accessibility and integration.

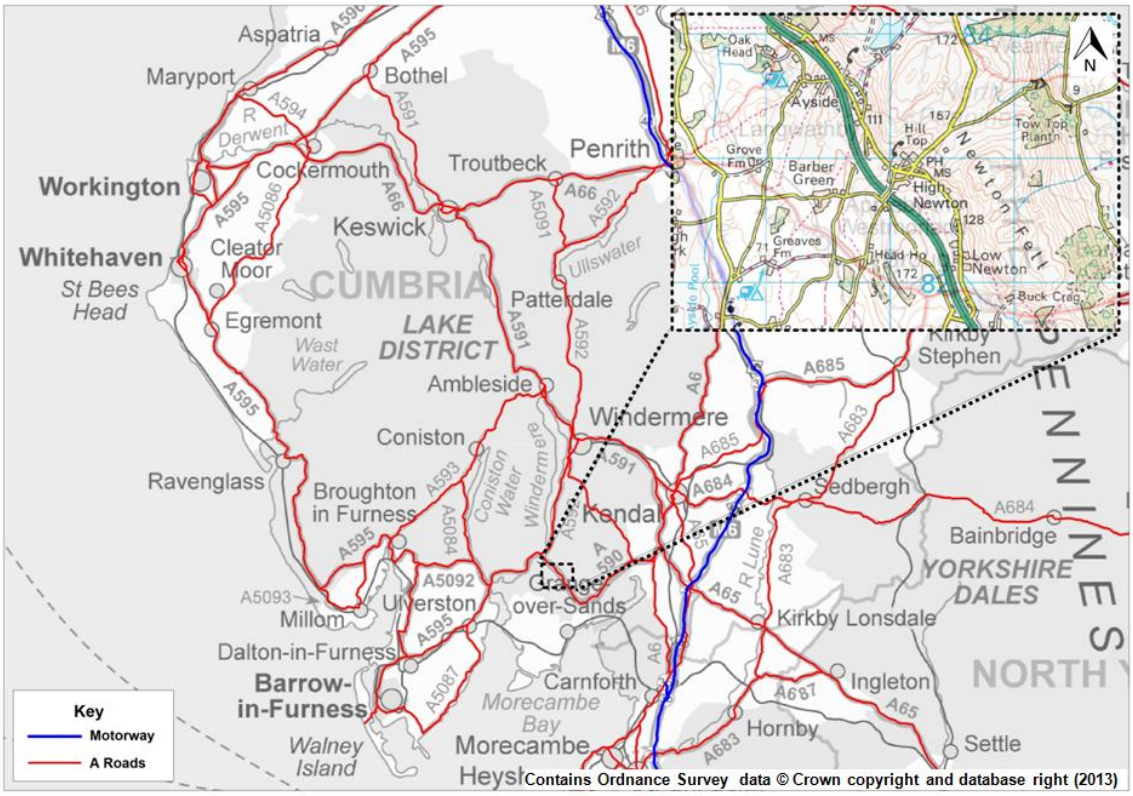
1.3 More specifically, the report sets out the following:

- A comparison of the 'before' and 'after' traffic volumes on the A590 and other roads in the vicinity of the scheme.
- A comparison of 'before' and 'after' journey times on the A590.
- An outline of the changes in collision rates on the corridor following the opening of the scheme.
- A monetised comparison of the predicted and actual impacts of the scheme.
- Evaluation of the impact of the scheme upon the environment, more specifically its impact upon noise, air quality, landscape, biodiversity, heritage and water.
- An assessment of the scheme's impact on the accessibility and integration objectives.

Scheme Context

1.4 Situated in HA Area 13, the scheme, highlighted in Figure 1.1, is situated within the Lake District National Park, 20 miles east of Barrow-in-Furness and 13 miles west of the M6 Junction 36.

Figure 1.1 – Location of Scheme



1.5 The A590 is a strategic link between the industrial town of Barrow-in-Furness and the national motorway network. The A590 also provides access to the recreational areas of the southern Lake District and the coast of west Cumbria. In addition, it serves many local agricultural interests, market towns and isolated dwellings.

1.6 The bypass is situated entirely within the Lake District National Park. By this designation, the landscape is recognised as being of the highest quality; it is also a major recreational resource and has high populations of protected species, including badgers and bats.

Problems Prior to the Scheme

1.7 The former A590 through High and Low Newton was substandard for the current level of traffic in terms of alignment, visibility, width and safe overtaking opportunities. There was a poor collision record and environmental conditions in the villages were unacceptable due to noise, dust, dirt, fumes and visual intrusion from passing traffic.

1.8 The problems prior to the scheme can therefore be summarised as follows:

- Congestion from high traffic volumes and heavy goods vehicles (HGVs) through the villages.
- Poor safety record.
- Negative environmental impacts.

Scheme Objectives

1.9 The objectives of the scheme, according to the Environmental Statement (1993) are to:

- **Improve the environment by removing through traffic on the existing road in High and Low Newton.**
- **Provide a new high standard route with improved journey times for road users.**
- **Provide a road which enhances safety for road users.**
- **Provide good accessibility to the existing communities and to areas of industrial, commercial and tourist development.**

Scheme Description

1.10 The new off-line bypass is located up to 300m west of the former A590 at High and Low Newton and Ayside villages. It provides direct access to the Furness Peninsular, the western coastal strip, and the southern Lake District attractions.

1.11 The scheme is comprised of the following elements:

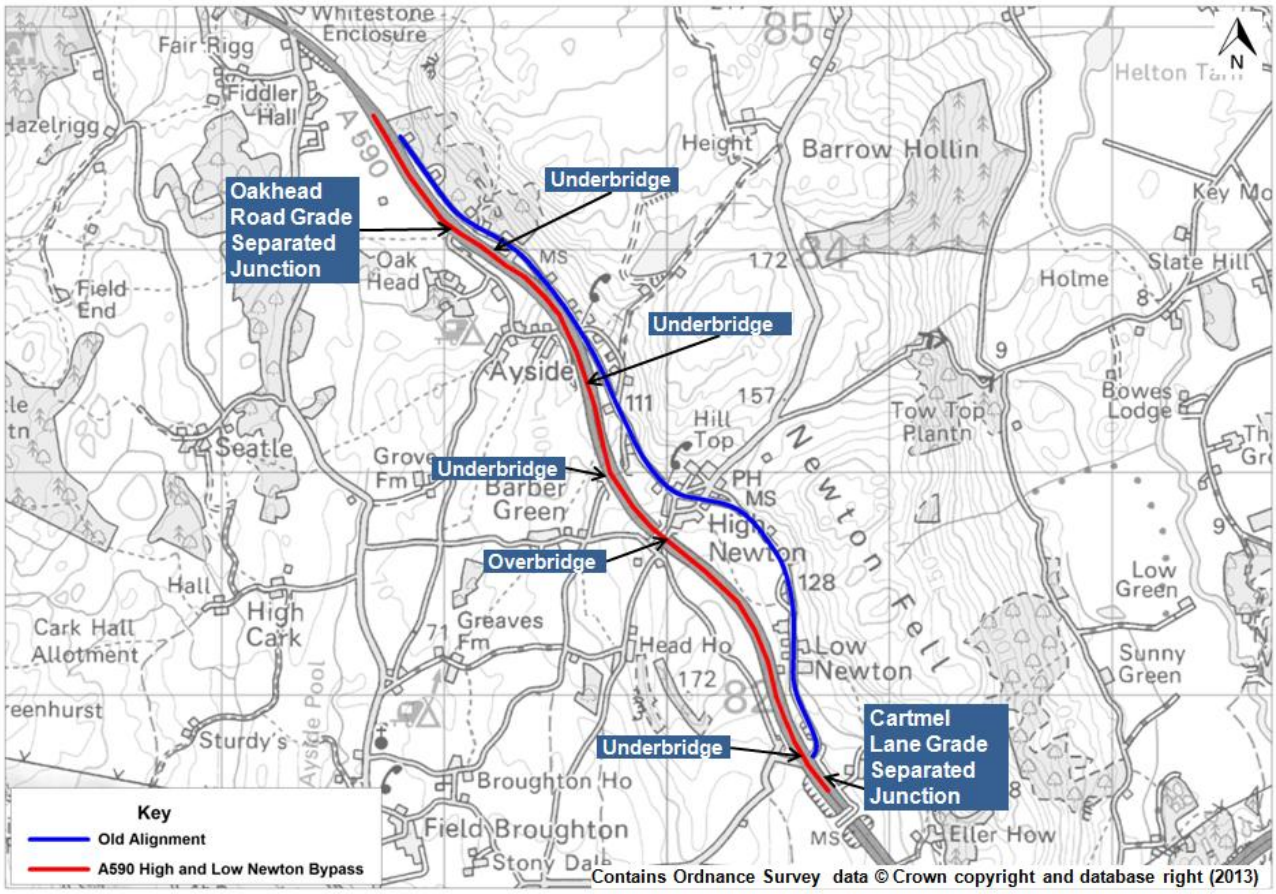
- 2.4 miles (3.8 km) of dual two lane carriageway.
- 5 structures for crossing the bypass.
- 2 grade-separated junctions at the northern and southern tie-ins.
- False-cutting and earth mounding to mitigate the visual intrusion.
- Wildlife mitigation measures.

1.12 The A590 High and Low Newton bypass is 3.8 km in length and links the Lindale bypass in the south to the Barrow Banks Diversion. It removes through traffic from the existing road in High Newton and Low Newton by providing a new high-standard route for quick and safe travel for road users. It provides good accessibility to the existing communities and to areas of industrial, commercial and tourist development.

1.13 Figure 1.2 illustrates the key elements of the scheme and the bypass alignment in relation to the old A590.

1.14 On completion of the bypass the old A590 was detrunked, with grass verges widened to reduce carriageway width and centre line road markings removed.

Figure 1.2 – Existing and New Layout



Scheme History

1.15 The case for a bypass of High and Low Newton was first published by the Government in 1976. A public local inquiry into the scheme was held in 1993, which was approved by the Secretary of State for Transport in November 1994. The scheme was added to the Governments Targeted Programme of Improvements (TPI), now known as the Programme of Major Schemes, on 29th October 2003. A timeline showing the recent history of the scheme leading up to its opening can be found in Table 1.1.

Table 1.1- Chronology of the A590 High and Low Newton Bypass Scheme

Date	Event
March 2005	Tenders for an Early Contractor Involvement (ECI) contract are invited
March 2005	Construction tenders close
May / June 2005	Ecological / archaeological surveys completed
July 2005	Contract awarded
August – December 2005	Detailed design and liaison with Statutory Environmental bodies/land owners and sub-regional interests including businesses
January 2006	Pre-construction exhibition
April – June 2006	Ground investigations take place
July 2006	**Construction begins**
April 2008	**Scheme opens**

Post Opening Project Evaluation (POPE)

1.16 The HA is responsible for improving the strategic highway network (motorways and trunk roads) through the Major Schemes programme. At each key decision stage through the planning process, schemes are subject to a rigorous appraisal process to provide a justification for the project's continued development.

1.17 When submitting a proposal for a major transport scheme, the Department for Transport (DfT) specifies that an Appraisal Summary Table (AST) is produced which records the degree to which the five Government objectives for Transport (Environment, Safety, Economy, Accessibility and Integration) have been achieved. The contents of the AST allow judgements to be made about the overall value for money of the scheme. The AST for this scheme is presented in Table 7.1.

1.18 POPE studies are carried out for all Major Schemes to assess the strengths and weaknesses in the techniques used for appraising schemes. This is vital so that improvements can be made in the future. POPE compares information collected before and after the opening of the scheme to traffic, against predictions made during the planning process. The outturn impacts of a scheme are summarised in an Evaluation Summary Table (EST) which summarises the extent to which the objectives of a scheme have been achieved. The EST for this scheme can be found in Table 7.2.

1.19 POPE of Major Schemes goes beyond monitoring progress against targets set beforehand. Instead, it provides the opportunity to study which aspects of the intervention and appraisal tools used to assess it are performing better or worse than expected, and how they can be made more effective. More specifically the objectives of POPE evaluation reports are to:

- Provide a quantitative and qualitative analysis of scheme impacts consistent with national transport appraisal guidance (WebTAG) and scheme specific objectives.
- Identify and describe discrepancies between forecast and outturn impacts.
- Explore reasons for differences between forecast and outturn impacts.
- Identify issues relating to appraisal methods that will assist the HA in ongoing improvement of appraisal approaches and tools used for major schemes.

Summary of the One Year After Opening Study

1.20 The purpose of the FYA study is to verify and study in more detail the emerging trends and conclusions presented in the OYA study report. The main conclusions made in the A590 High and Low Newton Bypass OYA report were as follows:

- Traffic flows on the old A590 have reduced by 97% at one year after compared to pre-opening levels.
- One year after opening, journey times on the new bypass as compared to the former A590 improved by around 4 minutes in the AM peak period, and approximately 3 minutes in the inter-peak and PM peak period.
- The curved alignment, careful use of cuttings and earthworks, and new landscape planting helped to integrate the scheme into the local landscape.
- The impacts on heritage resources were as expected, with no unforeseen impacts. There were no direct impacts on listed buildings.
- The impact on water was considered to be worse than expected largely as a result of heavy prolonged rain during the first winter of construction. It was therefore recommended to reconsider this at FYA stage.
- Regarding safety in the opening year, across the relevant network used in the appraisal, no collisions had been recorded. There was an annual saving of 5.4 collisions, however this is not statistically significant and therefore may have occurred by chance alone. The impact on personal security was considered neutral.
- The outturn scheme cost was within 3% of that predicted.
- The forecast Benefit Cost Ratio was lower than the POPE re-forecast Benefit Cost Ratio. The primarily because the Present Value Benefit was lower than expected because of the higher than predicted journey times savings at OYA.

- The reduction of through traffic on the former A590 lessened severance and improved residential amenity, local noise and air quality in High and Low Newton.

1.21 This FYA report will reconsider the status of the above findings and provide further clarity on the longer term effects of the improvements on the immediate area affected by the scheme. This is of particular importance when considering collision and environmental impacts, and longer term economic regeneration effects.

Report Structure

1.22 The remainder of this report is structured as follows:

- Chapter 2 - Traffic Impact Evaluation
- Chapter 3 - Safety
- Chapter 4 - Economy
- Chapter 5 - Environment
- Chapter 6 – Accessibility and Integration
- Chapter 7 – Appraisal Summary Table and Evaluation Summary Table
- Chapter 8 – Conclusions

1.23 There is a glossary explaining technical terms and acronyms in Appendix E.

2. Traffic Impact Evaluation

Introduction

2.1 This section examines traffic data from a number of sources to provide a before and after opening comparison of traffic flows and journey times along the A590 High and Low Newton bypass. The purpose of this evaluation is to understand whether changes in traffic flows and journey times may be attributable to the scheme.

2.2 This chapter comprises:

- A summary of the sources used to compile data for this evaluation.
- A description of national, regional and local background traffic trends.
- A detailed comparison of before, one year after and five years after traffic flows on key routes in the study area likely to be affected by the scheme.
- A comparison of journey times for pre-scheme, OYA and FYA stages.
- An evaluation of key differences between forecast and outturn impacts of the scheme in terms of traffic flows and journey times.

Background Changes in Traffic

2.3 Historically in POPE scheme evaluations, the ‘before’ counts have often been factored to take account of background traffic growth so that they are directly comparable with the ‘after’ counts. This usually involves the use of National Road Traffic Forecasts (NRTF), with local adjustments made using Local Growth Factors if applicable.

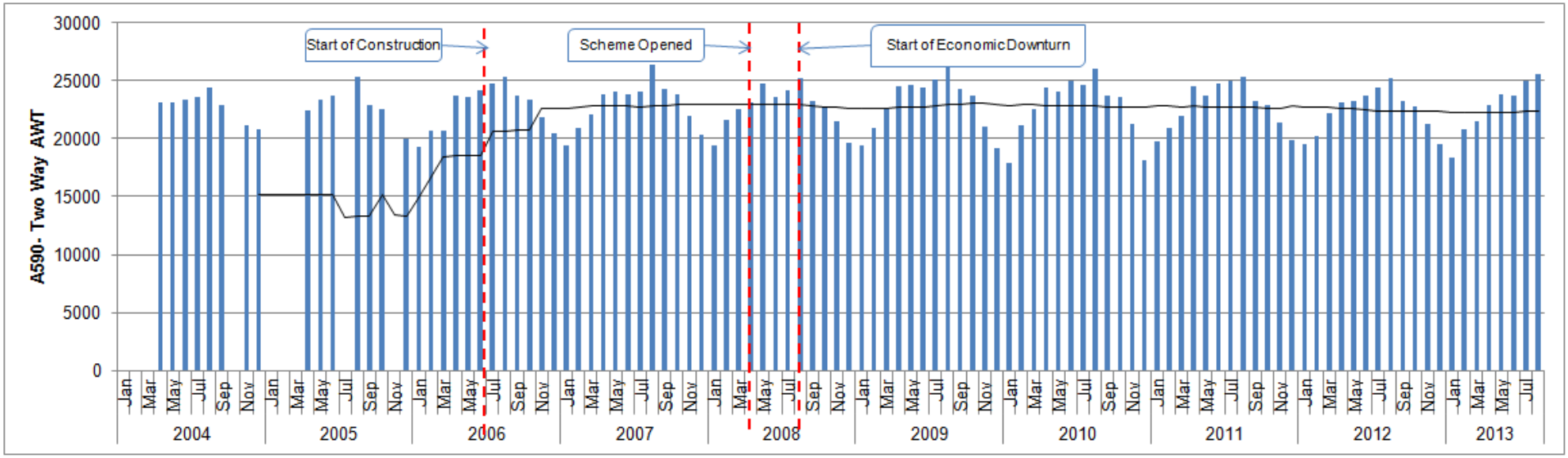
2.4 However, in light of the recent economic climate, which has seen widespread reductions in motor vehicle travel in the United Kingdom (UK) as a whole since 2008, it is no longer deemed appropriate to use this method of factoring ‘before’ counts to reflect background changes in traffic. Rather, recent POPE studies have taken a more considered approach in order to assess changes in the vicinity of the scheme, within the context of national, regional and locally observed background changes in traffic.

2.5 As such, this section will examine and discuss the regional and local trends in traffic flows.

Long Term Trends

2.6 Figure 2.1 shows the long term trends on the A590 between 2004 and 2013.This is based on TRADS data, for a site approximately 6 miles north east of the scheme. The trendline shown represents a 12 month moving average of the data.

Figure 2.1 – Long term trends on the A590



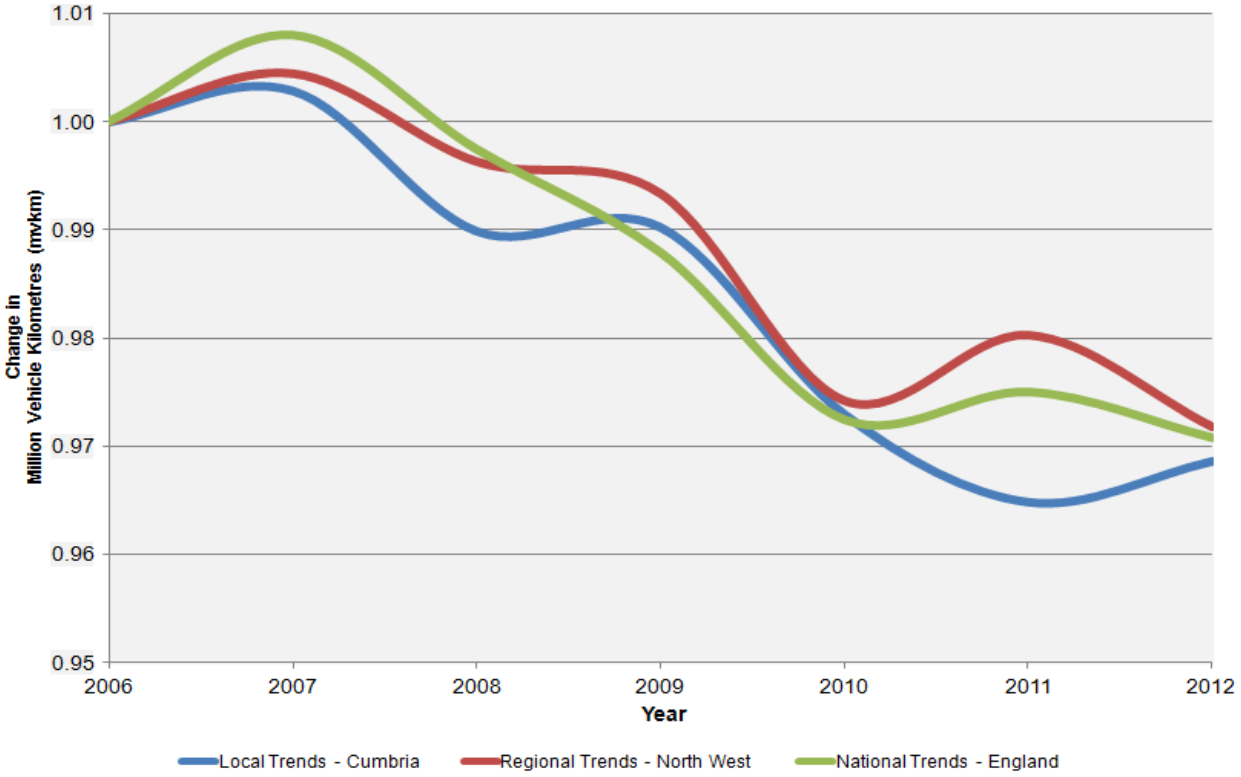
2.7 Figure 2.1 shows long term trends on the A590 in a site location north east of the scheme area. It can be seen from that

- The opening of the scheme was just before the start of the economic downturn in the latter half of 2008.
- Despite the widespread decline in traffic levels reported nationally towards the end of 2008 and in 2009, it can be seen that the A590 showed little variation from previous years.
- The A590 exhibits considerable seasonal variation which is attributable to tourism.
- During the construction of the scheme, there seemed to be little variation which is shown by the 12 month moving average trendline. This is to be expected as most of the works were offline.

National, Regional and Local Trends

2.8 The DfT produces observed annual statistics for all motor vehicles by local authority[1]. Data between 2006 (before construction) and 2012 (the latest available) is shown in million vehicle kilometres (mvkm) for Cumbria, North West Region, and England in Figure 2.2.

Figure 2.2 – Local, Regional and National Trends in Million Vehicle Kilometres (mvkm)



2.9 Local, regional and national trends show a decline in Million Vehicle Kilometres by 3% between 2006 and 2012.

2.10 In Figure 2.2, national trends indicate an increase in vehicle kilometres travelled between 2006 and 2007 with a subsequent decline in their number between 2007 and 2010. While there is a slight increase shown from 2010 to 2011, this then declines again into 2012.

2.11 When compared to national trends, the local Cumbria and regional North West vehicle kilometres also peak in 2007. However, the regional and local levels have a slight increase in vehicle kilometres from 2008 to 2009 unlike national trends. The local Cumbria trends diverge from national and regional trends by showing a decline in vehicle kilometres travelled from 2010 to 2011, while the national and regional levels show an increase.

[1] Motor vehicle traffic (vehicle kilometres) by region in Great Britain, annual from 1993 to 2012. Table TRA8904 (Department for Transport; accessed October 2013).

2.12 Table 2.1 shows the AAWT flows on the A590 which can be used to compare with wider national, regional and local trends. In line with these trends, there is a small decline in flows shown during the period 2006 to 2012. However, this is a lower degree of change than trends at local, regional and national trends, at 1% rather than 3%. Also in line with the trends is that there is an increase in flows from 2006 to 2007. In line with local and regional trends, there is a dip in flows in 2008, followed by an increase in 2009 and a drop into 2010. The national trends follow a more smoothly declining trajectory than this. Also following local and regional trends, there is an increase in flows in 2011 which is followed by a drop into 2012.

2.13 Table 2.1 also shows an increase in traffic flows on the A590 between 2012 and 2013. This data is not available for national, regional or local trends.

Table 2.1 – Two-Way AAWT on the A590

Year	Two-Way AAWT on the A590	Change on Previous Year
2006	22,630	
2007	22,910	1.2%
2008	22,630	-1.2%
2009	22,990	1.6%
2010	22,670	-1.4%
2011	22,770	0.4%
2012	22,340	-1.9%
2013	22,780	2.0%

Note: 2013 figures based on AAWT January to September only

Conclusions on Background Changes in Traffic

2.14 Based on the information presented in this section, it has been considered that no annual growth factors should be applied to the data presented in this report. Therefore when reading this report it is important to keep in mind that any decrease in vehicle flows of 3% or less can potentially be attributed to the background reduction across Cumbria.

Traffic Volume Analysis

Scheme Objective: Remove through traffic from the existing road in High and Low Newton

Data Sources

2.15 For the purposes of this evaluation study, the main source of traffic data were permanent traffic count data obtained from the TRADS database for count locations on the HA network. TRADS data availability covers the before construction, OYA and FYA periods.

2.16 At the before pre-scheme stage it was found that there was no data at two locations around the scheme. Therefore, new data collection was commissioned at these sites. Thus in addition to the TRADS data, temporary ATC data was commissioned for the purpose of this study in June 2007 (before construction), June 2009 (OYA) and October 2013 (FYA). June and October are considered neutral months[2] and are therefore comparable. Figure 2.1 confirms that June and October flows are very similar.

2.17 The locations of the traffic count data sources used in this evaluation are shown in

2.18 Table **2.2** and Figure 2.3 alongside details of each traffic count site.

[2] DMRB Volume 13, Section 1, Part 4.

Table 2.2 – Traffic Count Sites

Site	Description	Source
1	A590, southeast of Tow Top Rd, High Newton	Commissioned ATC Sites
2	Lane north of Low House Farm, Ayside	Commissioned ATC Sites
3	A590 between B5277 and A592 (New Bypass)	TRADS
4	A590 between B5277 and A592 (North of Bypass)	TRADS
5	A590 eastbound between A5087 and A592	TRADS
6	A590 eastbound between B5277 and A6	TRADS

2.19 It should be noted that:

- As site 3 is the new bypass, it does not have any before-construction data available.
- For the A590 site north of the bypass (site 4), two-way data was available before scheme opening. However, no eastbound data was available at OYA or FYA stages.
- To obtain eastbound flows for OYA and FYA, the westbound to eastbound flow proportions at site 6 were calculated and applied to the eastbound data.
- Additionally, westbound data was only available until January 2012. To obtain June 2013 FYA flows, westbound flows from June 2011 were factored up to June 2013 by using a factor determined from the change in flows at site 6 on these dates.

2.20 Having considered the wider trends in traffic volume across the local, regional and national road network, it is now possible to analyse changes in flows on the A590 scheme section and roads in the immediate vicinity.

Figure 2.3 – Location of HA TRADS Sites and Temporary Automatic Counts

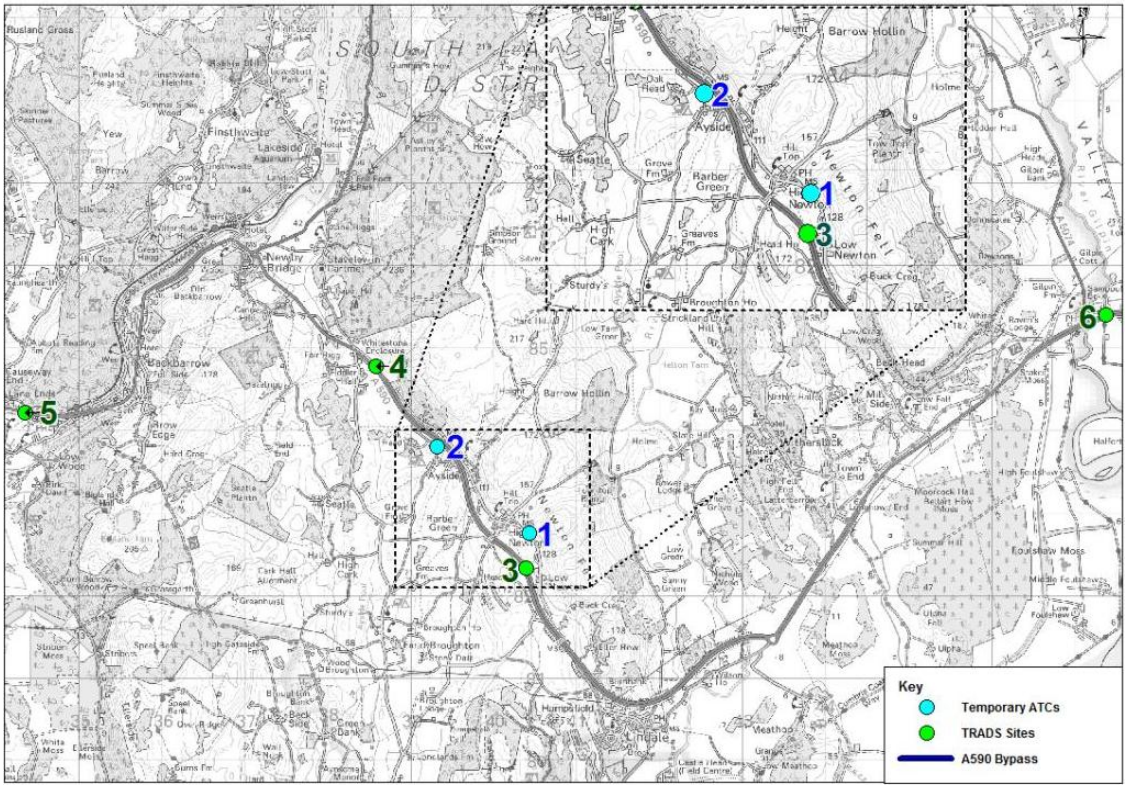
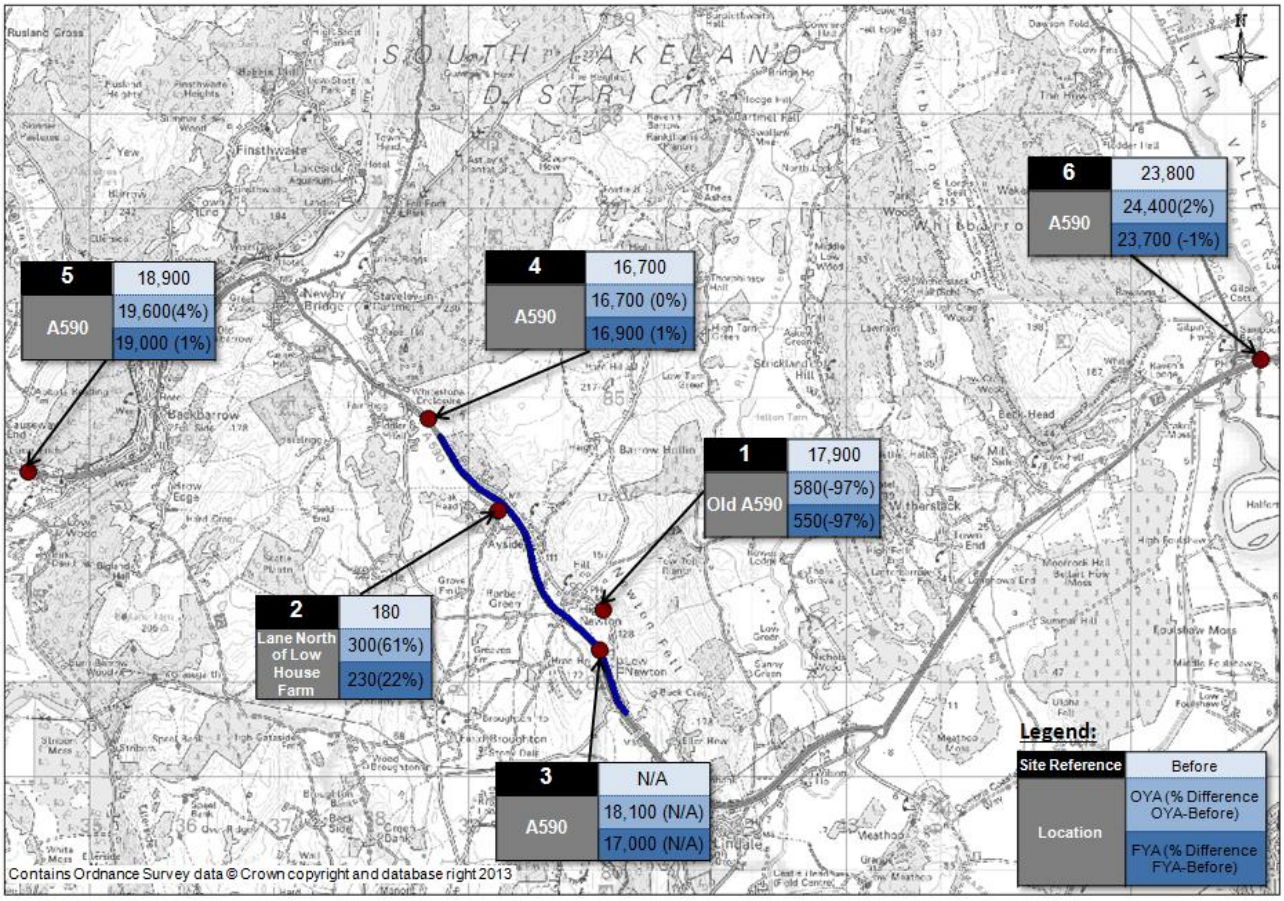


Figure 2.4 – Two-Way AWT Flows at Traffic Count sites: Before, OYA and FYA



2.21 The traffic data shows:

- At FYA stage, two-way average weekday flows on the old A590 (site 1) were 550, which is a reduction of 97% (17,350 vehicles per day) between pre-scheme and FYA periods. This indicates that the vast majority of traffic has reassigned to the bypass.
- Average weekday flows on the new bypass (site 3) are 17,000 vehicles per day which is 900 vehicles less than pre-scheme flows on the old A590. This can be accounted for because some traffic remains on the old road for access to High and Low Newton.
- Within the corridor (the bypass and the old A590), average weekday flows have decreased from 17,900 vehicles per day pre-scheme to 17,550 vehicles per day, a reduction of 2%. This can potentially be accounted for by the decline in Million Vehicle Kilometres travelled in Cumbria by 3.1%, as seen in Figure 2.2. This also shows that no traffic has reassigned onto this route from other roads in the area or been induced by the scheme.
- On the A590 between A5087 and A592 (west of bypass) (site 5), traffic has increased by 1% whilst between B5277 and A6 (east of bypass) (site 6) traffic has reduced by 1%.
- Traffic volumes have remained relatively unchanged between the OYA and FYA stages.

Forecast vs. Outturn Traffic Flows

2.22 Justification for the scheme was based on detailed forecasting of the traffic impacts. This section firstly briefly considers the traffic modelling and forecasting approach followed by a comparison of the forecast and observed impacts.

Traffic Modelling Approach

2.23 The pre-scheme appraisal process for the A590 bypass scheme involved the forecasting of traffic flows for 'Do Minimum' (DM) and 'Do Something' (DS) scenarios. A traffic assignment model was not used due to the simplicity of the scheme and the limited re-routing options. A COBA model was used to calculate the economic impacts of the scheme.

2.24 Forecast flows used in this report have been derived from the draft Guidance on the Methodology of Multi-Modal Studies (GOMMMS) where base year flows were growthed from 2000 to 2005 (predicted opening year) and 2020 using NRTF 1997. Within this assessment, Forecast Annual Average Daily Traffic (AADT) is presented for:

- The years 2000 and 2020
- Low growth and high growth conditions
- DM and DS scenarios

2.25 Due to data availability, observed flows are presented as Average Daily Traffic (ADT).

2.26 It should be noted that this model was based on the assumption that the opening year would be 2005.

2.27 At the modelling stage, DM and DS flows were forecast for 2005 and 2020. To allow for comparison with observed data collected in 2009 (for the OYA after study) and in 2013 (for this FYA study), the forecasted flows have been interpolated (assuming a straight line projection).

Forecast vs. Observed Do-Minimum (without scheme) Traffic Flows

2.28 Table 2.3 shows a comparison of predicted and outturn DM traffic flows.

Table 2.3 – Comparison of Predicted and Outturn 'Do-Minimum' Traffic Flows

		Forecast (2013 AADT*)				Difference (percentage difference)		
Site	Location	Low Growth	Central Growth	High Growth	Observed ADT (June 2007 adjusted to 2013)**	Low Growth	Central Growth	High Growth
1	Old A590, southeast of Tow Top Rd, High Newton	16,440	17,320	18,210	16,950	510 (3%)	- 370 (- 2%)	-1,250 (- 7%)

*Growthed from 2000 to 2007 using NRTF 1997, then adjusted to 2013.

**Adjusted using a growth factor of 0.986 (based on 2007 Q2 vehicle km compared to 2013 Q2 vehicle km for rural A roads)[3]

2.29 As shown by Table 2.3, observed flows for the old A590 are 2% lower than the central growth figure, and are therefore relatively in line with the forecasted figures.

Forecast vs. Observed Do-Something (with scheme) Traffic Flows

2.30 Table 2.4 shows the difference between the AADT low, central and high growth forecasts for the traffic count sites and that observed.

[3] Department for Transport, (2013), Table TRA2505a: Road traffic (vehicle kilometres) by road class in Great Britain, quarterly from 1993, [Online], Available at: https://www.gov.uk/government/uploads/system/uploads/.../tra2505.xls, Accessed December 2013.

Table 2.4 – Comparison of Predicted and Outturn 'Do-Something' Traffic Flows

		Forecast (2013 AADT*)				Difference (percentage difference)		
Site	Location	Low Growth	Central Growth	High Growth	Observed ADT 2013	Low Growth	Central Growth	High Growth
1	Old A590, southeast of Tow Top Rd, High Newton	1,130	1,200	1,260	530	-600 (-53%)	-670 (-56%)	-730 (-58%)
2	Lane North of Low House Farm	340	320	290	230	-110 (-32%)	-90 (-28%)	-60 (-21%)
3	A590 between B5277 and A592 (New Bypass)	15,310	16,120	16,940	16,950	1,650 (11%)	830 (5%)	10 (0%)
4	A590 between B5277 and A592 (North of Bypass)	16,440	17,320	18,210	18,170	1,730 (11%)	850 (5%)	-30 (-0%)

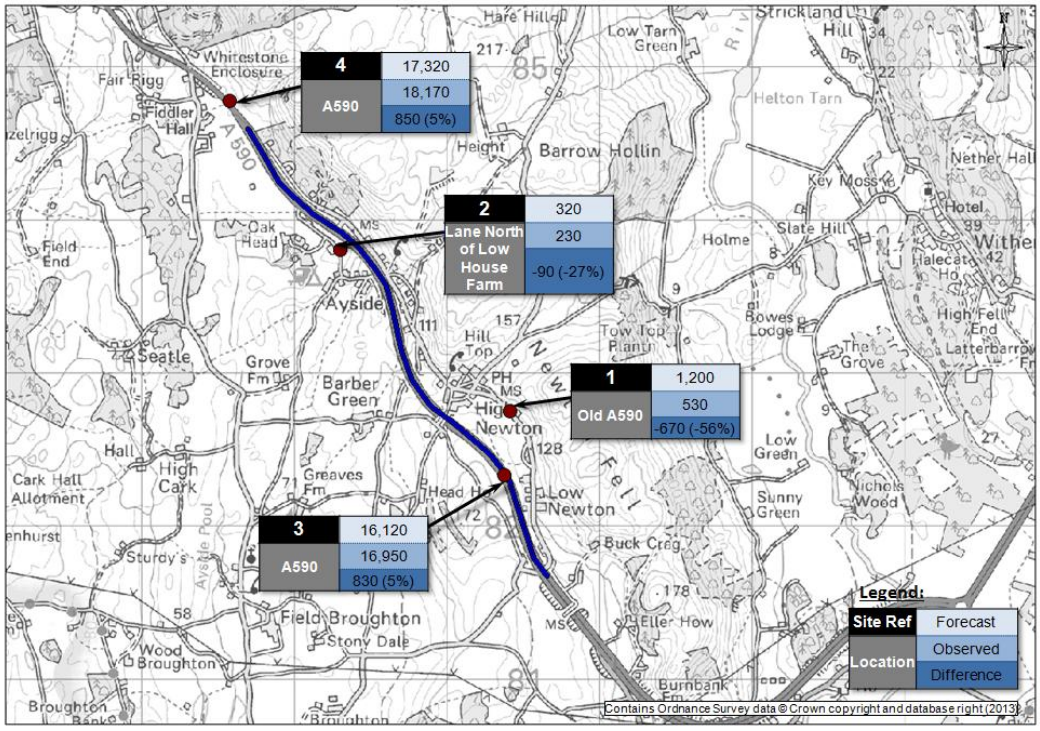
*Growthed from 2000 to 2007 using NRTF 1997, and then adjusted to 2013

2.31 The Environmental Statement stated that 'over 90% of the traffic using the A590 between Barrow Banks Diversion and Lindale Bypass is estimated to be through traffic, and relatively small numbers of journeys are generated between settlements on or near to the trunk road'. Figure 2.5 shows that it was forecasted that 7% of the traffic within the corridor (the A590 bypass and the old A590) would remain to travel via the old route through the villages of High and Low Newton.

2.32 Figure 2.5 presents the Central Growth DS Flows for the FYA stage, compared to the ADT flows observed.

2.33 The Environmental Statement stated that 'over 90% of the traffic using the A590 between Barrow Banks Diversion and Lindale Bypass is estimated to be through traffic, and relatively small numbers of journeys are generated between settlements on or near to the trunk road'. Figure 2.5 shows that it was forecasted that 7% of the traffic within the corridor (the A590 bypass and the old A590) would remain to travel via the old route through the villages of High and Low Newton.

Figure 2.5 – Forecast (Central Growth) 2013 AADT Do Something Flows versus Observed ADT Flows



2.34 From Table 2.4 and Figure 2.5 it can be seen that:

- Along the new A590 bypass (site 3), observed flows are higher than the central growth forecasts by 830 vehicles per day (5%).
- On the A590 north of the bypass (site 4), observed flows are higher by 850 vehicles per day (5%).
- Observed flows on the old A590 (Site 1) are significantly lower than the central growth forecast, by 530 vehicles a day (56%). This indicates that a greater level of traffic has reassigned onto the new bypass than was forecasted by central growth figures at the appraisal stage.
- On completion of the bypass, measures were taken to 'downgrade' the old A590 route. It was detrunked, grass verges were widened to reduce the carriageway width and centre line road markings were removed. The Forecasting Report indicates that the impact of the above traffic calming measures and the introduction of the speed limit were not considered at the modelling stage. This may explain the slightly higher than forecasted observed flows on the A590, and the lower than expected observed flows along the old route.

Journey Time Analysis

Scheme Objective: Provide a new high standard route for quick travel for road users

2.35 This section considers the impact the opening of the scheme has had on journey times on the A590 route.

2.36 By comparing journey times taken before the scheme opened with those taken one year and five years after, it is possible to draw conclusions regarding journey time savings and improvements to journey time reliability which may have occurred as a result of the scheme.

2.37 At before construction stage, journey time surveys were undertaken on the old A590 in July 2007. At the One Year After stage, journey time surveys were undertaken on the old A590 and the new bypass in July 2009. The journey times undertaken were through the moving observer method.

2.38 At the FYA stage, journey times have been collected on the new bypass only using sat nav data. FYA journey times on the former A590 were not repeated due to its low flows and minimal changes in flow since the OYA study.

2.39 Journey times are analysed based on the old A590 route compared to the new bypass. These are shown in Table 2.5 and

2.40

2.41

2.42 Table 2.6.

Figure 2.6 – Journey Time Route

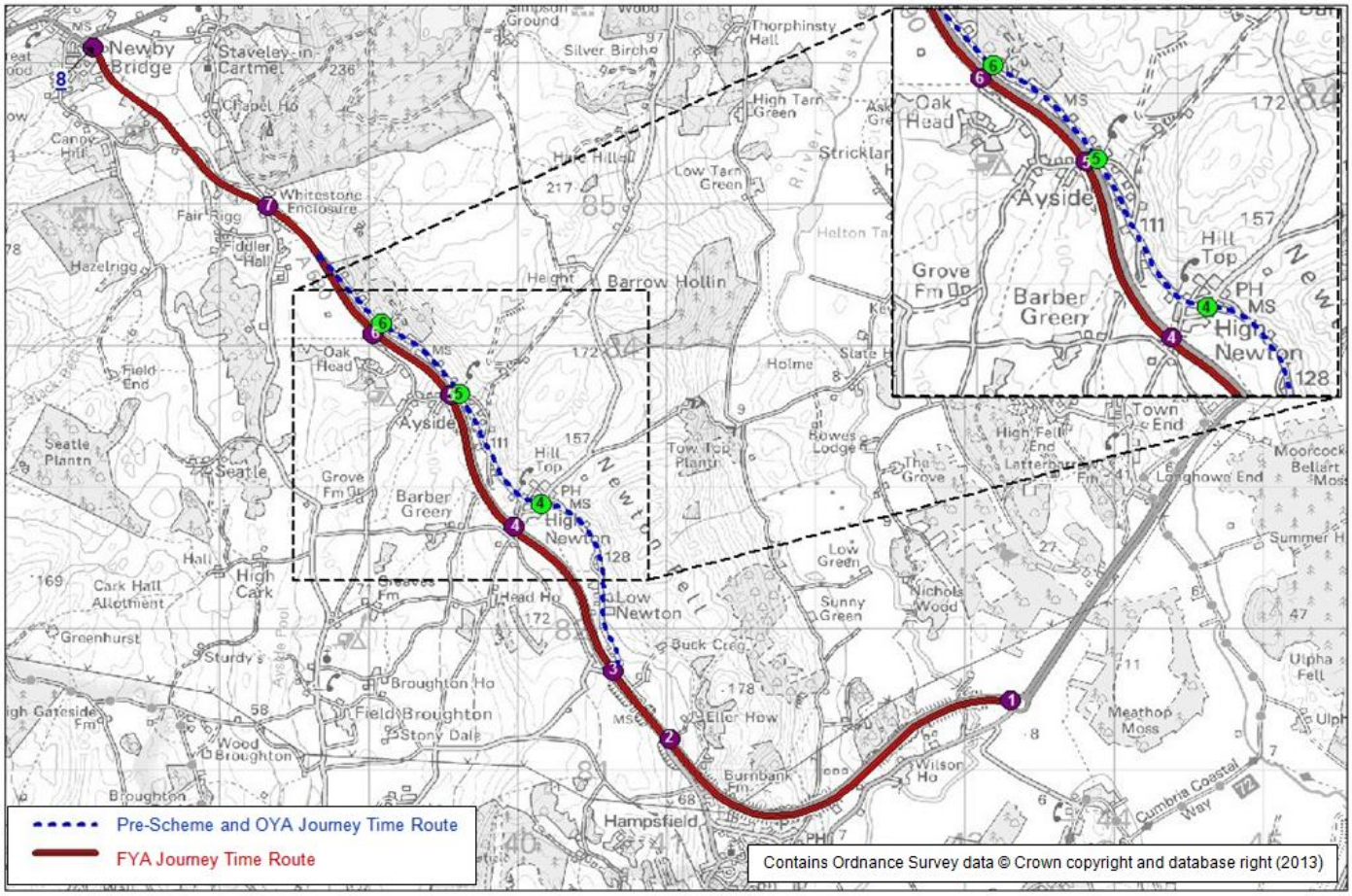


Table 2.5 - Eastbound journey times via new bypass compared to old A590 route

Eastbound Timing Points	Before			FYA			Difference		
	Time (m:s)			Time (m:s)			Time (m:s)		
	AM	Inter-peak	PM	AM	Inter-peak	PM	AM	Inter-peak	PM
TP6-TP8	03:30	03:12	03:43	02:16	02:24	02:23	-01:14	-00:48	-01:22
TP3-TP6 (Bypass Section)	03:13	03:15	03:31	01:40	01:42	01:40	-01:33	-01:33	-01:51
TP1-TP3	02:06	02:12	02:10	02:03	02:07	02:05	-00:03	-00:05	-00:05
Total	**08:49**	**08:39**	**09:24**	**05:58**	**06:13**	**06:07**	**-02:51**	**-02:25**	**-03:18**

Table 2.6 - Westbound journey times via new bypass compared to old A590 route

Westbound Timing Points	Before			FYA			Difference		
	Time (m:s)			Time (m:s)			Time (m:s)		
	AM	Inter-peak	PM	AM	Inter-peak	PM	AM	Inter-peak	PM
TP1-TP3	02:47	02:40	02:31	02:24	02:21	02:12	- 00:23	- 00:19	- 00:19
TP3-TP6 (Bypass Section)	03:39	03:08	03:07	01:42	01:37	01:42	- 01:57	- 01:31	- 01:25
TP6-TP8	03:21	03:07	03:12	02:18	02:16	02:14	- 01:03	- 00:51	- 00:58
Total	**09:47**	**08:54**	**09:11**	**06:23**	**06:14**	**06:17**	**- 03:24**	**- 02:41**	**- 02:44**

Figure 2.7 - Eastbound Journey times via new bypass (after) compared to old A590 route (before)

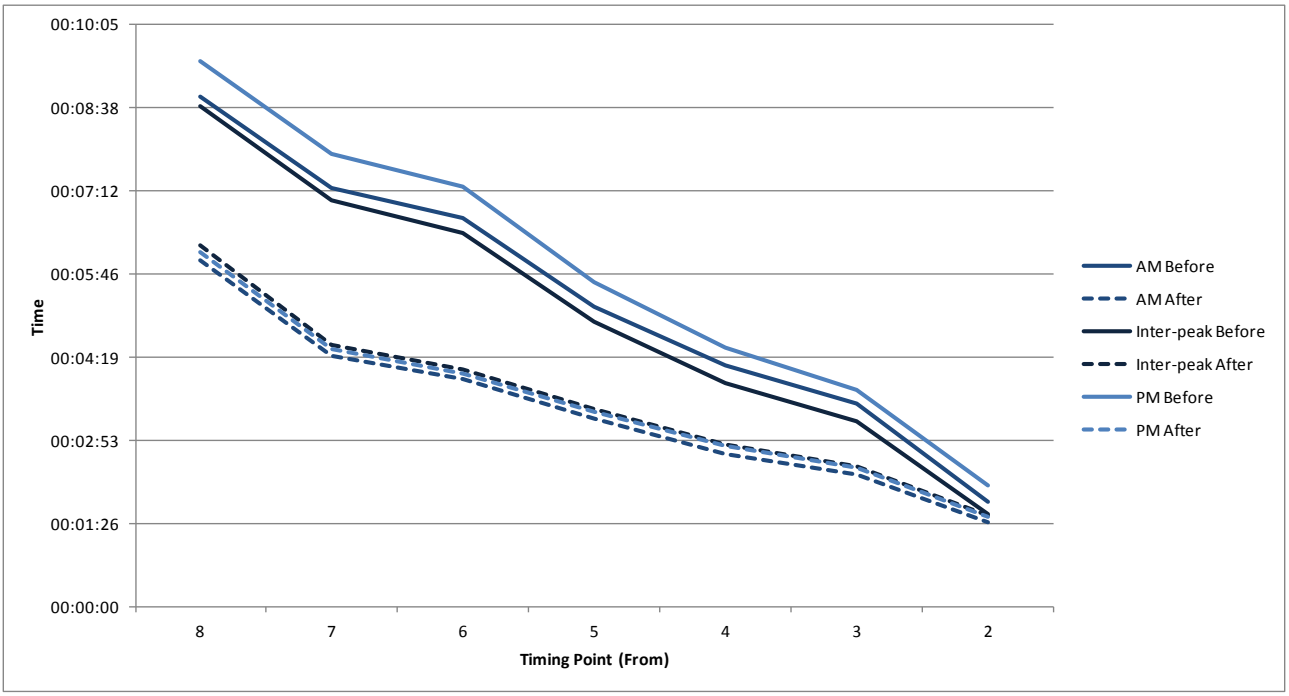
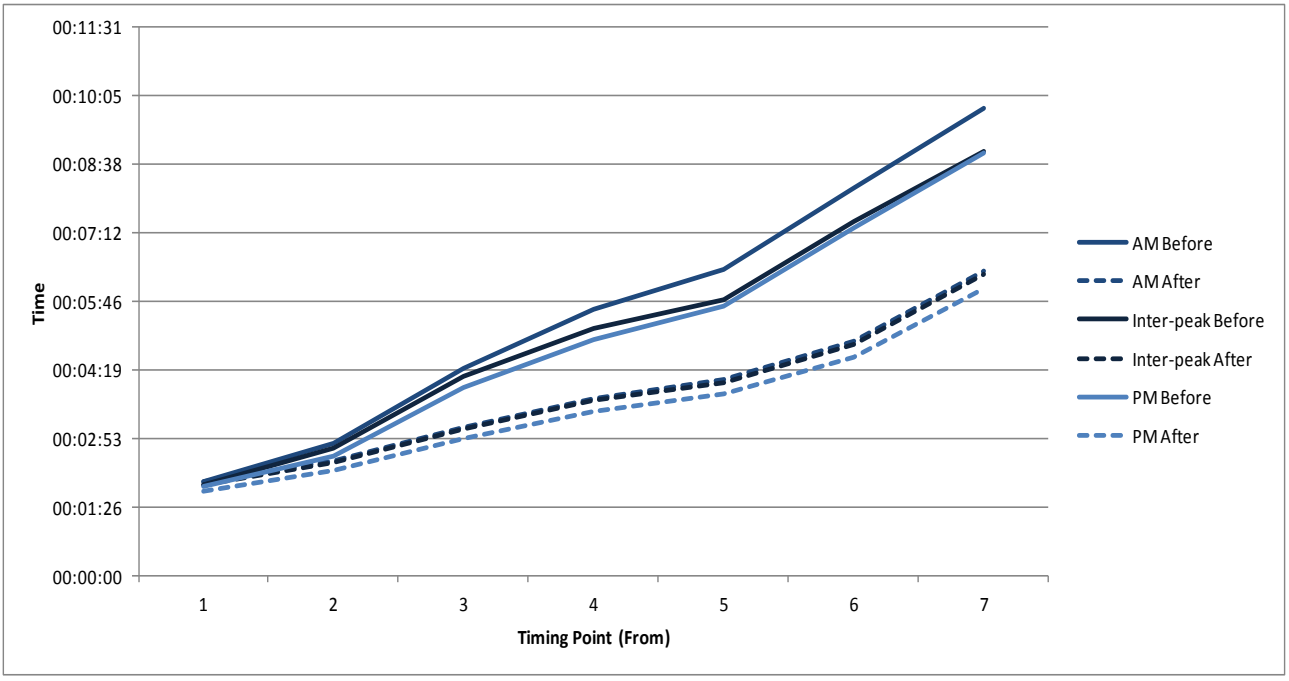


Figure 2.8 - Westbound Journey times via new bypass (after) compared to old A590 route (before)



2.43 From the above results, the following observations regarding journey time savings can be made:

- In the AM peak period, journey times using the new bypass as opposed to the old A590 have improved over three minutes in an eastbound direction and by just under three minutes in the westbound direction.
- In the inter-peak period, journey times have improved by over two minutes in both directions.
- In the PM period, journey times have improved by just over three minutes in an eastbound direction and just under three minutes in the westbound direction.
- The largest savings in journey times are between timing points 3 and 6. This is the section of route which bypasses through the villages of High and Low Newton.

Analysis of Forecast versus Observed Journey Times

2.44 Forecast journey times have been derived between the Cartmel Lane junction (timing point 3 in Figure 2.6) to the Oak Head Road junction (timing point 6 in Figure 2.6). The before journey times are based on moving observer survey data at pre-scheme stage, while the after journey times are based on sat nav data collected at the FYA stage. These have been replicated in

2.45

2.46

2.47

2.48 Table 2.7 along with forecast journey times on the same stretch of road for comparison purposes.

Table 2.7 – Forecast versus Observed Journey Times for a Do-Something Scenario for the new bypass route based on a two-way average between Timing Points 3 and 6

Time Period	Scenario	Journey Time (min:sec)		Difference	% Difference
		Predicted	Observed		
AM	Do-Minimum	02:58	03:26	00:28	**16%**
	Do-Something	01:52	01:41	-00:11	**-10%**
	Difference	01:06	01:45	00:39	**60%**
	% Difference	**37%**	**51%**		
Inter Peak	Do-Minimum	02:51	03:11	00:20	**12%**
	Do-Something	01:52	01:42	-00:10	**-9%**
	Difference	00:59	01:29	00:30	**51%**
	% Difference	**35%**	**47%**		
PM	Do-Minimum	02:58	03:20	00:22	**12%**
	Do-Something	01:52	01:38	-00:14	**-12%**
	Difference	01:06	01:41	00:35	**54%**
	% Difference	**37%**	**51%**		

2.49 From this, it should be noted:

- During the AM period, Inter Peak period and PM period, observed DM journey times exceeded that which was predicted. During all time periods, the observed DS journey times were also lower than that predicted. This combination means there is a significant increase between the journey time improvement expected between the DM and DS scenarios.
- In all time periods, the observed time savings are 30 seconds or more higher than predicted.

Journey Time Reliability

2.50 The Route Stress Factor for a particular link is defined as the ratio of the annual average daily traffic (AADT) flow to the Congestion Reference Flow (CRF). When the traffic flow on a particular link reaches the CRF it is considered to be at 100% stress. The CRF is expressed as an AADT flow estimate at which a road is likely to be congested in the peak periods on an average day. The route stress calculation is a commonly used approach to calculate the journey time reliability impacts of schemes.

Changes to Route Stress

2.51 The Appraisal Summary Table (AST) for the scheme forecast a reduction in route stress from 74% to 24%, with an assessment of 'Neutral'. Although stress was predicted to reduce as a result of the scheme, the before opening value of 74% is below the value at which stress becomes significant therefore the assessment of 'Neutral' was applied.

2.52 Calculation methods presented in DMRB Volume 5, Section 1, Part 3 TA/46/97 Annex D have been used to determine the Capacity, CRF and stress factors for the A590 as a single carriageway before the scheme opened, and a dual carriageway after the scheme opened.

2.53 Capacity, which can be described as 'the maximum sustainable hourly lane throughput' has then been calculated by using set parameters and the percentage of 'Heavy Vehicles' in the peak hour. Using the calculated Capacity, the CRF was then derived by using the formula presented in Appendix B.

2.54 Table 2.8 shows the estimated CRF and route stress percentage for the A590. Stress can be expressed as AADT/CRF. DfT[4] guidance states that only values between 75% - 125% should be considered and anything outside this range should be adjusted up or down to 75% or 125%, hence the adjusted stress figures are included in brackets.

2.55 Table 2.8 shows the route stress on the A590 at pre-scheme and FYA stage.

Table 2.8 - Route Stress on the A590 before and Five Years After scheme opening

Route	Forecast (AST)		Observed	
	Before	After	Before	FYA
			Stress	Stress
Old A590	74% (75%)	2% (75%)	61% (75%)	2% (75%)
New Bypass	-	24% (75%)	-	20% (75%)

2.56 The following observations can be made regarding changes to route stress on the A590:

- Route stress on the old A590 has reduced from 61% to 2% which is a significant improvement on the before situation. This is broadly consistent with the predicted change to route stress in the AST, which predicted a reduction from 74% to 2%.
- It can be seen that the dualled bypass five years after scheme opening is at only 20% stress, broadly in line with a predicted stress level of 24%.
- Although route stress has reduced, when the adjusted levels are considered in accordance with DfT guidance it demonstrates no change to route stress.

[4] http://www.dft.gov.uk/webtag/documents/expert/pdf/U3-5-7D-the-reliability-sub-objective-Oct-2013.pdf

Key Points – Traffic Impacts

Traffic Flow Impacts

- There has been a reduction of 97% on the old A590 from between pre-scheme and post-scheme periods, indicating that the vast majority of traffic has reassigned to the bypass.
- Within the corridor (the bypass and the former A590 route), average weekday flows have reduced by 2%.
- Traffic on the A590 east and west of the bypass has reduced by 1%.

Traffic Flow Forecasting

- For the DM scenario, observed flows for the old A590 are 2% lower than the central growth forecast, and are therefore in line with forecasted figures.
- For the DS scenario, observed flows on the new bypass are 6% higher than the central growth forecast. Observed flows on the old A590 route are 56% lower than the central forecast figure, indicating that a greater proportion of traffic has reassigned onto the new bypass than expected at appraisal stage.

Journey Times

- In the AM and PM period, journey times improved by around three minutes on the route shown in Figure 2.6.
- During the inter-peak period, this saving was around two minutes.
- The largest journey time savings are between timing points 3 and 6, where the new route bypasses the villages of High and Low Newton.

Journey Time Forecasting

- In general, journey times between the Cartmel Lane junction to the Oak Head Road junction were similar to those predicted in both the DM and DS scenario.
- There was an underestimation of the DM journey times on the old road, and an overestimation of DS journey times on the new road, translating into a greater time saving than being observed than was forecast.

Route Stress

- Route stress on the old A590 has reduced from 61% to 2% which is a significant improvement on the before situation, broadly in line with predicted changes.
- Route stress on the new A590 bypass route is at 20%, broadly in line with predicted changes.
- When the adjusted route stress levels are considered in accordance with DfT guidance, no change to route stress is demonstrated.

3. Safety Evaluation

Scheme Objective: Provide a road which enhances safety for road users

Introduction

3.1 This section examines how successful the scheme has been in addressing the objective of improving safety. The overarching objectives, as set out in the DfT's transport appraisal guidance, are to reduce collisions and improve security. This includes reducing the loss of life, injuries and damage resulting from transport collisions and crime.

3.2 In order to assess the scheme's impact on collisions, this section of the report analyses changes in personal injury collisions (PICs) occurring in the five year period before construction opening and after. Evaluation of the scheme's impact on personal security has also been undertaken through the use of observations made during a site visit.

3.3 For the safety objective regarding collisions, the AST stated the expectation of *'significant benefits accrued as a consequence of traffic diverting from single to dual carriageway and the subsequent reduction in collision rate.'* Regarding security, the AST expects *'significant improvements for road users, neutral for public transport users'.*

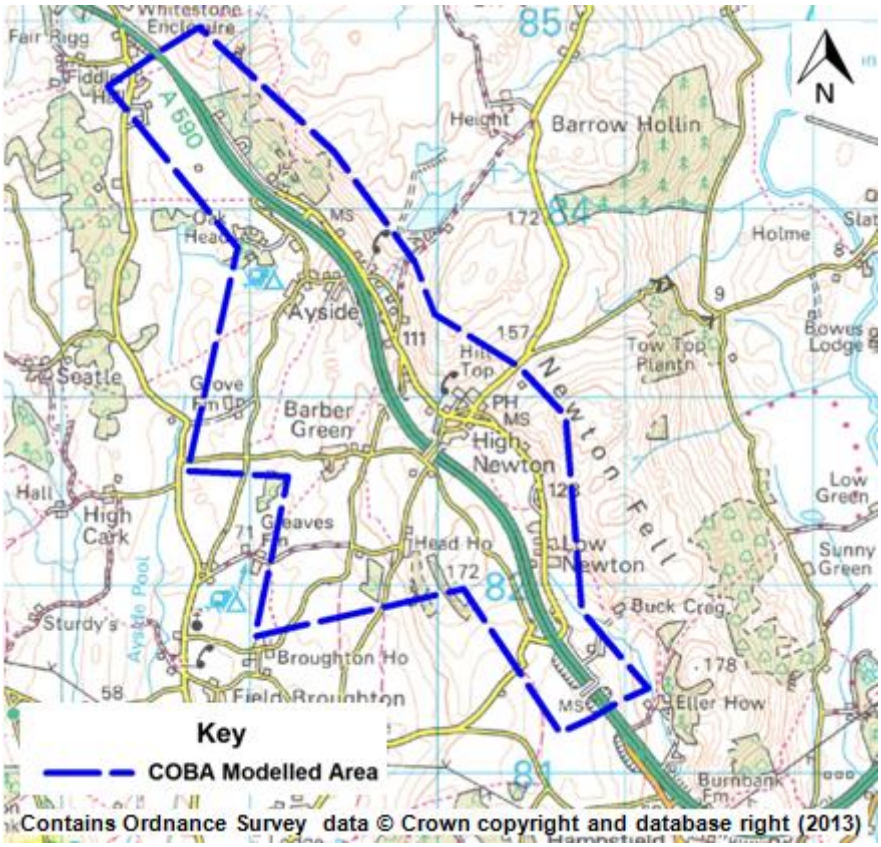
Data Sources

Forecast Data

3.4 For purposes of assessing the safety benefits of the scheme, forecasts were produced of the number of collisions the scheme is expected to save, together with the associated numbers of casualties and the monetary benefit of the savings. These forecasts were undertaken using the Cost Benefit Analysis (COBA) model, outputs from which have been obtained for this aspect of the evaluation. It should be noted that forecasts of the economic or monetary impact of the forecast changes in safety is evaluated in Chapter 4, rather than in this chapter.

3.5 The extent of the COBA model area considered in this evaluation is shown in Figure 3.1. This covers all of the main routes in the immediate and wider vicinity of the scheme where changes in traffic flows and hence collisions may occur.

Figure 3.1 COBA modelled area for collision analysis



Observed Data

3.6 It is standard practice to evaluate collisions for a five year period (60 months) prior to the start of construction which was in July 2006, and all subsequent years up to the start of construction. However, a speed limit reduction was put in place in the latter half of 2001 through the villages of High and Low Newton. In order to examine the impact of the bypass only and not the speed limit reduction, collision records have only been used post introduction of the speed limit. This equates to 53 months of pre scheme construction data.

3.7 Collision data has been obtained from Cumbria County Council covering the following time periods:

- Pre-scheme: 1st Jan 2002 – 30th June 2006
- Construction: 1st July 2006 – 31st March 2008
- Post-opening: 1st April 2008 – 31st July 2013

3.8 The collision data is based on the records of PICs (i.e. collisions that may involve injuries to one or more persons) recorded in the STATS19 data collected by the police when attending collisions. Collisions that do not result in injury are not included in this dataset and are thus not considered in this evaluation.

3.9 It should also be noted that at this stage, the collision data may not yet have been validated by the DfT. The requirement for up to date and site specific information necessitated the use of unvalidated data sourced from the local authority. Thus the data is judged to be sufficiently robust for use in this study, but it may be subject to change. However, it is not anticipated that this would be significant in terms of the analysis of collision numbers presented in this report.

Collisions

3.10 This section analyses the observed trends in PICs following the implementation of the scheme. This includes investigating the changes in the collision rate, the number of collisions

and associated casualties as well as whether there has been a reduction in the relative severity of incidents.

Background Reduction in Collisions

3.11 It is widely recognised that for over a decade there has been a year-on-year reduction in the numbers of collisions on the roads, even against a trend of increasing traffic volumes during much of that period. The reasons for the reduction are considered to be multi-factorial and include improved safety measures in vehicles and reduced numbers of younger drivers. We need to consider this background trend when considering the changes in collision numbers in the High and Low Newton area. If the scheme had not been built, collision numbers in the area may still be influenced by wider trends. In the context of post opening evaluation, we refer to this as the counterfactual scenario.

3.12 The comparison needed is between the five year after (2013) and the middle of the pre-construction period (2004). The approach is to use national data for the changes in the numbers of collisions in this period occurring on A roads for the key links and on all roads for the wider area[5]. These reductions in national collision numbers are used in calculations of the collisions savings in this section.

Evaluation of Collision Numbers and Severity – Wider COBA Area

3.13 An evaluation of before and after opening collision numbers by year for the COBA modelled area is shown in

3.14

3.15

Table 3.1 and

[5] Data sourced from DfT table RAS10002 which includes reported collisions and collision rates by road class and severity, Great Britain.

3.16 Figure 3.2.

In

3.17 Figure 3.2, incomplete years have been extrapolated to a period of one year for comparison purposes.

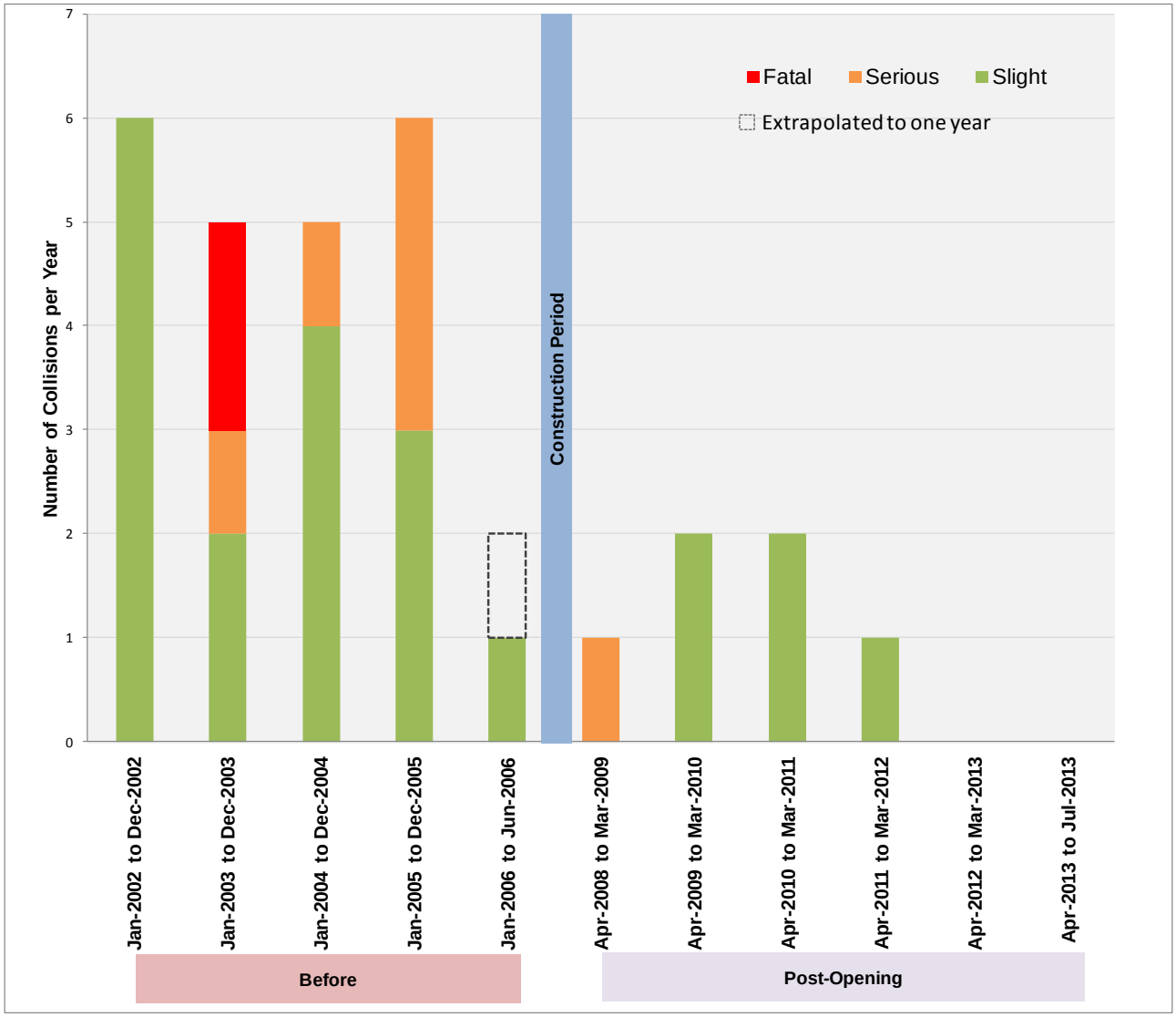
Table 3.1 - Number of Collisions by Severity (COBA Area)

Time Period	Date		Number of Collisions				Annual Average			
	To	From	Fatal	Serious	Slight	Total	Fatal	Serious	Slight	Total
Pre-scheme (53 months)	Jan 2002	Dec 2002	0	0	6	6	0.4	1.1	3.6	5.1
	Jan 2003	Dec 2003	2	1	2	5				
	Jan 2004	Dec 2004	0	1	4	5				
	Jan 2005	Dec 2005	0	3	3	6				
	Jan 2006	Jun 2006	0	0	1	1				
Construction Period	Jul 2006	Jun 2007	0	0	4	4	0.0	0.6	4.0	4.6
	Jul 2007	Mar 2008	0	1	3	4				
Post Opening (64 months)	Apr 2008	Mar 2009	0	1	0	1	0.0	0.2	0.9	1.1
	Apr 2009	Mar 2010	0	0	2	2				
	Apr 2010	Mar 2011	0	0	2	2				
	Apr 2011	Mar 2012	0	0	1	1				
	Apr 2012	Mar 2013	0	0	0	0				
	Apr 2013	Jul 2013	0	0	0	0				
Annual Average Saving Five Years After										4.1
Annual Average Adjusted Saving Five Years After*										2.7

It should be noted that these figures are rounded.

*Adjusted figures show a comparison between the annual averages before and post opening, with the before period data reduced by the national trend on all roads. This assumes that collisions would have reduced here in line with the national trend without the scheme in place.

Figure 3.2 - Number of Collisions by Severity on a Year-by-Year basis



3.18 The results presented above indicate that:

- The number of collisions across the COBA study area has reduced from a pre-scheme annual average of 5.1 PICs, to a post-scheme annual average of 1.1 PIC, a reduction of 80%. This represents an annual average saving of 4.0 PICs.
- Assuming that the national trend of safety improvement of roads would have occurred in this area, the annual average saving would be 2.7 PICs.
- There were no fatal collisions during the post opening period. There was one serious collision across the five year post opening period, an annual average of 0.2, reducing from an annual average of one serious incident. Slight collisions have also reduced from an annual average of 3.6 collisions to 0.9, a reduction of 75%.

3.19 The collision severity index is the ratio of the numbers in the serious and fatal categories compared to the total number of collisions. The severity index for the pre- and post-scheme opening periods has decreased from 30% to 17%. As there were no fatal accidents and just one serious accident during the post-scheme period, the 17% has wide confidence limits.

Evaluation of Casualty Numbers and Severity – Wider COBA Area

3.20 In addition to analysing the number of observed collisions, it is also useful to investigate trends in the number of casualties associated with these incidents.

3.21 Table 3.2 and

3.22

3.23

Figure 3.3 show the number of causalities by severity within the COBA area. In

3.24 Figure 3.3, incomplete years have been extrapolated to a period of one year for comparison purposes.

3.25 Reducing the number of people killed or seriously injured (KSI) in road collisions is a Government objective[6]. KSI is measured as the proportion of such casualties out of the total injured. Table 3.2 presents casualty numbers and the severity index for the whole of the COBA modelled area. It should be noted that these casualty numbers do not take account of background reduction in collisions.

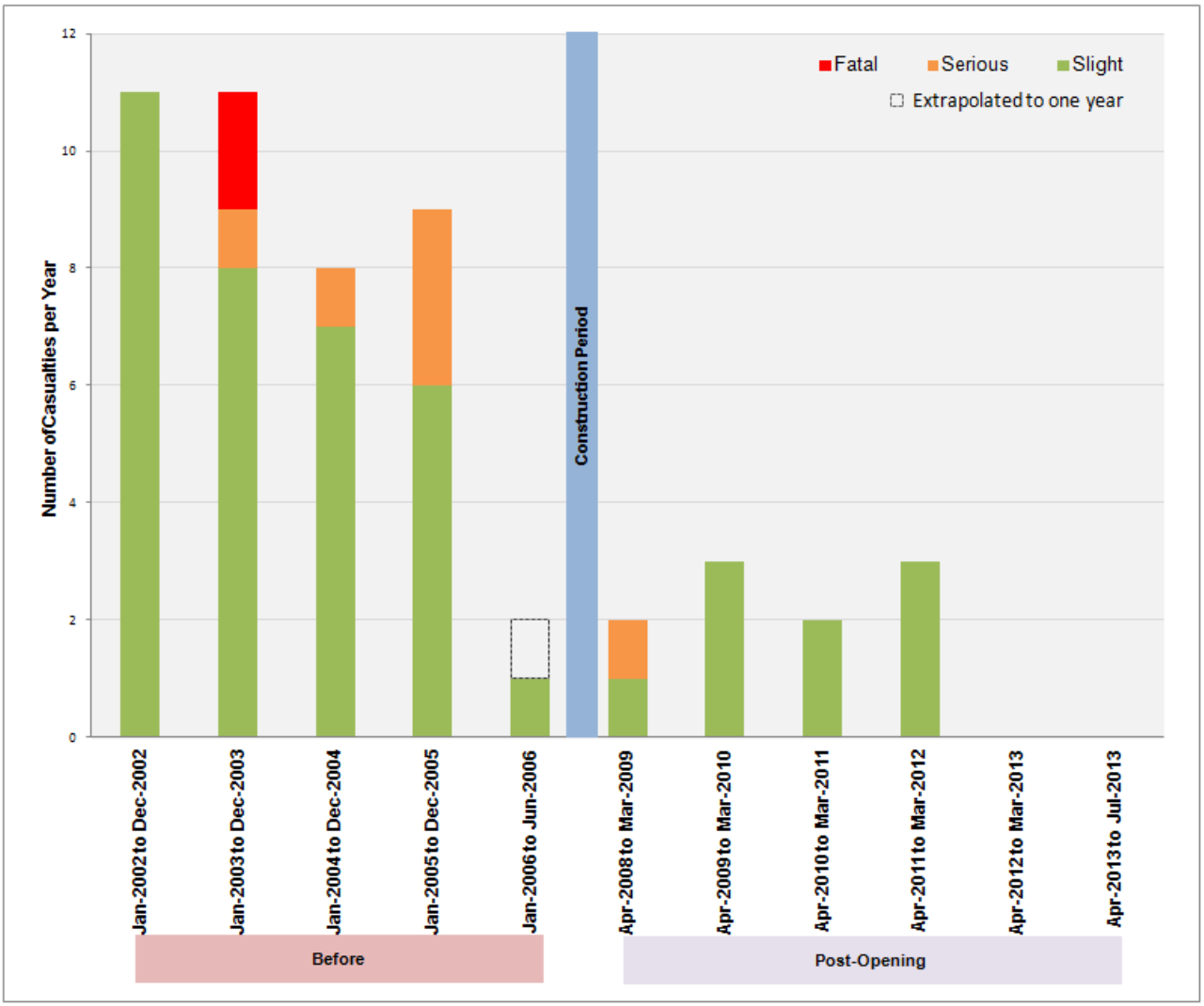
Table 3.2 - Number of Causalities by Severity (COBA Area)

Time Period	Date		Number of Causalities				Annual Average				KSI
	To	From	Fatal	Serious	Slight	Total	Fatal	Serious	Slight	Total	
Pre-scheme (53 months)	Jan 2002	Dec 2002	0	0	11	11	0.4	1.1	7.3	8.9	18%
	Jan 2003	Dec 2003	2	1	8	11					
	Jan 2004	Dec 2004	0	1	7	8					
	Jan 2005	Dec 2005	0	3	6	9					

[6] Tomorrow's Roads: Safer for Everyone. The Government's road safety strategy and casualty reduction targets for 2010 (Department for Environment, Transport and the Regions, 2000).

	Jan 2006	Jun 2006	0	0	1	1					
Construction Period	Jul 2006	Jun 2007	0	0	9	9	0.0	0.6	8.6	9.1	6%
	Jul 2007	Mar 2008	0	1	6	7					
Post Opening (64 months)	Apr 2008	Mar 2009	0	1	1	2	0.0	0.2	1.7	1.9	10%
	Apr 2009	Mar 2010	0	0	3	3					
	Apr 2010	Mar 2011	0	0	2	2					
	Apr 2011	Mar 2012	0	0	3	3					
	Apr 2012	Mar 2013	0	0	0	0					
	Apr 2013	Jul 2013	0	0	0	0					
Annual Average Saving Five Years After										7	

Figure 3.3 - **Number of Casualties by Severity on a Year-by-Year basis**



The results presented in Table 3.2 and

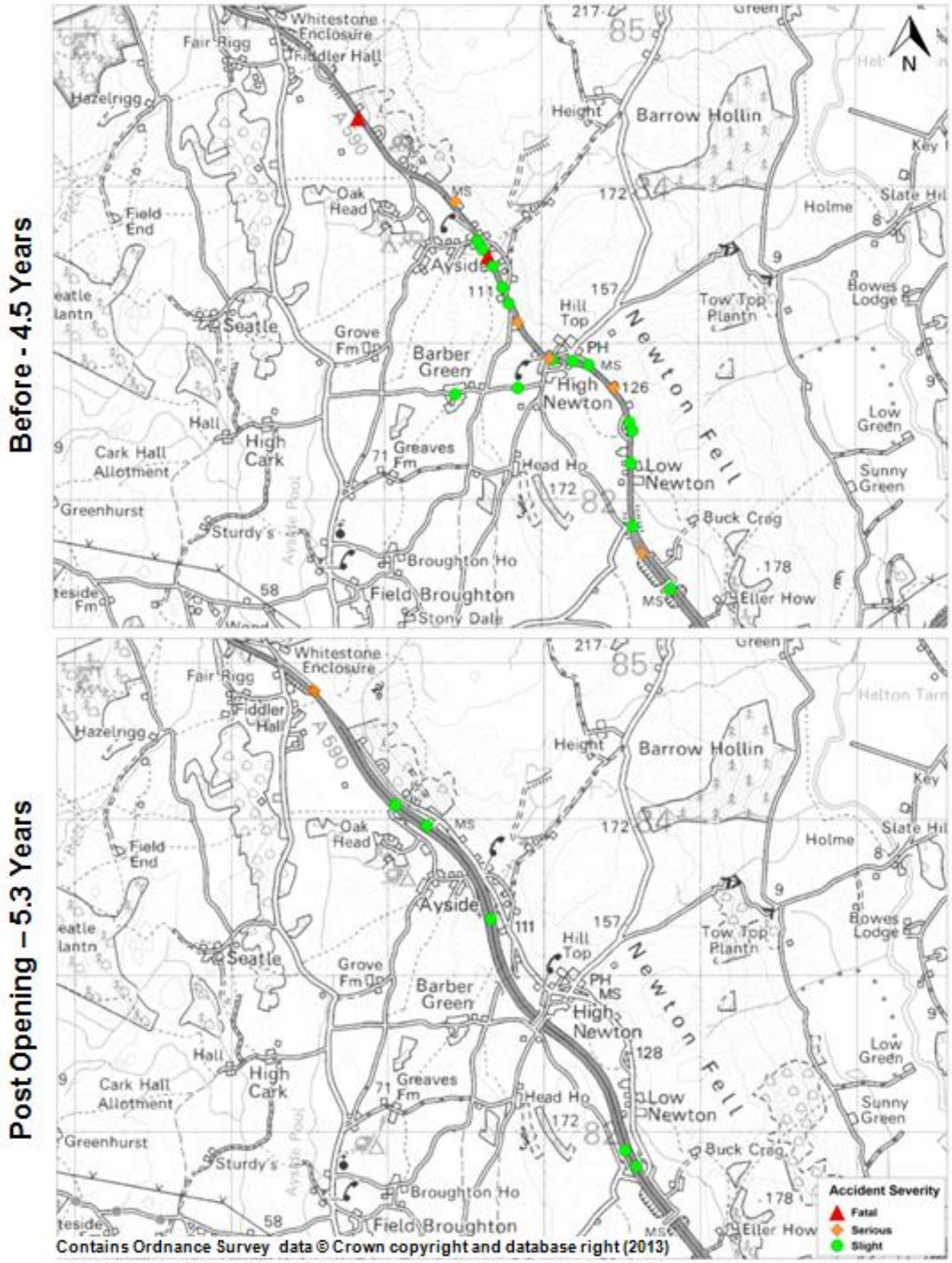
3.26 Figure 3.3 indicate that:

- The average annual number of casualties reduced from 8.9 in the pre-scheme period to 1.9 post-scheme opening.
- Similarly, the annual average number of fatal casualties fell from 0.4 to 0 between the pre-scheme and post-opening period, while the number of serious casualties reduced from 1.1 to 0.2.

Locations of Collisions – Wider COBA Area

3.27 The locations of the collisions on the old A590 route alignment for the pre-scheme period and on the old route and new A590 bypass alignment for the post-scheme period are shown in Figure 3.4.

Figure 3.4 – Collision Locations Four Years and Six Months Before Construction and Five Years and Four Months After Construction



3.28 Figure 3.4 shows that prior to scheme opening, collisions generally occurred along the whole length of the former A590. This is likely to be because the route included a number of accesses and junctions along its length, and the route was generally the same standard throughout.

3.29 The post-scheme opening map reveals that the numbers of collisions overall has reduced significantly. Here, the numbers of collisions on the old route through High and Low Newton has reduced to none. The collisions along the new A590 bypass route are largely dispersed

along the route. There is one serious collision within the COBA area, North West of the bypass.

Collision Causation - Wider COBA Area

3.30 Whilst overall collisions numbers are low, analysis of the contributory factors reveals that the most common causes of collisions are classified within three categories: 'Road and Environment Contributed', 'Injudicious Action' and 'Driver/Rider Error'. The data available does not show any significant changes between the before and after periods, other than collisions caused by 'Injudicious Action' have reduced by 80% from one collision per annum in the pre-scheme period to just 0.2 during the post-opening period.

Changes in Collision Rates - Key Links

3.31 Collision rates on the roads which are directly affected by the scheme (termed 'key links') will now be considered. By looking at the rates we see the impact on the roads of most interest whilst taking account of the change in traffic volumes. The following key links in the COBA model are considered:

- Those added due to the scheme:
- Included in the Do-Minimum scenario, but deleted and replaced in the Do-Something situation.
- On the old road both the DM and DS scenarios.

3.32 These rates are compared with these with the forecasts for the same links and junctions. The forecast collision impact in COBA has a built in prediction of collision reduction over time. This has been based on observed accident data records. Analysis here took into account the change in speed limit on the section of the A590 along High and Low Newton in the latter half of 2001, with accident records only being used post the introduction of the speed limit to calculate individual accident rates for links and junctions. To make a comparison, we have extracted details of the flows, lengths, and collision numbers from the COBA model output for the selected key links and junctions to calculate an overall rate. This is then compared with the rate calculated from the observed data for the same links as shown in Table 3.3.

Table 3.3 - Collision Rates (PIC/mvkm) on the key links including adjustment for national reduction trend

Forecast		Observed	
Do-Minimum (without scheme)	0.52	Before	0.16
		Counterfactual*	0.12
Do-Something (with scheme)	0.12	After	0.04
Saving	**0.40 (77%)**	**Saving**	**0.08 (67%)**

*The 'counterfactual' represents a scenario where it is assumed that without the scheme in place, collision numbers would have reduced in line with the national trend.

3.33 The key points from the changes in collision rates as shown by Table 3.3 are:

- The reduction of the collision rate on the key links is less than predicted, being 0.08 collisions/mvkm as compared to 0.40 collisions/mvkm. Part of this difference is due to the background reduction having a bigger impact than forecast, leaving less scope for improvement. However, the most significant reason is that the observed collision rate before scheme opening without consideration of the background reduction in collisions is 0.36 collisions/mvkm below that forecasted.
- The observed collision rate in the post opening period is lower than forecast by 0.08 collisions/mvkm.

Statistical Significance of Changes in Collision Rates - Key Links

3.34 In order to determine whether the changes in collision numbers observed before and after the scheme opened are statistically significant, a Chi-square test has been undertaken with the background reduction in collisions being taken into account. This test uses the before and

after numbers of collisions and traffic flows to establish whether the changes are significant or are likely to have occurred by chance.

3.35 It was found that the reduction in collision rates is significant, and therefore is not the result of chance alone.

Fatalities and Weighted Injuries

3.36 The collision rate discussed above and shown in Table 3.3 does not take into account the severity of collisions. To analyse this we now present the Fatalities and Weighted Injuries (FWI) metric which adjusts of severity and is defined as:

(number of fatalities) + 0.1 x (number of serious casualties) + 0.01 x (number of slight casualties)

3.37 The FWI metric reflects the approximate ratios between the costs of fatal, serious and slight casualties given in the DfT's WebTAG (Unit 3.4.1).

3.38 The FWI for the 53 months before and 64 months after period are shown in Table 3.4. For comparison with other schemes, the FWI rate per billion vehicle kilometres (bvkm) is also shown.

Table 3.4 - FWI on the A590 old route at before stage and the new A590 bypass at FYA stage

	FWI/collision	FWI/year	FWI/bvkm
Before	0.086	0.36	19.6
After	0.010	0.01	0.5

3.39 Table 3.4 shows that the FWI/bvkm metric has significantly reduced, indicating that the seriousness of collisions occurring on the route has decreased. The FWI/collision metric has also reduced considerably since scheme opening, indicating that the number of fatal and serious injuries have decreased in proportion to the total number of collisions.

Personal Security

3.40 The aim of this sub-objective is to reflect both changes in security and the likely number of users affected. In terms of roads, security includes the perception of risk from personal injury, damage to or theft of vehicles, and theft of property for individuals or from vehicles.

3.41 For highway schemes, security issues may arise from the following:

- On the road itself (e.g. being attacked whilst broken down).
- In service areas, car parks, and so on (e.g. vehicle damage while parked at a service station, being attacked while walking to a parked car).
- At junctions (e.g. smash and grab incidents while queuing at lights).

3.42 The primary indicators for roads include surveillance, landscaping, lighting and visibility, emergency call facilities and pedestrian and cyclist facilities.

Forecast

3.43 The Appraisal Summary Table states that in terms of security, there would be 'significant improvements for road users, neutral for public transport users'. As such, the scheme was forecast to have a 'moderate beneficial' impact on security.

Observed

3.44 The new route includes two lay-bys (one in each direction), each with an emergency telephone. The former A590, while not having any lay-by provision, can be considered a less isolated route because it runs through High and Low Newton. Lighting along the former A590 route was also enhanced by nearby properties compared to the bypass. There was footpath provision between High and Low Newton pre-scheme. The scheme is therefore considered to

have a **neutral** impact. The AST prediction of 'Moderate Beneficial' impact on personal security for road users can therefore be considered to be an overestimate of the benefit. It is concluded that 'neutral' would be a more appropriate assessment.

Key Points - Safety

Collisions

- Across the COBA modelled area, the average annual number of collisions has reduced from a pre-scheme level of five collisions to a post-scheme annual average of one.
- There were no fatal collisions during the post opening period. Serious collisions have reduced by 80%, with slight collisions reducing by 75%. The collision severity index has reduced from 30% to 17%.
- The fatalities and weighted injuries calculation show that the seriousness of collisions occurring on the route has decreased, and that the number of fatal and serious has decreased in proportion to the total number of collisions.
- The average annual number of casualties reduced by seven casualties between pre-scheme and post-scheme. This included a reduction in the annual average number of fatal casualties from 0.4 to none, and an annual average reduction of serious casualties from 1.1 to 0.2.
- The previously most common causes of collisions on the former A590 route, of 'Road and Environment Contributed', 'Injudicious Action', and 'Driver/Rider Error' have all reduced slightly with the opening of the new scheme.

Collision Rate

- On the key links, the observed reduction in collision rate is less than predicted, being 0.08 collisions/mvkm as compared to 0.40 collisions/mvkm. The majority of this difference is due to the DM collision rate forecast being higher than observed at before stage.
- The observed collision rate in the post opening period is lower than forecast by 0.08 collisions/mvkm.

Location of Collisions

- Prior to scheme opening, collisions generally occurred along the whole length of the former A590. Post-scheme opening, there were no collisions along the former route through High and Low Newton. Those on the new A590 bypass were largely dispersed along the route.

Personal Security

- The new route includes two lay-bys (one in each direction), each with an emergency telephone. The former A590, while not having any lay-by provision, did run through High and Low Newton where lighting was enhanced by nearby properties. There was also footpath provision between High and Low Newton. The scheme is therefore considered to have a **neutral** impact.

4. Economy

Introduction

4.1 This chapter evaluates the costs and economic benefits of the A590 Bypass scheme, based on a comparison of before and observed 'five years after' data, and compares this to the forecast economic impact.

Sources

4.2 Economic assessment forecasts for the scheme were obtained from the May 2005 COBA. The economic forecast data presented in the AST uses figures from the 2005 COBA.

4.3 The economic forecasts from the 2005 model cover a sixty year period based on a 2008 opening year and reports in 2002 prices and values. A central growth forecast was used, taking an average of the low and high growth scenarios. Details of this are provided in the A590 COBA Technical Note Rev D (May 2005).

4.4 In this report the economic evaluation is based on re-forecasting the benefits for the same time frame based on observed outcomes seen in the first five years after the opening of the scheme.

4.5 All costs presented in this report are in 2002 prices discounted to 2002.

Transport Economic Efficiency

Monetised Journey Time Benefits

4.6 The POPE method of evaluating the economic value of benefits deriving from vehicle hour savings is based upon comparing the observed vehicle hour savings, combined with the assumption that the observed vehicle hour saving at the FYA stage can be taken as indicative of that over the whole 60 year appraisal period. Based on this assumption, comparing the forecast vehicle hour saving with the observed vehicle hour saving enables the calculation of the 60 year monetised benefit.

4.7 In order to establish the proportion of vehicle hours saved compared to the forecast, it was necessary to calculate the observed vehicle hours saved per annum based on the FYA journey times and traffic flows. This was done using a 'saving per vehicle' approach for existing traffic.

4.8 A similar exercise was then undertaken using the forecast Do-Minimum and Do-Something traffic flows, transit time and junction delay from the COBA model outputs.

4.9 Journey time savings have been calculated for the A590 bypass section only compared to the new bypass. The old A590 route has been excluded due to the low vehicle numbers it experiences at FYA stage.

4.10 The forecast and observed journey time saving and resulting monetary benefit are presented in Table 4.1.

Table 4.1 – Annual Journey Time Saving and Sixty Year Monetary Benefit

			Vehicle Hours Saving/Benefit
COBA Forecast	Forecast vehicle hour saving	(a)	32,267
	Forecast Benefit over 60 years	(b)	£68.2m
Observed	Annual average vehicle hour saving (observed)	(c)	35,091
POPE Re-Forecast	Re-forecast 60 year benefit	(d) = (c)/(a) x (b)	£74.2m

4.11 The table shows that:

- The re-forecast sixty year benefit is 9% higher than the COBA forecast sixty year benefit. This is due to greater than predicted journey time savings as discussed in Section 2.44, and a higher proportion of traffic switching to the new and faster road.

Evaluation of Safety Benefits

- The evaluation of the outturn safety benefits is based on the forecast 60 year safety benefits, and the comparison between the forecast and observed saving of collisions in the opening year. These are all based on the impact for the whole study area as modelled in the original COBA. The outturn collision saving is that using the counterfactual Do Minimum scenario (taking into account the background reduction), as shown in .
- Table 4.2.

4.12 Monetisation is carried out by:

- Calculating the net difference between the forecast and observed savings in the study area.
- Monetising the net difference using the Project Appraisal Report (PAR) method with values collisions by road type and enables capitalisation over 60 years based on expected traffic growth.
- Calculating the 60 year outturn benefits for the whole area by combining the forecast from COBA for the whole study area with the outturn assessment of the net difference for the narrow area. This is set out in .
- Table 4.2.

Table 4.2 – FYA Outturn Economic Evaluation of Safety Benefits

Forecast			Outturn		
Forecast annual average saving in study area	a	6.60	Observed annual saving in study area (based on adjusted counterfactual)	c	2.66
			Net difference between forecast and observed	d=a-c	-3.94
			Monetisation of (c) into 60 year impact of net diff between forecast and observed saving using PAR3.3 guidance	e	-£9.64m
COBA forecast for whole study area (£m, 60 years)	b	£24.18	Outturn 60 years wide area	b+e	£14.54m

4.13 The key points for the outturn safety outturn benefits are:

- Outturn safety benefits for sixty years is reforecast to be £14.54m.
- As the collision saving is lower than predicted at this stage, as discussed in Section 3.33 the long term monetary benefits are expected to lower than predicted by 40%.

Present Value Benefits

4.14 Cost benefit analysis of a Major Scheme requires the costs to be considered for the whole of the appraisal period and they need to be expressed on a like-for-like basis with the benefits. This basis is termed Present Value. Present Value is the value today of an amount of money in the future or past. In cost-benefit analysis, values in differing years are converted to a standard base year by the process of discounting giving a present value.

4.15 A comparison of all forecast and outturn benefits is presented in Table 4.3.

Table 4.3 – Summary of Scheme Present Value Benefits

Benefit Stream	Forecast	Re-Forecast based on FYA Outturn Impacts

Journey Time Benefits	£68.2m	£74.2m
Collision Benefits	£24.2m	£14.5m
Total PVB	**£92.4m**	**£88.7m**

4.16 The results presented in Table 4.3 show that the re-forecast PVB for the scheme is £88.7m, 4% lower than forecasted at the appraisal stage. This difference is a reflection of the lower collision benefits than forecast, when adjusted to the background reduction that would have occurred without the scheme. Despite this, the forecast is relatively accurate.

Scheme Costs

Investment Costs

4.17 The investment cost is the cost to the HA of constructing the scheme and purchasing the land. Comparison between the forecast and outturn is presented in Table 4.4.

Table 4.4 – Summary of Investment Costs at 2002 prices (undiscounted)

Forecast Cost	Outturn Cost	Difference
£30.1m	£32.1m	£2.0m

4.18 Outturn investment costs are 7% higher than what was forecasted.

Indirect Taxation

4.19 Indirect tax revenue is the expected change in indirect tax revenue to the Government due to changes in the transport sector as a result of the scheme over the appraisal period. For the highways scheme in this study, the tax impact is derived primarily from the monetisation of the forecast change in fuel consumption over the sixty years period. A scheme may result in changed fuel consumption due to:

- Changes in speeds resulting in greater or lesser fuel efficiency for the same trips.
- Changes in distance travelled.
- Increased road use through induced traffic or the reduction of trip suppression.

4.20 The methodology adopted to evaluate the indirect tax impact of the A590 scheme has been based on estimating the change in fuel consumption as a result of the scheme opening. This involves comparing the forecast and observed net change in vehicle flows, speeds and classes for the DM and DS scenarios in order to calculate fuel consumption. The ratio method was then used to reforecast the outturn monetary impact. Central growth figures have been used in the calculation outlined.

4.21 Table 4.5 presents a summary of the indirect taxation impact as forecast at the appraisal stage and re-forecast using five years of observed data.

Table 4.5 – Summary of Change in Indirect Taxation

	Forecast	Re-Forecast based on FYA Outturn Impacts
Change in Indirect Taxation	£2.95m	£3.10m

Total Present Value Costs

4.22 Table 4.6 presents the costs expressed in terms of present value, including the impact to the Treasury in the changes in indirect taxation. This present value cost is used to calculate the benefit cost ratio.

Table 4.6 – Summary of Scheme Present Value Costs

Cost	Forecast	Re-Forecast based on FYA Outturn Impacts
Scheme Costs	£25.7m	£32.9m
Indirect Taxation to Public Accounts	- £2.95m	- £3.1m
Total PVC	**£22.75m**	**£29.8m**

Benefit Cost Ratio

4.23 The Benefit Cost Ratio (BCR) is used as an indicator of the overall value for money of the scheme. It is the comparison of the benefits (PVB) and costs (PVC) expressed in terms of present value.

4.24 At the time of scheme appraisal, Treasury guidance was to include indirect tax as a cost. However, the most recent guidance on indirect tax impacts is to include these as a benefit, rather than a reduction in cost. This means that when a scheme leads to increased fuel consumption and hence increase tax revenue, the PVB is increased rather than the PVC being decreased.

4.25 Table 4.7 presents the BCR of the scheme, with indirect tax included as both a cost and a benefit. All figures are presented in 2002 prices discounted to 2002.

4.26 Projects with a BCR greater than 1 have greater benefits than costs; hence they have positive net benefits. The higher the ratio, the greater the benefits relative to the costs.

4.27

4.28 Table 4.7 shows the BCR calculation the A590 High and Low Newton Bypass scheme.

Table 4.7 - Forecast vs. Outturn Re-Forecast Benefit Cost Ratio

All monetary figures in 2002 Prices and values		COBA Forecast	Re-Forecast based on FYA Outturn Impacts
Indirect Tax as a Cost	**PVB**	£92.4m	£88.7m
	PVC	£22.8m	£29.8m
	BCR	**4.1**	**3.0**
Indirect Tax as a Benefit	**PVB**	£95.4m	£91.8m
	PVC	£25.7m	£32.9m
	BCR	**3.7**	**2.8**

4.29 Table 4.7 shows that outturn BCR is lower than predicted, when indirect tax is classed as a cost or as a benefit. The reason for this is that the PVB was lower than forecast because there were lower collision savings than forecast, while the PVC was higher because the scheme costs were higher than forecast.

4.30 It should be noted that the BCR ignores non-monetised impacts. In the former NATA assessment and its replacement, the Transport Business Case, the impacts on wider objectives must be assessed but are not monetised. The evaluation of the environmental, accessibility and integration objectives is covered in the following sections.

Wider Economic Impacts

4.31 It is inherently difficult to isolate wider economic impacts which could be attributed to the scheme. However, it is important to understand the socio-economic context in which the scheme opened and how the A590 bypass may have assisted local and regional socio-economic aspirations.

Forecast

4.32 Regarding economic impacts, the AST forecast stated that the scheme would have a neutral impact, as the scheme is not a designated regeneration area, nor are there significant developments dependent on the proposed bypass.

Evaluation

Local and wider policy:

4.33 The Cumbria Local Transport Plan 2, covering the period 2006 to 2011, gives a top priority to transport measures that assist economic development, with the improvement of journey time reliability on key strategic routes and improving access to employment sites being crucial.

4.34 Cumbria's third Local Transport Plan (LTP3), published after scheme opening in 2011, recognises that the Furness economy depends on longer distance connections to West Cumbria and the rest of the UK. It is stated that Cumbria County Council 'will aim to secure the required improvements to the A590 to enable new development to come forward in Barrow and South Lakeland'.

4.35 The South Lakeland core strategy acknowledges that the A590 is a key strategic route, which enhances connectivity between the Principal Service Centres of Kendal and Ulverston. It is also noted that the long and unreliable journey times on the road, alongside safety concerns, have 'significant implications for the ability of Barrow to attract economic development'.

4.36 Regarding wider policy, the document 'A New Deal for Trunk Roads in England' includes policies to contribute to an efficient economy and to support sustainable growth in appropriate locations. As can be seen by the local policy documents above, the A590 was an appropriate location in these terms. In the document 'Actions for Roads – A network for the 21st century 2013', there is an emphasis on supporting the UK economy and growth with the provision of well-connected infrastructure with sufficient capacity.

Other considerations:

4.37 The A590 bypass scheme won the CEEQAL ('Civil Engineering Environmental Quality Award') Excellence Award. The scheme extensively utilised locally sourced materials and labour; 130 people were employed on site, many of which were local residents and contractors.

4.38 Based on surveys completed at OYA stage, one local concern has been that the lack of signage directing traffic to the local amenities in High and Low Newton has had negative consequences for local business within the villages. This has again been raised as an issue by the Parish Council. It is understood that Yew Tree Farm requested brown tourist signage off the A590, which was investigated by the Highways Agency but found not to be justified according to standards.

Summary of Wider Economic Impacts:

4.39 The A590 High and Low Newton Bypass is a strategically important route to link Kendal and Ulverston, and the South Lakeland core strategy states that the long and unreliable journey times on the road and safety concerns on the old A590 had strong implications for economic development in Barrow. Evidence in this report show that journey times along the new scheme section have improved on the new bypass compared to the former A590 route at pre-scheme stage. Collisions have also significantly improved.

4.40 Taking into account the emphasis placed on efficient transport connections in both local and wider policy and because the A590 provides a strategic route between Kendal and Ulverston,

and is important for development in Barrow, it can be concluded that the A590 new bypass will have assisted in economic priorities at a local and regional scale. Therefore, it can be considered that the scheme has had a slight beneficial result on wider economic impacts, exceeding the forecast of neutral.

4.41 One concern relating to the new bypass is that traffic is not aware of local amenities in High and Low Newton, which is an unfortunate impact of bypasses. It is understood that the Highways Agency have investigated providing a brown tourist sign off the A590, but that this was not justified according to standards.

Key Points - Economy

Present Value Benefits

- Regarding journey times, the re-forecast sixty year benefit is 9% higher than the COBA forecast sixty year benefit due to a higher reduction in journey times than expected.
- Regarding safety benefits, there were 2.66 less observed adjusted average collisions per year compared to what was forecast. This translates into the sixty year collision benefits being £14.54m, £9.64m lower than what was originally forecast.
- The overall PVB, including the consideration of journey time benefits and collision benefits, is £88.7, 4% lower than the benefit of £92.4m forecast at the appraisal stage.

Present Value Costs

- The outturn cost was £32.1m, 7% higher than that forecast.
- Regarding the change in indirect tax related to the scheme, the re-forecast based on FYA outturn impacts was £3.10m, 5% higher than the forecast of £2.95m.
- The re-forecast Present Value Costs based on FYA Outturn Impacts, taking into account scheme costs and indirect taxation to public accounts, is £29.8m, which is 24% higher than the forecast of £22.75m.

Benefit Cost Ratio

- When indirect taxation is taken as a cost, the re-forecast Benefit Cost Ratio is 3.0, which is lower than the forecasted figure of 4.1 at appraisal stage.
- When indirect taxation is taken as a benefit, the re-forecast Benefit Cost Ratio is 2.8 compared to the forecasted figure of 3.7.

Wider Economic Impacts

- Within local policy, the A590 is recognised as being important in enabling new development in Barrow and South Lakeland, and a way to enhance connectivity between Kendal and Ulverston. In local and wider policy, transport links in strategic locations are recognised as important to supporting economic development. Evidence in this report shows that journey times along the new scheme section have improved.
- The scheme used locally sourced materials and labour. However, there has been some local concern regarding insufficient signage to the local businesses in High and Low Newton.
- The scheme is considered to have had a slight beneficial result on wider economic impacts, exceeding the forecast of neutral.

5. Environment

Scheme Objective: To improve the environment by removing through traffic from unsuitable roads in towns and villages (Environmental Statement, 1993)

Introduction

5.1 This section documents the evaluation of the environmental sub-objectives, focussing on those aspects not fully evaluated at the OYA stage or where suggestions were made for further study.

Summary of OYA Evaluation Recommendations

The OYA evaluation identified a number of areas where further analysis was required at the FYA stage to confirm the longer term impacts of the scheme on the surrounding environment, these are summarised as follows:

- **Landscape** – The Handover Environmental Management Plan (HEMP) included management prescriptions for the maintenance and management of the landscape planting and seeded areas during the three year aftercare period, and the on-going establishment of the planting should be reviewed as part of the FYA evaluation.
- **Heritage** – Confirmation of the final deposition of the archaeological archive and report should be confirmed at the FYA evaluation. There has been no direct impact on listed buildings and the impact on the setting would be reconsidered at FYA when the establishment of planting should be more advanced
- **Biodiversity** – It was considered too soon at OYA to be able to evaluate fully the effectiveness of the mitigation measures which should be considered further at FYA, including extending consultation to include the Managing Agent Contractor, Local Wildlife Trust and badger group, as well as re-consulting with Natural England and the Lake District National Park Authority. It was reported at OYA that a final biodiversity report including recommendations for the bat crossing structure along with conclusions on the effectiveness of the mitigation measures was expected to be prepared in April 2011 and made available for the FYA study.
- **Water** – It was reported at OYA that due to silty run-off during construction there appeared to have been temporary impacts on the biodiversity of local watercourses which would take time to recover. It was suggested that water be evaluated again at the FYA stage including re-contacting consultees.

5.2 The Environmental Statement (ES) noted that the key environmental advantages of the scheme would result from the removal of approximately 93% of traffic from the existing A590 at High Newton and Low Newton providing:

- Reduction in casualties due to collisions
- A safer environment for pedestrians, cyclists and other users of local roads
- Improved amenity for residents and visitors

5.3 The main environmental disadvantage of the scheme would be the introduction of a new dual carriageway in a rural area within the Lake District National Park, where the landscape is recognised as being of high quality and a major recreational resource.

5.4 The following environmental sub-objectives were appraised in the ES and in the Appraisal Summary Table (AST)

- Noise
- Local Air Quality

- Greenhouse Gases
- Heritage
- Landscape
- Townscape
- Biodiversity
- Water Environment
- Physical fitness
- Journey Ambience

5.5 For each of these environmental sub-objectives, the evaluation in this Section assesses the environmental impacts predicted in the scheme's AST and ES against those observed five years after opening.

5.6 In the context of the findings from the OYA evaluation and using new evidence collected five years after opening, this section presents:

- An evaluation of the on-going effectiveness of the mitigation measures implemented as part of the scheme.
- An updated summary of key impacts against all of the nine environment WebTAG sub-objectives, with particular focus on assessment of sub-objectives where it was too early to conclude at the OYA evaluation stage.
- Additional analysis relevant to close out issues/ areas for further study as identified at the OYA stage for consideration at the FYA stage.

Methodology

5.7 This section focuses on those aspects not fully evaluated at OYA, or where at OYA, suggestions were made for further study and also any issues that have arisen since the OYA evaluation. The detail of the OYA study is not repeated here, and reference is made to the OYA report where required, although key points are incorporated into this FYA report where appropriate to provide contextual understanding.

5.8 No new modelling or survey work has been undertaken for this FYA environmental evaluation.

Data Collection

5.9 The following documents have been used for the FYA:

- Appraisal Summary Table (2008)
- A590 High & Low Newton Bypass Environmental Statement February 1993 including main text, appendices, figures and non-technical summary
- As Built drawings
- Handover Environmental Management Plan July 2011 and Appendices
- A590 Bat Monitoring 2007 – 2009 Final Report February 2010
- A Review of Bat Mitigation in Relation to Highway Severance September 2011
- Do Bat Gantries and Underpasses Help Bats Cross Roads Safely? Authors: Anna Berthinussen, John Altringham Institute of Integrative and Comparative Biology, University of Leeds, Leeds, UK

5.10 A full list of the background information requested and received to help with the compilation of this report is included in Appendix A.

Site Visit

5.11 As part of the FYA evaluation, site visits were undertaken in September and November 2013. This included the taking of photographs to provide comparison with material produced at the time of the ES (in the Landscape Proof of Evidence November 1993) and at OYA (Appendix C).

Consultation

5.12 The organisations contacted as part of the FYA evaluation regarding their views on the impacts they perceive the road has had on the environment are shown in **Error! Not a valid bookmark self-reference.**.

5.13 It was suggested at OYA that consultation could be extended to include the local badger groups; it would appear at FYA that the Cumbria Badger Groups are not currently operating. Consultation has however been extended to include the local Wildlife Trust.

Table 5.1 – Summary of Environmental Consultation Responses

Organisation	Field of Interest	Comments at OYA	Comments at FYA
Natural England	Biodiversity & Landscape	Scheme in line with NE expectations although concerned that bat monitoring was not as extensive as requested by NE	Responded that from the information provided, it does not appear to fall within the scope of the consultations that Natural England would routinely comment on.
English Heritage	Heritage	No impacts on archaeology of national importance. Evaluation and recording taken place as agreed	Not considered necessary to re-consult at FYA
Environment Agency	Water	Generally as expected although heavy prolonged rains in first winter when bare ground was exposed resulted in considerable volumes of silty water, pollution prevention measures generally successful although some silty run-off to local watercourses occurred	No further comments to make
Lake District National Park Authority (LDNPA)	Lake District National Park	Commented on landscape, biodiversity, heritage and access	Did not respond to the invitation to provide feedback
Friends of the Lake District	Lake District National Park	No response	Not consulted at FYA
Cumbria County Council	General	As scheme is within the National Park most aspects dealt with by the LDNPA	Not consulted at FYA
South Lakeland District Council	General	As expected for noise, air quality and drainage	No complaints, comments or requests relating to the A590 Bypass since POPE consultation in 2009. Post-opening nitrogen dioxide monitoring results supplied showed no cause for concern. No further feedback on the scheme.

Allithwaite Upper Parish Council	General	Setting of the villages, ecology and access generally as expected, concerned about sediment in local watercourses, signage and HGV routes	Landscape as expected, wider verges on old A590 maintained by village, very limited evidence of wildflowers. Concerned about sediment in local watercourses, signage and HGV routes.
South Cumbria Rivers Trust (SCRT)	Water	Commented on impact on local watercourses including siltation	Commented on siltation and habitat improvements undertaken by SCRT since the bypass construction in response to local concerns about the deterioration of the river and its biodiversity
Cumbria Wildlife Trust	Biodiversity	Not consulted	Did not respond to the invitation to provide feedback
Cumbria archive Centre, Kendal	Deposition of archaeology archive	Not consulted	No record of the deposit of the 2007 report or of a note of the works having been included in the Transactions of the Cumberland and Westmorland Archaeological and Antiquarians Society
Kendal Museum Archaeology Curator	Deposition of archaeology finds	Not Consulted	Checked records and confirmed depositions made in 2008

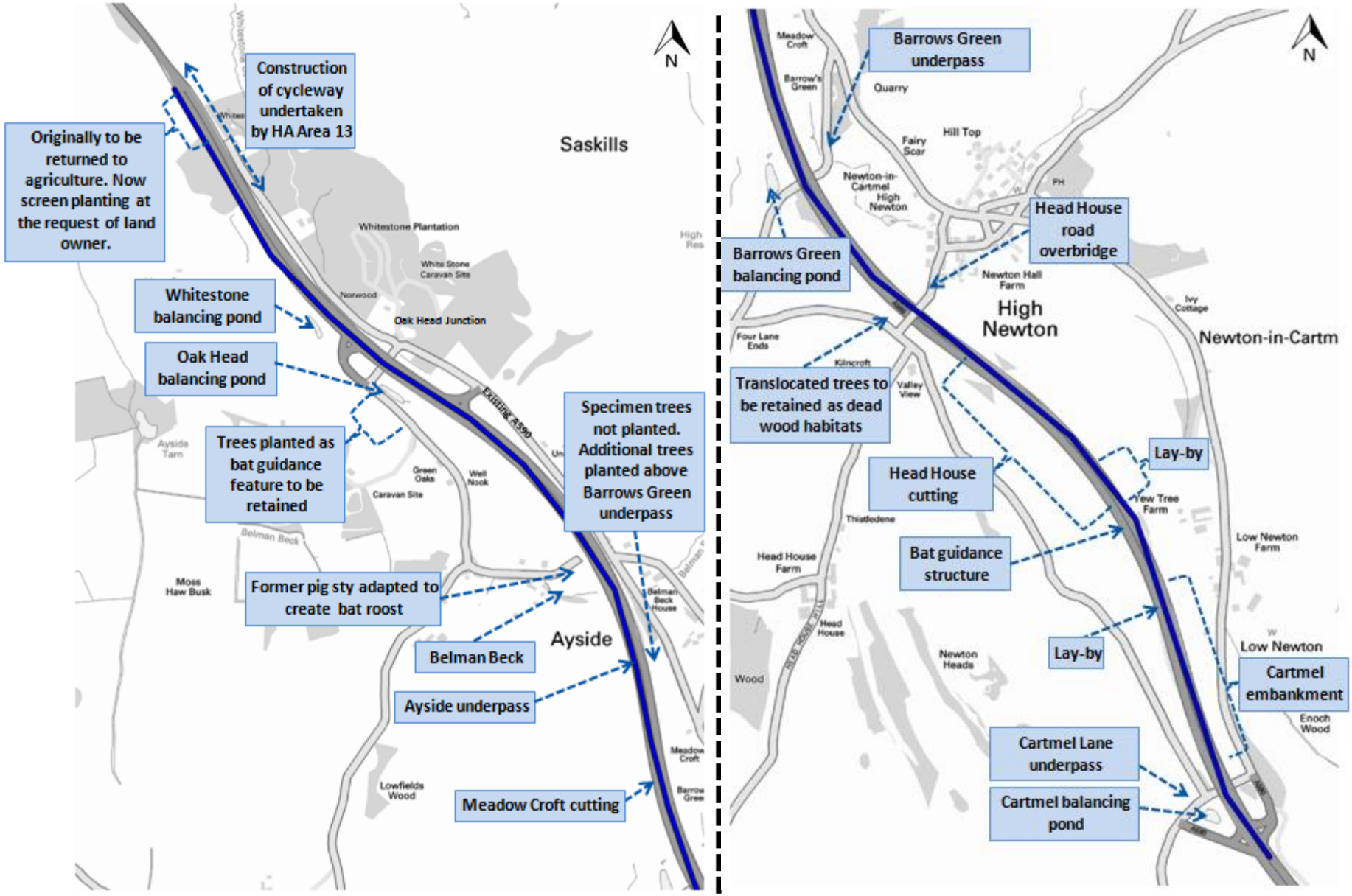
5.14 The Area 14 Managing Agent Contractor (MAC) has provided animal mortality figures for the A590 route corridor at High and Low Newton and these are included in the biodiversity chapter.

Areas of environmental interest

5.15 Figure 5.1 sets out areas of environmental interest along the bypass scheme. The left image shows the north side of the scheme, while the right presents the section to the south.

5.16 It should be noted that Fiddler Hall Barn, where there is off-side planting by agreement, is not included at his mapping scale, but is located to the north west of the scheme section shown.

Figure 5.1 – Locations of areas of environmental interests (left image shows north section of the scheme, while the right shows the south section)



Traffic Forecast Evaluation

5.17 Three of the environmental sub-objectives (noise, local air quality and greenhouse gases) are directly related to traffic flows. No new noise or air quality surveys are undertaken for POPE and an assumption is made that the level of traffic and the level of traffic noise and local air quality are related.

5.18 The ES traffic assessment noted that in 1990 the AADT flow on the A590 between High and Low Newton was 12,840 vehicles. The proportion of HGVs was seasonally variable but averaged 10%. The ES predicted traffic flows for the design year of 2011 as shown in Table 5.2 below. It was expected that over 90% of traffic would be removed from the A590 through the villages of High and Low Newton.

5.19 The noise appendix to the ES stated that speeds used in the calculations were taken to be 97kph for the proposed bypass, 81kph for the existing A590 and 50kph for adjacent side roads.

5.20 As noted in the OYA report, flows on the old A590 in 2007 prior to construction had risen to 17,000 ADT.

Table 5.2 - ES Forecast v Observed traffic

Location		ES Forecast for 2011 AADT	Observed Flows OYA (2009)	Observed Flows FYA (2013)	% Difference (2013 Forecast vs. Observed)	
Old A590 High & Low Newton Without Bypass	LG*	18,200 (1,800 HGVs)	**N/A**	**N/A**	**N/A**	
	HG**	22,100 (2,200 HGVs)				
Old A590 High & Low Newton With Bypass	LG	1,300 (130 HGVs)	**578 (5 HGVs)**	**535 (18 HGVs)**	**LG**	**-59%**
	HG	1,600 (160 HGVs)			**HG**	**-66%**
Bypass	LG	16,900	**17,476*** (1,634 HGVs)**	**16,953 (1,569 HGVs)**	**LG**	**0%**
	HG	20,400			**HG**	**-17%**

*LG = Low Growth **HG = High Growth

*** The OYA figure for 2009 observed flows was 16,800 based on annual traffic data and no HGV numbers were provided. At FYA monthly traffic data from TRADS has been used to be able to include HGV data. The change makes no difference to this FYA evaluation.

5.21 At FYA traffic on the old road has reduced significantly (97%) since the bypass opened and flows are lower than forecast. Traffic on the bypass is in line with low growth forecasts for the design year 2011.

5.22 At FYA HGV numbers on the bypass are slightly less than the average of 10% noted for the old road in the ES. HGV numbers on the old A590 in 2013 would appear to be higher than observed in 2009 but remain significantly lower than pre-scheme and the ES forecast.

5.23 At FYA observed speeds on the bypass are 105.8km/h[7] and on an adjacent side road at Ayside 42km/h – both of which are within 10km/h of the ES calculations. On the old A590 speeds are 62km/h[8] which is 19km/h lower than ES calculations.

Five Years After Assessment

5.24 Included in this section is a brief summary of statements from the AST, ES and OYA evaluations (including close out / key issues identified for further reporting at the FYA stage) which have been included to provide the context for the FYA evaluation.

Noise

5.25 The AST predicted that the removal of traffic from the existing A590 would result in a reduction of noise at nearby properties. With the scheme, the number of people exposed to noise levels of greater than 75dB was expected to reduce from 55 to zero. There would also be a reduction of people, (from 26 to 17), exposed to noise levels between of 70 and 74dB. Overall the estimated population annoyed by noise would be reduced by 27.

5.26 The ES concluded that the overall noise experienced by residents along the existing A590 and in the settlements of High and Low Newton would be reduced by construction of the bypass and that the landscape proposals including false cuttings and mounding would provide some noise attenuation along the bypass route. Several properties would experience a change of direction of the traffic noise source, for example, from the front to the back of the property and two properties would qualify for insulation against noise.

5.27 The OYA noise evaluation noted that the 1993 ES noise assessment was updated in 2006 taking a revised lower vertical alignment and use of low noise surface for the bypass into account (not expected at the time of the ES), with the conclusion that no properties would be eligible for noise insulation. No other noise specific mitigation measures were proposed.

5.28 It was expected that the scheme would reduce the overall population annoyed by noise by 27. Impacts were predicted to be;

- Decrease in noise for majority of properties at High Newton as the bypass would be in deep cutting, except for Greenacres and Valley View nearest to the cutting.
- Decrease in noise for majority of properties in Low Newton except for Lynfield, East View and Fell Cottage.
- Slight increase in noise for properties at Ayside.

5.29 Based on observed traffic flows after opening it was concluded at OYA that the impacts on noise were **as expected** – it was likely that there had been an improvement in the local noise climate adjacent to the old A590 and a worsening for properties nearer to the new bypass.

Consultation

5.30 South Lakeland District Council reported it has received no complaints, comments or requests for service relating to the A590 Bypass since the OYA consultation in 2009 and has no further feedback on the scheme.

5.31 Allithwaite Upper Parish Council responded that ‘it has been noted that there is increased traffic noise at top end of Lindale village adjacent to Lindale Hill incline on the A590, this may be due to resurfacing completed recently or accelerating traffic as the dual carriage way now continues at summit of hill’.

5.32 It should be noted with regard to this comment that Lindale Hill is beyond the scheme extents and any recent resurfacing works are outside the scope of this study.

[7] FYA Inter-peak average km/h for time-periods 09:00 – 16:00 (June 2012 to July 2013)

[8] FYA average two way AWT speeds km/h.

Evaluation

5.33 Information regarding the high speed Road Surface Index (RSI) value to confirm the noise reduction properties of any low noise surface used for the scheme has not been made available for the FYA study.

5.34 The HEMP states that no properties requested noise surveys during construction works and that no post construction monitoring was undertaken. It has been confirmed by the HA that no properties were eligible for noise insulation.

5.35 As noted in Table 5.2 above, traffic flows have significantly reduced along the old A590 as a result of the bypass and noise due to traffic will have reduced as expected for properties adjacent to the old road within High and Low Newton.

5.36 The bypass has however moved traffic closer to properties in a previously quiet rural location and noise will have increased e.g. for properties in Ayside, at High and Low Newton near the bypass and outlying properties. Traffic flows on the bypass are in line with expectations.

Figure 5.2 - View towards properties at the edge of High Newton near Head House over-bridge

Table 5.3 - Evaluation Summary: Noise

Sub-Objective	FYA Score	Evaluation
Noise	-	As expected

Local Air Quality

5.37 The AST predicted that residents of properties along the existing road would benefit, while a smaller number close to the bypass would experience deterioration in air quality. Overall, there was not an air quality problem in the area.

5.38 The ES noted that the air quality for the route was considered typical for a rural area with no industrial air pollution sources; emissions were limited to vehicular and domestic ones. It was expected that local air quality along the old A590 would improve through the removal of through traffic and that there were unlikely to be unacceptable levels of air pollution due to the bypass.

5.39 At OYA it was concluded that the impacts on local air quality were **as expected** - traffic had significantly reduced on the old A590 and it was likely that residents would have benefited from improved air quality. Traffic on the bypass was in line with predictions and properties near to the bypass would have experienced deterioration in air quality.

Consultation

5.40 South Lakeland District Council reported it has received no complaints, comments or requests for service relating to the A590 Bypass since the OYA consultation in 2009.

5.41 The post-opening nitrogen dioxide monitoring results showed no cause for concern and there is no further feedback on the scheme.

Evaluation

5.42 The HEMP notes that it was predicted that the scheme would not result in a worsening in air quality and therefore no monitoring was undertaken during or post construction.

5.43 Traffic has significantly reduced on the old A590 since the opening of the bypass and it is likely that residents will have benefited from improved air quality as expected. Traffic on the bypass is in line with the 2011 design year low growth forecasts and the few properties near to the bypass will have experienced a deterioration in air quality as expected.

Table 5.4 - Evaluation Summary: Local Air Quality

Sub-Objective	FYA Score	Evaluation
Local Air Quality	-	As expected

Greenhouse Gases

Forecast

5.44 The AST stated that carbon dioxide (CO_2) emissions could be expected to increase by 9% as a result of increased vehicle speeds on the bypass with, 4821 tonnes of CO_2 per year in the Do-minimum scenario and 5273 tonnes per year in the Do-Something scenario. This represents an increase of 452 tonnes per year, which equates to a forecast increase of 123 tonnes of carbon.

Evaluation

5.45 Since this scheme was appraised, greenhouse gas emissions are now measured in terms of tonnes of carbon (C) rather than carbon dioxide (CO_2).

5.46 At OYA stage, carbon emissions were calculating by rerunning the COBA model. The re-forecast here was higher than the AST forecast because the model included more links than that with the AST forecast. The re-forecast was for an increase in 215 tonnes in the opening year, while the outturn result was 221 tonnes per year. This reason for this was that traffic had increased more than expected in the COBA area as a whole.

5.47 At FYA stage, the methodology for calculating carbon emissions is that outlined in the Design Manual for Roads and Bridges (DMRB). This is the likely method used through the AST, meaning that a comparison between the figures is possible.

5.48 The re-forecast was calculated through the DMRB methodology based on forecast data, including traffic flows and speeds. Observed carbon emissions were calculated using the same methodology, using observed data collected for this study on the same links.

Table 5.5 - Re-forecast and Outturn Change in Carbon Emissions

	Carbon Emissions (carbon tonnes/year)		
	AST Forecast	Re-Forecast	Observed
Do-Minimum	1,315	1,206	1,063
Do-Something	1,438	1,343	1,213
Net Difference	123	137	150
	9%	11%	14%

5.49 In the re-forecast, an increase of 137 carbon tonnes/year is expected. This is broadly in line with the forecasted increase of 123 tonnes of carbon from the AST. The observed net difference is broadly in line with this, at 150 carbon tonnes/year. The observed Do-Minimum for carbon emissions is 1,063 carbon tonnes/year, 12% lower than the forecasted figure of 1,206. The observed Do-Something observed carbon emissions is also 10% lower than what was forecasted. The reasons for the lower levels of carbon emissions is that lower HGV figures were observed than were forecasted, and also that there were lower speeds observed than were forecasted.

Table 5.6 - Evaluation Summary: Greenhouse Gases

Sub-Objective	FYA Score	Evaluation
Greenhouse Gases	Minor Negative	As expected

Landscape and Townscape

5.50 For Landscape, the AST stated that the offline bypass avoided High and Low Newton. The A590 was noted as an important communication route and gateway to a major tourist area; in an attractive high quality rural landscape within the southern part of the Lake District National Park. The route would follow the transitional zone between lowland vale and upland fell. There would only be a small loss of woodland but a significant impact on fields, walls and hedgerows. The scheme would be incompatible with the undulating landform and it was expected that planting would reduce the impact as it matured. The impact overall was assessed as **large adverse**.

5.51 For Townscape, the AST stated that the scheme would remove traffic from High and Low Newton. There would be a conflict with the existing small scale, fine grain townscape local to Ayside. The impact overall was assessed as **slight beneficial**.

5.52 The ES stated that in an area valued particularly for its scenery, it was inevitable that a new road of the scale of the bypass would impact upon the local landscape. The scheme falls within the Lake District National Park. The proposed alignment would be designed to follow the natural boundary between the steep sided fells and rolling lowland vale for much of its length, deviating only where necessary to bypass the villages. However, it was noted that a cutting through Newton Heads Hill and embankment over Barrows Green Valley would be necessary and these, together with the embankments for the grade separated junctions with the local road network would cause an impact on landform.

5.53 A large section of the proposed route would be adjacent to the existing A590, and near High and Low Newton villages the proposed road would be in cutting.

5.54 The OYA report recorded that the removal of significant volumes of traffic from the villages had improved the local landscape character as expected. The scheme had followed an alignment sympathetic to the landform; and this together with the use of local vernacular materials and styles, and attention to detail in the design had helped reduce the impacts of the

bypass in this attractive high quality rural landscape within the national park. However, as expected, the scheme impacted on the character of the area.

5.55 It was considered too soon at OYA to be able to evaluate the overall effectiveness of the landscape planting which it was suggested should be reviewed at the FYA stage. Some plots were less well advanced than others and it was noted that gorse was doing very well and could become dominant at the expense of other species.

5.56 With regard to townscape at OYA the old A590 had become less urban in character, with measures undertaken to 'downgrade' the road including widened verges to reduce carriageway width in High Newton. This was commented on at OYA by the parish council as it had caused more issues regarding maintenance than had been expected. Significant reductions in traffic had improved visual amenity and in turn local village character. The route corridor passed close to the village of Ayside as expected.

Consultation

5.57 Allithwaite Upper Parish Council comments made at OYA still stand i.e. that the bypass has enhanced the settings of the villages of High and Low Newton, and that it is starting to blend with the landscape well (Figure 5.4).

5.58 The parish council notes that some of the widened verges have now been adopted by households via a stopping up order and others are maintained by a working party of volunteers (see Figure 9.11 in Appendix C Photo Comparison between OYA and FYA and Figure 5.3).

5.59 With regard to the issue raised by the parish council concerning maintenance of verges, it is important that the full extent of any additional responsibilities falling to local communities as a result of downgrading or de-trunking roads is fully explored with the communities concerned.

Figure 5.3 - Widened verges along old A590 at High Newton which reduce the visual appearance of the old A590 carriageway to be more in keeping with the village setting and are now maintained by local residents.

Evaluation

5.60 The HEMP states that the landscape works have been implemented in accordance the contract drawings. It notes a number of locations where planting has been repositioned to accommodate changes on site and /or site conditions, for example:

- Specimen trees alongside Ayside bridleway have not been planted (at request of the landowner).
- Additional trees have been planted on top of the Barrows Green underpass (Figure 5.4 below) to screen the adjacent property and at the Whitestone balancing pond, to act as a bat guidance feature.

- Land at the northern end of the scheme, originally to be returned to agriculture has been planted with woodland, at the request of the adjacent landowner. Due to grazing by sheep many of the plants were eaten, gorse thrived and it was decided to retain as scrub. The Lake District National Park Authority (LDNPA) had not wanted a continuous strip of woodland so this approach also met their objectives.

Figure 5.4 - View from old A590 at High Newton towards Barrows Green underpass. Planting is establishing well on the embankment slopes, traffic is still visible as it crosses the bridge but it is expected that in time planting will provide more screening

Figure 5.5 - View from lane near Head House over-bridge looking west illustrating bypass alignment curving within the local landscape to minimise impact on the high quality National Park landscape

5.61 The HEMP confirms that regular maintenance was undertaken during the 3 year aftercare period from July 2008 to July 2011. Responsibility for ongoing maintenance and management then passed to the Area 14 MAC. After July 2011 the HEMP recommended that grass cutting and weed control operations continue until 2015 as per the 3 year aftercare maintenance regime. It suggests that the maintenance regime should be reviewed in 2015 and take into account of site conditions and the maturity of vegetation.

5.62 On the day of the September FYA visit grass cutting was underway. There was no particular evidence of any weed free circles around planting stations and some rank weed growth was visible within plots and the balancing pond areas. Typical planting plots are illustrated in Figure 5.6 and Figure 5.7 below.

Figure 5.6 - Illustrates well established hedge adjacent to Ayside bridleway with bypass behind hedge (left) and plot(on right) exhibiting variable growth. Gorse is evident and some shelters still in place

Figure 5.7 - Examples of plant growth in plots near Barrows Green (left) and at Oak Head Underpass (right)

5.63 **Cartmel junction planting plots** - At FYA the planting on the embankment slopes at the Cartmel junction, appears sparse and is less well advanced than elsewhere along the route and it will take time before it provides any screening of traffic and softening of the engineering features (see Figure 5.8 below).

5.64 It is understood from the HEMP that 'due to drainage/soil stability problems the topsoil was removed from the slope resulting in slow growth and lack of woodland cover. To compensate, trees were pit planted into locally imported pockets of topsoil. The addition of an agricultural track and cattle holding compound at the bottom of the embankment resulted in an over steepening of the embankment; making the establishment of vegetation even more difficult. Establishment of wood and on this embankment should be the main objective of the ongoing maintenance'.

5.65 It will be important for any dead trees/shrubs to continue to be replaced and routine aftercare operations carried out e.g. for weed free circles to be maintained until satisfactory growth is achieved within the plots.

5.66 **Gorse** - Gorse was noted as a potential problem at OYA and it appears to be becoming dominant in some areas at FYA. The MAC has confirmed that through routine maintenance it will attempt to control the gorse and allow the tree and shrub species to establish.

5.67 Figure 5.11 illustrates a typical plot with gorse.

Figure 5.8 - View of the Cartmel junction embankment slopes where planting is slow to become established (left) and planting plot with gorse (right)

5.68 **Offsite planting** - The HEMP confirms that offsite planting by agreement (screen planting and fencing) was undertaken at Fiddler Hall Barn in 2007, with defective plants replaced in 2008 and the plot maintained until 2010 after which it reverted to the landowners. This plot was not visited at OYA. Figure 5.9 below illustrates good growth noted during the November FYA site visit.

Figure 5.9 - View from PROW adjacent to Fiddler Hall Barn in November 2013. Offsite planting plot in mid distance along field boundary with bypass beyond.

5.69 Townscape - There were no issues identified at OYA with regard to townscape apart from maintenance of the widened verges, which are now being maintained by local residents. Traffic levels remain low at FYA and as noted at OYA this has improved visual amenity and in turn local village character.

5.70 Overall it is considered at FYA that landscape planting is establishing well and is beginning to provide a framework for the bypass. Subject to ongoing successful establishment it should reach its landscape objectives for screening and integration into the local landscape by the design year (year 15) in most locations. Planting at Cartmel embankments, however, remains slow to establish and could potentially fail to reach its objectives by the design year

5.71 Appendix B and C include ES photomontages compared with FYA views, before and after scheme aerial views, together with OYA and FYA comparison photos.

Table 5.7 - Evaluation Summary: Landscape and Townscape

Sub-Objective	FYA Score	Evaluation
Landscape	Large Adverse	As expected
Townscape	Slight Beneficial	As expected

Heritage

5.72 The AST stated that all known impacts would be adequately mitigated through a programme of archaeological works in advance of, or during, construction. The setting of the Listed Buildings at Low Newton would benefit from the removal of traffic from the existing road. The Listed Building at High Newton experiences slight visual intrusion which would in time be reduced by planting schemes. Black Beck Hall is not a Listed Building but had some local significance and was recorded prior to demolition. The overall impact was assessed as **neutral**.

5.73 The ES stated that no known sites of archaeological importance would be affected by the proposals. Six sites were recommended for further archaeological recording which would be carried out prior to construction. The ES considered that there was a strong possibility that traces of prehistoric occupation may be found in the Ayside to Barber Green area, and a moderate potential for discovery of remains of the medieval period.

5.74 The OYA report concluded that the impacts on listed buildings were considered to be generally as expected in the ES and would be reconsidered as necessary at FYA when the establishment of planting should be more advanced:

- East View & Fell Cottage, Low Newton - not directly affected and setting benefited from the significant reduction in traffic in front of properties on the old A590. The cottages have no view of the bypass.
- Newton Hall Farm & Jasmine Cottages, High Newton – not directly affected but views of Newton Heads Hill cutting would cause slight visual intrusion ameliorated by proposed landscape planting.
- Rose Cottage, Barber Green has not been affected by the scheme.

5.75 With regard to archaeology, at OYA it was noted that the 2007 archaeology report concluded that, on the basis of the recorded data, the development had very little impact on previously unknown buried archaeological remains. The archaeology report recommended that a short note on the works, referencing the location of the final report, was compiled for inclusion within a suitable journal, such as the Transactions of the Cumberland and Westmorland Archaeological and Antiquaries Society.

5.76 It was also noted that a full archive of the project had been produced, which together with a copy of the archaeology report, would be deposited in the Cumbria County Record Office, Kendal and the material finds, subject to discussion with the legal owner, would be deposited with the Kendal museum, the nearest museum which met the Museums and Galleries Commission Guidelines (MGC 1992).

5.77 In addition a copy of the report, together with an index to the archive, would be given to the LDNPA SMR (Sites and Monuments Record) and an archaeological fieldwork record form forwarded for deposition to the National Monuments Record.

5.78 It was suggested that these aspects of archiving should be confirmed at FYA.

Consultation

5.79 Cumbria Archive Centre (CAC) confirmed that a project archive for the A590 High and Low Newton Bypass for a project dated Jul-Aug 1992, including a copy of the Initial Archaeological Assessment report of Aug 1992, was deposited at CAC in 1998. However a record of the deposit of any subsequent report relating to the bypass could not be found.

5.80 CAC checked the annual lists of archaeological works and the indexes of the Transactions of the Cumberland and Westmorland Archaeological and Antiquarians Society for the years 2005 to 2013 and was unable able to find a note of the works.

5.81 The Kendal Museum has confirmed that it has the following material from the A590 High and Low Newton bypass deposited in 2008:

- Reference KMA2012.1 (2 x document wallets of paper archives. Site codes HLN05 and HLN06).
- Reference KMA2012.2 (2 x boxes, 1 x plan and 1 x box finds. Site code HN06).

Evaluation

5.82 With regard to listed buildings at High Newton the English Heritage National Heritage List has been checked and it identifies 3 Grade II listed properties: Newton Hall, Jessamine Cottages and Greensyke. They are situated within the village and their settings have not been affected by the scheme. Near High Newton the scheme is generally in cutting but as expected any longer views towards the bypass will in time be filtered by scheme planting.

5.83 With regard to archaeology and as noted above the Kendal Museum has confirmed that it holds archived information relating to the A590 bypass. Although it would appear that a short note on the archaeological works was not prepared for publishing in the Transactions of the Cumberland and Westmorland Archaeological and Antiquaries Society journal, it is understood (see below) that the Cartmel and Staveley Archaeology Society hold copies of the reports.

5.84 The HEMP states that results of archaeological fieldwork are detailed in the following technical reports, which have been issued to Pell Frischmann, the Highways Agency, the Lake District National Park Authority and the Cartmel and Staveley Archaeology Society:

- Black Beck Hall, Ayside, Cumbria: Archaeological Building Recording, 2006.
- A590 High and Low Newton Bypass, Cumbria: Archaeological Topographic Survey, Photographic Recording, Evaluation and Watching Brief, 2007.
- Stratigraphic and Palaeoenvironmental Investigations along the A590 Bypass at High Newton, Cumbria: Full Report, 2006.

5.85 The HEMP also states that no finds of archaeological importance were encountered during the trial trenching, or during the watching brief carried out during construction, and no further mitigation or monitoring was required.

5.86 No further evaluation has been undertaken at the FYA stage as there were no other outstanding issues highlighted at OYA and heritage is considered to be **as expected**.

Table 5.8 - Evaluation Summary: Heritage

Sub-Objective	FYA Score	Evaluation
Heritage	Neutral	As expected

Biodiversity

5.87 The AST stated that there would be significant impacts on protected species, notably badgers, breeding birds, commuting/foraging and roosting bats. The impact on ecological features at a landscape scale would be considerable, with connectivity and severance issues for bats. Construction of badger fencing, mammal tunnels and a bat conduit were designed to reduce impacts. The introduction of species-rich grasslands should improve species diversity. The impact overall was assessed as **moderate adverse**.

5.88 The ES stated that the route corridor lay within an area dominated by agriculture with virtually all land being improved pasture subject to a substantial degree of improvement and as a result botanical and hence ecological interest was described as low

5.89 There were said to be no statutory or informal designations of nature conservation interest and no rare flora. Seatle Woods, not affected by the proposals, was noted as being on the English

Nature Inventory of Ancient Woodland. At the junction of Oak Head Lane 0.2 hectares of mixed woodland would be lost to the scheme but it was noted that this had suffered disturbance from quarrying and tipping of rubbish which had reduced its ecological value.

5.90 The ES noted that the proposed route would impinge upon the foraging areas of several active badger setts but conflict between badgers and the existing A590 already existed. Mitigation measures would be considered for the proposed bypass.

5.91 Baseline information was updated prior to scheme design in 2005/06 with regard to badgers, bats, reptiles, birds and mature trees.

5.92 The OYA report noted that mitigation measures had been incorporated into the scheme as expected. Monitoring was in place to establish the effectiveness of measures for bats. It was understood at OYA that bat monitoring summary reports were to be prepared at the end of each year with a final report including recommendations for the bat crossing structure along with conclusions on the effectiveness of the mitigation measures to be prepared in April 2011.

5.93 It was considered too soon at OYA to be able to evaluate fully the effectiveness of all the mitigation measures, including areas of species-rich grasslands, which it was suggested should be considered further at FYA, including extending consultation.

Consultation

5.94 Allithwaite Upper Parish Council commented that there appears to be a high incidence of badger road deaths in the Lindale Newton areas of the A590.

5.95 The Parish Council also considers that there is very little evidence of wildflower species.

Evaluation

Wildflower areas

The HEMP notes that ‘large parts of Head House cutting and the margins of the balancing ponds have ponds have not been top soiled; creating a nutrient-poor substrate to encourage the establishment of establishment of diverse grass and wildflower swards. These areas have not colonised as quickly as quickly as first envisaged and consequently a small amount of surface erosion has occurred in places. places. These areas need to be monitored to ensure the situation does not deteriorate. Should more more pronounced rutting occur it may be necessary to hydro-seed these areas with a faster growing growing seed mix (to be agreed with the Lake District National Park Authority). Otherwise these areas these areas should be left to colonise naturally’. Figures Figure 5.10 and

5.96 Figure 5.11 illustrate Head House cutting wildflower areas.

Figure 5.10 - View looking west from Oak Head over-bridge September 2013

Figure 5.11 - View east from Oak Head over-bridge illustrating bare areas on cutting slopes September 2013

5.97 It is noted that although the As Built Landscape & Ecology Treatment plans indicate that Meadow Croft cutting as an area of wildflower seeding, the Overview of Management Objectives plans included in the HEMP show that these areas were topsoiled and grass seeded and should not be treated as wildflower areas.

5.98 The HEMP confirms that during the 3 year aftercare period wildflower and wetland grass areas were cut to a height of 50mm once per year in August, after flowering, with cuttings removed. It recommended that grass cutting and weed control operations continue until 2015- at the time of the site visit (early September) the annual cut had not been carried out and there was some evidence in various locations along the scheme of a more diverse sward establishing.

Bats

5.99 The A590 Bat Monitoring 2007-2009 Final report dated 2010 confirms the following;

- New roost in the converted pig sty - monitoring of the converted pig sty confirmed no sign of bats in 2007 and a small number of common pipistrelle bats roosting at the site in June 2008. This observation was not made again in 2009 suggesting that the pig sty may have been used as an occasional roost.
- House at Barrows Green roost – a known bat roost before the scheme and bats were recorded roosting at the house every year of monitoring and the report considers that by-pass construction activities and changes to the landscape have not resulted in abandonment of this roost.
- Barrows Green underpass wing wall cavities – a pipistrelle bat was observed emerging from a cavity in 2008 (a month after cavities completed). No similar observations noted during underpass monitoring in 2009.

5.100 From activity monitoring surveys, the report concluded that:

- ‘The bat guidance structure has been used by bats. It has been used, however, by a small proportion of bats compared with the total numbers of bats crossing the road at this location. It is possible that either the structure does not yet form a sufficiently obvious landscape feature for the bats to maintain their previous levels of commuting activity prior to the bypass construction or the bats have not yet adapted to the new landscape features adjoining the structure which are immature. However, in 10-15 years time, an increase in bat activity is possible as the features mature’.
- ‘Barrows Green underpass and adjoining landscaping are very successful. Located on an original commuting route, the underpass has been increasingly used each year by bats for commuting and for foraging’.

- 'Ayside underpass is so far unsuccessful. Located away of the original commuting route, the underpass and surrounding landscape were designed to divert bats from their original crossing point (near the pig sty) to the new underpass. The vegetation has yet to reach maturity to fulfil the objectives of the mitigation and to resemble a feature likely to be used by bats. Only further monitoring would be able to measure the success of this mitigation strategy when the vegetation has reached a sufficient height and maturity.

5.101 **Long term monitoring** – the report recommended regular long-term monitoring within the next 15 year period to measure the success of the bat mitigation implemented as short term monitoring only provides a snapshot and does not provide a sufficient volume of quantitative data that can be used to identify true scientific and objective trends. It is not known by POPE whether any further monitoring will be carried out on behalf of the HA.

5.102 It is understood from the HEMP that the bat guidance structure was to be monitored in summer 2013 (5 years after scheme opening to confirm whether the structure is being used by bats). It was apparently agreed with the Lake District National Park Authority that the structure would be removed if it was no longer being used by bats. POPE is not aware whether or not this monitoring took place.

5.103 The HEMP also states a PhD student of the University of Leeds undertook some monitoring during the 2010 survey season[9]. This study looked at 4 sites including the A590 and it considers that;

- The Ayside underpass is not an effective mitigation measure: very few bats flew through relative to the number crossing at unsafe heights over the road above, and at an original commuting route nearby.
- The Barrows Green underpass showed high levels of use by commuting bats, with just 4% crossing at risk of collision mortality on the road above. This underpass is effective in allowing bats to cross the road safely.
- At the bat gantry, four times as many (41%) crossed the road at unsafe heights as crossed within 2 m of the gantry and 1.4 times as many as crossed within 5 m of the gantry.

5.104 This study states that 'we assessed only a small number of mitigation structures, but the results are sufficiently striking that wider appraisal is essential if mitigation against road construction is to be effective'. It is presumed that this study is being taken into account with regard to HA bat mitigation in the future.

5.105 The Review of Bat Mitigation in Relation to Highway Severance report 2011 reviews bat mitigation measures implemented on 7 HA schemes including the A590 and makes a series of recommendations relating to surveys, assessment, mitigation and monitoring. It is presumed that the report has been disseminated within the HA with a view to incorporating the findings into future schemes where bats are present.

Other species

5.106 There were no specific concerns raised at OYA and mitigation measures were noted to have been provided. The HEMP confirms the following monitoring during the construction period;

- **Badger** - Badger activity was regularly monitored during construction; there was no post-construction monitoring proposed and therefore none undertaken.
- **Otter and Water Vole** - Annual monitoring for water vole and otter activity along the watercourses.
- **Reptiles** – Watching brief during topsoil stripping at the northern end of the scheme and relocation of reptiles to a safe area.
- **Birds** – Weekly site inspections to identify and protect breeding birds.

5.107 No additional information has been made available to POPE at FYA with regard to other species.

[9] Do Bat Gantries and Underpasses Help Bats Cross Roads Safely? Authors:Anna Berthinussen, John Altringham Institute of Integrative and Comparative Biology, University of Leeds, Leeds, UK

5.108 At OYA animal mortality data provided by the MAC indicated that badger deaths ranged from 1 to 5 per year (average 3) between 2001 and 2007 on the old A590. There were also 2 recorded deer deaths (2006 and 2007).

5.109 At FYA animal mortality data provided by the MAC indicates that compared to the old A590, mitigation measures included within the bypass scheme appear to have been successful in reducing badger deaths within the scheme extents. It is thought that the badger deaths mentioned by the parish council are beyond the scheme extents.

Table 5.9 - Animal Mortality Data for A590 Bypass

	2009	2010	2011	2011	2013
Deer	-	1	2	-	1
Otter	-	-	1	-	-
Badger	1	-	1	-	-
Fox	1	1	-	-	-

5.110 At FYA wildflower grass areas are slow to establish and based on the bat monitoring reports it would appear that some of the bat mitigation measures may be less effective than had been hoped for. It was not a scheme requirement to monitor any other species post opening and no information has been provided as part of the FYA consultation. Based on the information available it is likely that the impacts of the scheme on biodiversity are **as expected – moderate adverse**.

Table 5.10 - Evaluation Summary: Biodiversity

Sub-Objective	FYA Score	Evaluation
Biodiversity	Moderate Adverse	As expected

Water Quality and Drainage

5.111 The AST stated that there would be a negligible overall impact on water quality and surface run-off. Four balancing ponds would be provided to attenuate flows with oil interceptors and lined filter drains trenches to protect the groundwater. The impact overall was assessed as **neutral**.

5.112 The ES noted that construction of the route would involve crossing several minor watercourses and drainage ditches, many of which were already culverted under the existing A590. It was expected that adherence to the National Rivers Authority (NRA now Environment Agency) guidelines and conditions, together with good site practices would avoid unnecessary water quality degradation and therefore protect water quality in the area.

5.113 Drainage ditches would take carriageway run-off to Whitestone Beck, High Newton Beck and Low Newton Beck. Drainage from Ayside bridleway would outfall to Bellman Beck. Run-off would be attenuated to prevent flooding the watercourses by provision of detention/storage facilities which would also provide additional areas of wetland habitat. Oil interceptors would be provided at the outfalls incorporating emergency shut-off valves in case of collisional spillage.

5.114 Four balancing ponds have been provided as part of the scheme. Planning applications were submitted to the Lake District National Park Planning Authority for works outside the approved scheme boundary and approvals were granted for three balancing ponds which were not included in the original scheme proposals (Cartmel Lane, Whitestone and Barrows Green). The fourth balancing ponds is at Oak Head.

5.115 The OYA report confirmed that mitigation measures had been incorporated into the scheme and there was no information to suggest that they were performing other than as expected, however, due to heavy rain during construction sedimentation of local watercourses occurred. It would appear that the silty run-off impacted on the biodiversity of local watercourses which could take some time to recover.

5.116 The water sub-objective was evaluated worse than expected and it was suggested that water should be re-evaluated at FYA including re-contacting consultees, as the situation regarding sedimentation might have improved

Consultation

5.117 The Environment Agency (EA) responded that it has consulted internally and has no further comments to make since OYA. It was not aware of any pollution incidents post opening.

5.118 At OYA Allithwaite Upper Parish Council was concerned about the significant impact on local watercourses caused by siltation during construction and sought reassurance that there would be some follow-up monitoring i.e. post construction. At FYA the Parish Council responded that it has no knowledge of any follow-up monitoring taking place and that there have been some instances where Lindale beck appears to be carrying higher levels of sediment during heavy rainfall.

5.119 The South Cumbria Rivers Trust (SCRT) notes '*the significant impact of siltation to the River Eea produced from the High Newton bypass construction'* and confirms from observations at that time *'that it was a very high loading and subsequently destructive to macrophytes, particularly Ranunculus. Silt is also particularly damaging to river gravels by causing the physical blocking of the gravel interstices through which cool, oxygenated water is needed to flow to feed salmonid ova and aquatic invertebrates that are within. SCRT have been working on habitat improvements since the bypass construction in response to local concerns about the deterioration of the river and its biodiversity. This is being funded by SCRT's core funds- we are a very small, independent, charitable Trust and have very limited resources. I do not believe that any mitigation costs were ever sought at the time from the road construction companies. It would be a very welcome gesture from those involved to the local community who are very much concerned about their environment if a contribution to these improvement works could be found. The work that we have done so far and hope to plan for the future is beneficial to cleaning river silt and establishing a thriving biodiversity once more*'.

Evaluation

5.120 The HEMP confirms that weekly monitoring of suspended solids was undertaken throughout the construction period at six sample points. The site experienced large amounts of rainfall during construction, resulting in considerable silt run-off. Mitigation measures such as settlement lagoons, filter stone, flocculents were implemented and discussions held with the EA Pollution Control Officer to resolve issues.

5.121 It is understood that there was no requirement to monitor water quality during the maintenance/aftercare period, however, all culverts, drains, balancing ponds, pond inlets and outlets and the outfalls to the nearby watercourses are to be inspected annually to ensure they are free of blockages, with any accumulated litter and debris removed.

5.122 The balancing ponds are seasonal and during dry conditions they may largely dry-out, however, they are designed to hold a small amount of water throughout the year to ensure the survival of aquatic species. The HEMP notes that the ponds are to be monitored and if necessary cleared of aquatic/marginal vegetation to ensure they do not become choked with weed and retain some areas of open water. Figure 5.12 illustrates the four balancing ponds in September 2013 at Whitestone, Oak Head, Barrows Green and Cartmel. At the time, Cartmel pond appeared largely dry and colonised by grassland with noxious weed evident. Marginal vegetation was established at the other ponds which all displayed areas of open water. Vegetation clearance will be required in the future, including control of noxious weeds. Algae was present at Barrows Green pond. Figure 5.13 shows Belman Beck and Appendix C shows OYA and FYA comparison views for ponds and culverts.

Figure 5.12 - Balancing ponds September 2013 Whitestone (top left), Oak Head (top right), Barrows Green (bottom left) and Cartmel (bottom left).

Figure 5.13 - Belman Beck looking west from the culvert works adjacent to the Ayside bridleway. The embankments are identified on the Landscape & Ecology as built plans as having been planted but there was no evidence in September 2013 of any aftercare.

5.123 It was confirmed at OYA that drainage mitigation measures had been provided as expected and at FYA no information has been provided to POPE to indicate that they are operating other than as designed. Ongoing maintenance will be required to ensure the balancing ponds retain areas of open water and noxious weed is controlled.

5.124 With regard to the issue of sedimentation problems caused during construction, apart from the response from SCRT explaining that it is working to clean river silt and restore river habitats, no other information regarding the status of the local watercourses has been provided.

Table 5.11 - Evaluation Summary: Water Quality and Drainage

Sub-Objective	FYA Score	Evaluation
Water Quality and Drainage	Slight Adverse	As expected

Physical Fitness

5.125 The AST stated that traffic reduction on the existing A590 would produce substantial relief of existing community severance and improvement in amenity. The provision of four underpasses and one over-bridge would remove the conflict between equestrians/cyclists/pedestrians and the bypass road traffic. The impact overall was assessed as **slight beneficial**.

5.126 The ES noted that few pedestrians used the existing road which only had footpath provision between High and Low Newton. Elsewhere, narrow verges, encroaching walls and hedges were said to exacerbate the dangerous conditions for pedestrians to such an extent that journeys on foot were avoided. A pedestrian refuge had recently been installed in the A590 at High Newton. Conditions for cyclists were said to be often intolerable, with large volumes of fast moving traffic, including HGVs.

5.127 Once the bypass was constructed it was expected that both pedestrians and cyclist using the existing A590 were to experience a reduction in traffic and a beneficial effect upon amenity.

5.128 Existing footpath links would be maintained across the bypass by using the underpasses at Oak Head Road and Ayside Road.

5.129 The OYA report stated that traffic had significantly reduced along the existing A590 resulting in an improvement in local amenity. It was considered that connectivity had been retained across the bypass for non-motorised users (NMUs) linking into the wider public rights of way (PROW) network. Although not specifically mentioned in the ES, the provision of bridleway access at Ayside was welcomed locally and was considered to have benefitted equestrian and cyclists.

5.130 As expected the bypass was noted to have introduced traffic noise into the previously quiet countryside and overall at OYA impacts were evaluated to be as expected.

Consultation

5.131 Allithwaite Upper Parish Council responded that it considers the comments provided at OYA as still appropriate – these were:

- With regard to the attractiveness of footpath and bridleway diversions – they do not compare to the original landscape, however the new landscape is still maturing.
- As far as the parish council is aware public rights of way have been retained as expected.
- Access for cyclists to and from the old road is hazardous where there is no cycle lane on the dual carriageway.

5.132 It should be noted that the exit off the bypass via the link is indicated to cyclists with markings in the hard strip at the edge of carriageway.

Evaluation

5.133 It is understood that a post opening NMU survey has not been undertaken as it was not a scheme requirement and no new NMU surveys have been carried out specifically for POPE which would provide any quantifiable measures of use of the PROWs. However, traffic has significantly reduced on the old A590 and it is likely that this will have encouraged pedestrians and cyclists to take advantage of the quieter roads and improved local environment (see Figure 5.3).

5.134 Since the OYA evaluation a new cycle/footpath has been provided by the MAC at the northern extent of the scheme, adjacent to the eastbound carriageway. This connects into the pedestrian/cycle link provided by the scheme allowing access onto the old A590 through the

villages to re-join the bypass at the Cartmel junction or access other roads via the underpasses and over-bridge. This is an improvement over the situation at OYA (see Figure 5.14).

5.135 As at OYA impacts are evaluated to be **as expected**.

Figure 5.14 - Cycle/footpath provided by MAC at northern extent of the scheme. View west (left) with 'Whitestone' located on the old A590, traffic has moved further away on bypass. View east with access onto the old A590 (right).

Table 5.12 - Evaluation Summary: Physical Fitness

Sub-Objective	FYA Score	Evaluation
Physical Fitness	Slight Beneficial	As expected

Journey Ambiance

5.136 The journey ambience sub-objective considers traveller care (facilities and information), traveller views and traveller stress (frustration, fear of potential collisions, and route uncertainty).

5.137 The AST stated that there would be improvements for both public transport and road users. The impact overall was assessed as **large beneficial**.

5.138 The ES described the existing A590 as generally narrow, twisting and undulating with stone walls flanking narrow verges. Poor alignment and lack of overtaking opportunities resulted in platoons of vehicles following slow moving vehicles leading to high levels of driver stress due to frustration and fear of potential collisions. The main factors leading to fear were proximity of other vehicles, inadequate sight distances and the likelihood of pedestrians stepping into the road. The ES stated that the new bypass would be significantly better than the existing A590 in terms of driver stress.

5.139 With regard to views from the road and due to the location within the Lake District National Park it was considered important that the scheme would achieve an attractive image, sympathetic to the natural landscape. Monotony for drivers would be avoided; open view would be retained where possible and tree planting used to screen less attractive views. Junctions would be treated with attention to detail. The proposed route was expected to provide enhanced views over the Vale of Cartmel and the Newton Fell.

5.140 Traveller care was not part of the methodology at the time of the ES.

5.141 The OYA report noted that on the old A590 through the villages the removal of significant volumes of traffic had improved amenity for all road users.

5.142 On the bypass views from the road and driver stress were evaluated to be as expected. Laybys were provided but there were some local concerns raised regarding signing to the villages and this would be revisited at FYA.

Consultation

5.143 At OYA Allithwaite Upper Parish Council raised concerns about the lack of signs on the A590 directing traffic to the businesses in High and Low Newton and Ayside. At FYA the Parish Council comments that together with the local County Councillor it has lobbied for signs but the outcome has not been achieved.

5.144 The Parish Council also raised concerns about the possible increase of HGVs leaving the A590 at the top on Lindale Hill to access Grange-over-Sands via B5271 Windermere Road and the lack of advance signing on A590 to advise of an HGV ban.

Evaluation

5.145 At the time of the site visit, lay-bys were found to be clearly signed, generally tidy and litter free. Comparison OYA and FYA views are provided in Appendix C.

5.146 Signage to local facilities has again been raised as an issue by the Parish Council. It is understood that Yew Tree Farm requested brown tourist signage off the A590 to be provided - the matter was investigated by the Highways Agency and the provision of the requested signs found not to be justified. It was noted at FYA that tourist signs for the Priory and Yew Tree Barn are provided on the old A590 at junctions (see Figure 5.15 below) but not directly off the bypass.

Figure 5.15 - Example of local signage on old A590 at Cartmel junction

5.147 me's impact on journey ambience.

5.148 Table 5.13 summarises the evaluation of the scheme's impact on journey ambience.

Table 5.13 – Summary of Journey Ambience Evaluation

Sub-Objective	FYA Score	Evaluation
Views from the Road	Beneficial	For users of the bypass, despite part of the road being in deep cutting and sensitive use of earthworks to screen traffic using the new road there are still open attractive views to the Newton Fells, over the Vale of Cartmel and to the distant peaks of the wider Lake District. On the old A590 through the villages the removal of significant volumes of traffic has improved amenity for all road users.
Driver Stress - frustration	Beneficial	On the bypass, traffic is free flowing with no congestion and journey times have improved. There is good visibility and opportunities for safe overtaking which reduces driver frustration. Rationalisation of junctions has also contributed to reduced driver stress.
Driver Stress – fear of potential collisions	Beneficial	The provision of the bypass has improved sight distances and reduced conflict with oncoming traffic. There is no conflict with pedestrian who do not use the bypass, and cyclists have been encouraged to use the existing A590 with dedicated cycle route access off the bypass. On the old A590 traffic has reduced by 97% since the bypass was opened resulting in reduced stress for users of the old road, both drivers and NMUs.
Driver Stress – route uncertainty	Beneficial	Through traffic is routed onto the bypass and signs to direct local traffic are in place on the bypass. There has been some local concern raised regarding the lack of tourist signing to the local facilities from the bypass.
Traveller Care	Beneficial	Two lay-bys (one on either carriageway) have been provided towards the eastern end of the scheme. Facilities within the villages of High and Low Newton are easily accessed from the bypass, although concern has been raised locally that signage is not adequate to advise drivers of these facilities.
Journey Ambiance Summary Score	**Large Beneficial**	**As expected**

Key Points – Environment

Noise

- Traffic flows have significantly reduced along the old A590 as a result of the bypass and noise due to traffic will have reduced for properties adjacent to the old road within High and Low Newton.
- Traffic has moved closer to properties in a previously quiet rural location and noise will have increased for properties near the bypass.
- The impact of the scheme on noise is considered to be **as expected**.

Air Quality

- Traffic has significantly reduced on the old A590 since the opening of the bypass and residents will have benefited from improved air quality. Traffic on the bypass is in line with the 2011 design year low growth forecasts and the few properties near to the bypass will have experienced deterioration in air quality as expected.
- The impact of the scheme on local air quality is considered to be **as expected**.

Greenhouse Gases

- The re-forecasted figure was for an increase of 137 carbon tonnes/year, which is broadly in line with the AST forecast of 123 carbon tonnes/year. The observed net difference relatively corresponds with this, at 150 carbon tonnes/ year.
- The observed DM is 12% lower than the re-forecasted DM scenario figure, while the observed DS is 10% lower than the re-forecasted DS scenario figure. The reasons for the lower levels of carbon emissions is that HGV figures were lower than observed, and lower speeds were observed than were forecasted.
- It is considered that the scheme has had a **minor negative** impact on greenhouse gases, and is therefore **as expected**.

Landscape

- Overall it is considered at FYA that landscape planting is establishing well and is beginning to provide a framework for the bypass. Subject to ongoing successful establishment it should reach its landscape objectives for screening and integration into the local landscape by the design year (year 15) in most locations. Planting at Cartmel embankments, however, remains slow to establish and could potentially fail to reach its objectives by the design year.
- It has been concluded that the scheme has had a **large adverse** impact on landscape, and can therefore be considered being **as expected**.

Townscape

- There were no issues identified at OYA with regard to townscape apart from maintenance of the widened verges, which are now being looked after by local residents. Traffic levels remain low at FYA and this reduction in through traffic continues to provide improved visual amenity and in turn local village character.
- The effect to townscape has been scored as **slight beneficial** which was **as expected** at appraisal stage.

Biodiversity

- At FYA wildflower grass areas are slow to establish and based on the bat monitoring reports it would appear that some of the bat mitigation measures may be less effective than had been hoped for. It was not a scheme requirement to monitor any other species post opening and no information has been provided as part of the FYA consultation.
- Based on the information available it is likely that the impacts of the scheme on biodiversity are **moderate adverse as expected**.

Key Points – Environment

Cultural Heritage

- Locations of the archaeology archive including finds have been confirmed and the settings of listed buildings are considered to be **neutral** which is **as expected**.

Water Quality and Drainage

- It was confirmed at OYA that drainage mitigation measures had been provided as expected and at FYA no information has been provided to POPE to indicate that they are operating other than as designed. Ongoing maintenance will be required including to ensure the balancing ponds retain areas of open water and noxious weed is controlled.
- With regard to the issue of sedimentation problems caused during construction, at a local level the SCRT is working to restore river biodiversity. The HEMP notes that there was no requirement for post opening water monitoring and it is not possible for POPE to confirm whether the sedimentation issues are completely resolved although it is likely that over time the situation will continue to improve.
- Due to silty run-off entering local watercourses during construction, it is considered that the scheme has had a **slight adverse** impact on water quality and drainage which is **worse than expected**.

Physical Fitness

- Traffic has significantly reduced along the old A590 resulting in an improvement in local amenity, and connectivity has been retained across the bypass for NMUs linking into the wider PROW network as expected.
- As expected the bypass has introduced traffic noise into the previously quiet countryside.
- A new cycle/footpath connection provided by the MAC at the northern extent of the scheme improves access onto the old A590 for pedestrians and cyclists.
- It is considered that there has been a **slight beneficial** impact on physical fitness **as expected**.

Journey Ambience

- On the old A590 through the villages the removal of significant volumes of traffic has improved amenity for all road users.
- On the bypass despite deep cuttings there are also open views from the road to the attractive Lake District landscape; traffic is free flowing with no congestion and improved journey times. There is no conflict with NMUs and there are opportunities for overtaking which will have reduced driver stress as expected. Laybys have been provided.
- As at OYA, there are some local concerns regarding the lack of provision of brown tourist signs from the bypass to facilities within the villages.
- It is considered that the scheme has had a **large beneficial** impact on the scheme, which **as expected**.

6. Accessibility and Integration

6.1 This chapter evaluates the impact of the scheme in terms of the accessibility and integration objectives; comparing qualitative forecast assessments from the scheme AST with post-opening findings and analysis of policy objectives.

Accessibility

Scheme Objective: Provide good accessibility to the existing communities and to areas of industrial, commercial and tourist development.

6.2 The accessibility objective is concerned with how the scheme has affected the ability of people in different locations to reach different types of facility, using any mode of transport. The accessibility objective consists of three sub-objectives. These are:

- Option values
- Access to the transport system
- Severance

Option Values

Forecast

6.3 Option values, as defined in WebTAG, relate to the availability of different transport modes within the study area, even if they are not used. For example, a car user may value a bus service along their route even if they never used it because they have the option of another mode should their car become unavailable.

6.4 For the objective regarding option values, the AST states 'not applicable for road schemes. Scheme does not include any public transport provision'. As such the AST forecast a score of **neutral** for this objective.

Evaluation

6.5 As the scheme has not led to any change in public transport services or infrastructure the AST assessment of **neutral** for option values is considered as appropriate.

Access to the Transport System

Forecast

6.6 For the access to the transport system objective, the AST forecast impact states '*scheme does not include proposals for public transport nor does it directly affect access to existing public transport*'. Given the anticipated impact, the AST forecasts a score of **neutral** for this objective.

Evaluation

6.7 As discussed in the previous section, the scheme has not led to any change in public transport services or infrastructure.

6.8 The only bus service at pre-scheme and OYA stage in the area was the X35 service between Kendal and Barrow-in-Furness operated by Stagecoach North West. At FYA stage, this service has been renamed the X6, still with a route from Kendal and Barrow-In-Furness. Consultation with the operations manager for the X35 route was undertaken in January 2010. The following comments were received:

- The scheme has been beneficial in terms of reducing traffic through High Newton which improves journey time reliability.
- As the buses still use the old A590 and stop at High Newton, the narrowing of the carriageway at bends was considered to be a safety concern. This is because the size of the buses (Double Decker) combined with the new narrower carriageway width means that in some instances it is necessary for buses to encroach onto the opposite side of the road.

6.9 The impact of the scheme on access to the transport system is therefore considered to be **neutral**, which is **as expected**.

Severance

Forecast

6.10 Severance is concerned with the affects of traffic on those using non-motorised modes, especially pedestrians. For the severance objective, the AST forecasted that the scheme would result in a 'high level of relief from severance for local population and tourists', with the expectation that approximately 205 people within the local population would be positively impacted.

6.11 Given the predicted impact, the AST forecasted a score of **moderate beneficial** for this objective.

Evaluation

6.12 As no post opening Non Motorised User (NMU) surveys were available for this scheme the evaluation of this sub-objective will focus on the qualitative impacts and the results from the resident's survey undertaken for the One Year After stage.

6.13 At the One Year After stage, local residents were asked a number of questions to grasp their view on severance related issues.

6.14 Residents that had lived in the area for more than 3 years were asked how the ease and safety of crossing the road had changed since the scheme opened. In total 83% of respondents found the ease and safety of crossing the road was better since the scheme opened.

6.15 Another good indication of severance is whether residents are making more or less journeys by foot or bicycle following the opening of the scheme. In the resident's survey, 49% of respondents make more journeys on foot and 35% make more journeys by bicycle since the scheme opened.

6.16 Taking account of the results from the resident's survey and with 97% of traffic diverting to the new bypass, the assessment score of **moderate beneficial** is considered to be appropriate.

Integration

6.17 The integration objective consists of two main elements:

- Interchange with other transport modes: how the scheme assists different modes of transport in working together and the ease of people moving between them to choose sustainable transport choices.
- Land Use Policy and Other Government Policies: how the scheme integrates with local land use and wider government objectives.

Transport Interchange

Forecast

6.18 The transport interchange objective relates to the extent to which the scheme contributes towards the Government objective of improving transport interchange for passengers and freight. Regarding this, the AST forecast states:

> 'Scheme does not include any additional public transport provision or freight interchange facilities'.

6.19 Due to the above prediction, the AST forecasted the scheme to have a neutral impact.

Evaluation

6.20 Qualitative evidence at the OYA stage found the scheme has caused no change in public transport facilities. However, reduced traffic volumes on the former A590 were found to have facilitated indirect public transport interchange improvements including:

- Buses can now stop without causing significant disruption to the flow of traffic.
- Lighter traffic volumes have resulted in a more pleasant waiting environment for local bus users (largely through removal of traffic, reduced noise, and improved roadside air quality).
- Reduced traffic volumes have helped to reduce the severance. Consequently the accessibility and safety of bus stops on both sides of the route appear to have improved significantly.

6.21 Any impacts on transport interchange are clearly not due to the improvement of facilities but are purely related to the removal of through traffic. The AST assessment of **neutral** is therefore considered a valid assessment of the impact.

Land Use Policy

6.22 This section looks at the scheme in relation to national, regional and local level land use and development policies.

Forecast

6.23 For Land Use Policy the AST recognises that the scheme is specifically proposed in regional and more local level planning documents, and that the scheme is in line with the Northern Way Growth Strategy and the Government's transport objectives at a national level. With this in mind, the AST forecasts the scheme to have a neutral impact.

Evaluation

6.24 An evaluation of the scheme in relation to policy has been undertaken and is summarised in Table 6.1 on the following page. Given the findings presented, it is considered that the forecast assessment of the scheme on land use policy integration is **neutral as expected**.

Table 6.1 – Scheme Alignment with National, Regional and Local Policy

	Policy/Document	Relevant Policy Objective/Reference	Relevant Scheme Impacts	Alignment
	Cumbria and Lake District Joint Structure Plan 2001-2016	This is a statutory document which provides a strategy and policies for the development and use of land within Cumbria, including the Lake District National Park. The structure plan states that: • As roads can have far reaching visual and environmental impacts there is a need to ensure, through careful design that all possible steps are taken to limit any harm. • Appropriate measures for accommodating public transport, cycling and walking will need to be incorporated into the design of new developments at an early stage.	• Visual and environmental impacts were an important consideration. There has been an emphasis on landscaping for screening and integration of the scheme. • There was a neutral impact on public transport. A new cycle/ footpath connection has been provided. The resident's survey at OYA stage shows that 49% of respondents make more journeys on foot and 35% make more journeys by bicycle since scheme opening.	✓
Local and Sub-Regional Policies	**Cumbria Local Transport Plan 2 (2006-2011)**	When the scheme opened, Cumbria's Local Transport Plan 2 was the local transport policy document. There were a number of objectives in the plan relevant to the scheme, including: • Develop transport infrastructure which supports improvements to the Cumbria economy. • Reduce the high level of road casualties. • Invest in infrastructure that assists tourism development. The document also details several other targets and policies including: • Target S1: Reduce the total number of people killed or seriously injured (KSIs) on Cumbria's roads to less than 332 by 2010. • Policy H6: Manage the network through sustainable initiatives that protect and enhance the environment, including the protection of habitats, air and water quality adjacent to the highway and developing an approach to highway works that enhances landscapes and townscapes.	• The bypass has improved connectivity between the Principal Centres of Kendal and Ulverston by the reduction of journey times, which are favourable for tourism and the economy. • The level of casualties has reduced. • The percentage of KSIs has reduced from 18% to 10%. • There has been an emphasis on landscaping for the screening and environmental integration of the scheme.	✓
	Cumbria Local Transport Plan 3 Strategy (2011-2026)	The strategy document for the current Cumbria LTP3 refers to the A590 High and Low Newton Improvements as a key highlight of what has been achieved for transport in the Barrow-in-Furness and South Lakeland district. The strategy also mentions: • The key priority for transport in Barrow and the Furness peninsula is to support economic development, social regeneration and improve the quality of life. • The County will work with the Department for Transport to secure journey time reliability improvements to the A590 along with other major roads.	• The A590 bypass improves connectivity between the principal centres of Kendal and Ulverston by reducing journey times. • Route stress on the old A590 route has reduced from 74% to 2%, while the route stress on the new A590 bypass route is 20% five years after scheme opening.	✓
	South Lakeland Local Development Framework – Core Strategy (2010)	The Core Strategy identifies that the A590 is heavily trafficked and has speed restrictions in parts. It also prioritises the A590 High and Low Newton Bypass in the 5 year LTP period, and states that the District Council will continue to support the upgrade of the A590 to dual carriageway. It states that the Council will: • Support essential road infrastructure improvements, including the A590 road links to the M6 to support the economic, tourism and regeneration objectives for the Ulverston and Furness area.	• The scheme has improved journey times on the link to the M6, and may therefore be perceived to have supported economic, tourism and regeneration objectives in this light.	✓
	Moving Forward: The Northern Way. First Growth Strategy Report: Summary	The Northern Way Growth Strategy presents a vision for the North from 2004 to 2025. It defines a main investment priority to be the enabling of economic growth and better transport within and between each city region. The document also recognises the importance of good transport links to markets and suppliers, and that regions prosper and have a competitive advantage when they are well connected.	• The A590 bypass improves connectivity through the reduction of journey times within the Barrow and Furness peninsula and to locations within the area.	✓
Regional Policy	**North West Regional Transport Strategy**	The RTS objectives to which the scheme aligns most closely are: • Ensuring that north-south and east-west transport corridors have reduced congestion and make best use of existing capacity. • Support economic development and regeneration of Furness and West Cumbria • Improving road safety. • Protect national parks and areas of outstanding natural beauty, minimising the impact of transport infrastructure and traffic.	• Route stress has reduced. • The scheme has caused safety improvements, reducing collisions and casualties. • Application of landscaping techniques to screen and integrate the scheme into the environment.	✓

	Policy/Document	Relevant Policy Objective/Reference	Relevant Scheme Impacts	Alignment
National Policy	**A New Deal for Trunk Roads in England (1998)**	The Government's overarching objectives for transport at the time of the appraisals were set out in this document, and include policies to: • Protect and enhance the built and natural environment. • Improve safety for all travellers. • Contribute to an efficient economy, and to support sustainable economic growth in appropriate locations. • Promote accessibility to everyday facilities for all, especially those without a car. • Promote the integration of all forms of transport and land use planning, leading to a better, more efficient transport system.	• Application of landscaping techniques to screen and integrate the scheme into the environment. • There have been safety improvements, including a reduction in the levels of collisions and causalities and in the seriousness of incidents. • Connectivity within the Barrow and Furness peninsula improved through a reduction in journey times. • A new cycle/ footpath connection has been provided. In the resident's survey at OYA stage, it was found that 49% of respondents make more journeys on foot and 35% make more journeys by bicycle since scheme opening.	✓
	Action for Roads - A network for the 21st century (July 2013)	• Support the UK economy and drive growth into the future through provision of a well-connected road infrastructure with sufficient capacity; • Push for greater safety, and avoid letting the improvements of recent years breed complacency; and • Ensure transport plays its part in meeting carbon budgets and other environmental targets.	• The scheme has improved the connectivity within the Barrow and Furness peninsula. • There have been safety improvements, including a reduction in the levels of collisions and causalities and in the seriousness of incidents. • The scheme has led to an increase of 150 carbon tonnes/year. This is broadly in line with its forecast.	✓

Key Points – Accessibility and Integration

Accessibility

- The scheme has not led to any change in public transport services or infrastructure, meaning there is an assessment of neutral for the impact of the A590 bypass on option values and access to the transport system.
- Regarding severance, the AST forecasted a moderate beneficial impact for the local population and tourists.
- In the OYA resident's survey, 83% of respondents found an improvement in the ease and safety of crossing the road, 49% stated that they make more journeys on foot, while 35% make more journeys on foot since the scheme opened. Therefore, a score of **moderate beneficial** seems appropriate.

Integration

- Regarding transport interchange, it was forecasted that there would be a neutral impact. While at OYA stage, indirect public transport interchanges were facilitated, these were due to the removal of traffic, and can therefore be considered to have a **neutral** impact.
- The scheme is aligned with local, national and regional policies.

7. Appraisal Summary Table & Evaluation Summary Table

Appraisal Summary Table

7.1 The AST is a brief summary of the main economic, safety, environmental and social impacts of a highway scheme**.** Table 7.1 presents the AST for the A590 High and Low Newton Bypass.

7.2 The AST presents a brief description of the scheme, a statement detailing the problems that the scheme planned to address, and makes an assessment of the scheme's predicted qualitative and quantitative impacts against the following objectives:

- **Environment** – an estimate of the impact of the scheme on factors such as noise, local air quality, landscape, biodiversity, and water;
- **Safety** – measured reduction in the number and severity of collisions and qualitative assessment of impacts on security;
- **Economy** – estimated impact of the scheme upon journey times, vehicle operating costs, scheme costs, journey time reliability and wider economic impact;
- **Accessibility** – a review of scheme impact upon access to the public transport network, community severance, and non-motorised user impact; and
- **Integration** – a description of how a scheme is integrated with wider local planning, regional and national policy objectives.

Evaluation Summary Table

7.3 The EST was devised for the POPE process to record a summary of the outturn impacts against the same objectives, compared to the predictions in the AST.

7.4 Table 7.2 presents the EST for the scheme. An assessment of each of the objectives at the FYA stage is given. Where possible, the format of the EST mirrors the appearance and process of the AST to enable direct comparison between the two.

Table 7.1 - Appraisal Summary Table (AST)

OBJ	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE IMPACT	ASSESSMENT
Environment	**Noise**	The removal of traffic from the existing A590 would result in a reduction of noise at nearby properties. With the scheme, the number of people exposed to noise levels of greater than 75dB is expected to reduce from 55 to zero. There would also be a reduction of people (from 26 to 17), exposed to a noise levels between of 70 and 74dB.	Estimated population annoyed - Do-Minimum: 77.6, Do-Something: 50.3	Estimated Population Annoyed by Noise would be reduced by 27
	Local Air Quality	Residents of properties along the existing road will benefit, while a smaller number close to the bypass would experience deterioration in air quality. Overall, there is not an air quality problem in the area.	No. of properties where air quality would be: improved = 105; worse off = 89; no change = 12	Aggregate PM_{10} = -120.79; Aggregate NO_2 = -313.38
	Greenhouse Gases	Emissions of CO_2 emissions can be expected to increase by 9% as a result of increased vehicle speeds on the bypass	Do-Minimum: 4821 tonnes/year; Do-Something: 5273 tonnes/year	Increase in CO_2 of 452 tonnes/year
	Landscape	Offline bypass avoiding High and Low Newton. Important communication route and gateway to major tourist area. Attractive high quality rural landscape within the southern part of the Lake District National Park. Route follows transitional zone between lowland vale and upland fell. Small loss of woodland but significant impact on fields, walls and hedgerows. Incompatible with undulating landform.	Not applicable	Large Adverse
	Townscape	Removes traffic from High and Low Newton. Conflict with existing small scale, fine grain townscape local to Ayside.	Not applicable	Slight Beneficial
	Heritage of Historic Resources	All known impacts could be adequately mitigated through a programme of archaeological works in advance of, or during, construction. The setting of the Listed Buildings at Low Newton would benefit from the removal of traffic from the existing road. The Listing Building at High Newton would experience slight visual intrusion which would be ameliorated by planting schemes. Black Beck Hall is not a Listed Building but has some local significance and will be recorded prior to demolition.	Not applicable	Neutral
	Biodiversity	Significant impacts on protected species, notably badgers, breeding birds and commuting, foraging and roosting bats. The impact on ecological features at a landscape scale is considerable, and in places there are insurmountable connectivity and severance issues for protected species – notably bats. There is scope for conservation of species-rich grasslands through appropriate seeding.	Not applicable	Moderate Adverse
	Water Environment	Negligible overall impact on water quality and surface run-off.	Not applicable	Neutral
	Physical Fitness	Traffic reduction will produce substantial relief of existing community severance and improvement in amenity. Provision of 4 underpasses and 1 overbridge will remove conflict between equestrians/cyclists/pedestrians and the bypass road traffic.	No quantitative data, but consultations with local population suggest suppressed demand.	Slight Beneficial
	Journey Ambience	Improvements for both public transport and road users	>10,000 travellers (daily) experiencing benefits	Large Beneficial
Safety	**Accidents**	Significant benefits accrued as a consequence of traffic diverting from single to dual carriageway and the subsequent reduction in collision rate.	No. of collisions saved = 431 Casualty reductions: 10 Fatal, 72 Serious, 559 Slight	£24.18m saving; 94% of PVC
	Security	Significant improvements for road users, neutral for public transport user	10,000 travellers (daily) experiencing benefits	Moderate Beneficial
Economy	**Public Accounts**	All costs to central government	Central Government PVC	PVC £25.692m
	Transport Economic Efficiency	Moderate journey benefits for road users during peak and off-peak periods. Peak hour journey time savings of 1 minute 35 seconds. Off-peak hour journey time savings of 1 minute 26 seconds. Overall the scheme provides a modest economic return.	Users PVB Transport Providers PVB Other PVB Consumers PVB	PVB £36.214m PVB £0.145m PVB £0m PVB £31.875m
	Reliability	The percentage stresses are below the value at which stress becomes significant.	Route Stress Before 74%, After 24%	Neutral
	Wider Economic Impacts	The scheme is not a designated regeneration area, nor are there any significant developments dependent on the proposed bypass.	Serves regeneration priority area? – No. Development depends on the scheme – No.	Neutral
Accessibility	**Option Values**	Not applicable for road schemes. Scheme does not include any additional public transport provision.	Not applicable	Neutral
	Severance	High level of relief from severance for local population and tourists	Approx 205 local population	Moderate Beneficial
	Access to the Transport System	Scheme does not include proposals for public transport nor does it directly affect access to existing public transport.	Not applicable	Neutral
Integration	**Transport Interchange**	Scheme does not include any additional public transport provision or freight interchange facilities	Not applicable	Neutral
	Land Use Policy & Other Gov't Policies	The scheme is specifically proposed in regional and more local level planning documents. The scheme is in line with the Northern Way Growth Strategy and the Government's transport objectives at a national level.	Not applicable	Neutral

Table 7.2 - Evaluation Summary Table (EST)

OBJ	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE IMPACT	ASSESSMENT
Environment	**Noise**	Traffic flows have significantly reduced along the old A590 as a result of the bypass and noise due to traffic will have reduced for properties adjacent to the old road within High and Low Newton. The bypass has however moved traffic closer to properties in a previously quiet rural location and noise will have increased e.g. for properties in Ayside, at High and Low Newton near the bypass and outlying properties. Traffic flows on the bypass are in line with expectations.	-	As expected
	Local Air Quality	Traffic has significantly reduced on the old A590 since the opening of the bypass and residents will have benefited from improved air quality. Traffic on the bypass is in line with the 2011 design year low growth forecasts and the few properties near to the bypass will have experienced deterioration in air quality as expected.	-	As expected
	Greenhouse Gases	Slight increase in the change in carbon emissions caused by higher than predicted traffic volumes on the A590 due to a lower than forecast emissions for the DM scenario.	AST forecast change: + 123 carbon tonnes/year Re-forecast change: +137 carbon tonnes/year Observed change: +150 carbon tonnes/year	As expected
	Landscape	Overall it is considered at FYA that landscape planting is establishing well and is beginning to provide a framework for the bypass. Subject to ongoing successful establishment it should reach its landscape objectives for screening and integration into the local landscape by the design year (year 15) in most locations. Planting at Cartmel embankments, however, remains slow to establish and could potentially fail to reach its objectives by the design year	-	As expected (large adverse)
	Townscape	There were no issues identified at OYA with regard to townscape apart from maintenance of the widened verges, which are now being looked after by local residents. Traffic levels remain low at FYA and this reduction in through traffic continues to provide improved visual amenity and in turn local village character.	-	As expected (slight adverse)
	Heritage of Historic Resources	Locations of the project archive including finds have been confirmed. The settings of listed buildings is considered to be as expected; Rose Cottage at Barrows Green is not affected by the scheme, East view and Fell Cottage at Low Newton have benefitted from removal of traffic on the old A590 and in High Newton - Newton Hall, Jessamine Cottages and Greensyke are located within the village and views will be screened by planting and the road in cutting.	-	As expected (neutral)
	Biodiversity	At FYA wildflower grass areas are slow to establish and based on the bat monitoring reports it would appear that some of the bat mitigation measures may be less effective than had been hoped for. It was not a scheme requirement to monitor any other species post opening and no information has been provided as part of the FYA consultation.	-	As expected (moderate adverse)
	Water	No information provided to POPE at FYA which would indicate that scheme drainage is performing other than as expected. At a local level the SCRT is working to restore river biodiversity. The HEMP notes that there was no requirement for post opening water monitoring and it is not possible for POPE to confirm whether the sedimentation issues are completely resolved although it is likely that over time the situation will continue to improve.	-	Worse than the neutral expected due to silty run-off entering local watercourses during construction
	Physical Fitness	Low levels of traffic on the old A590 at FYA continue to improve local amenity. There has been no post opening NMU audit which would confirm usage of the PROW network. A new cycle/footpath connection provided by the MAC at the northern extent of the scheme improves access onto the old A590 for pedestrians and cyclists.	-	As expected (slight beneficial)
	Journey Ambience	On the old A590 through the villages the removal of significant volumes of traffic has improved amenity for all road users. On the bypass there are views to the attractive Lake District landscape; traffic is free flowing with no congestion and improved journey times. Laybys have been provided. As at OYA, there are some local concerns regarding the lack of provision of brown tourist signs from the bypass to facilities within the villages	-	As expected (large beneficial)
Safety	**Collisions**	Re-forecast collision benefits are less than forecast.	Average Annual Saving of 2.7 collisions. £14.54m sixty year outturn saving	Worse than expected
	Security	Lay-bys and emergency telephones included as part of the scheme. However, the old route passed through the High and Low Newton, where lighting is enhanced by nearby properties, and a footpath is provided between the two villages.		Worse than expected (neutral)

OBJ	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE IMPACT	ASSESSMENT
Economy	**Public Accounts**	Scheme costs are higher than expected.	Forecast PVC (without indirect taxation) - £25.7m Observed PVC (without indirect taxation) - £32.9m Forecast PVC (with indirect taxation) – £22.8m Observed PVC (with indirect taxation) - £29.8m	Worse than expected
	Transport Economic Efficiency	Across the AM, Inter Peak and PM periods, observed Do-Minimum journey times exceeded that which was predicted, while observed Do-Something journey times were lower than predicted. This translated into a substantial increase between the journey times improvement than was forecast. In all time periods, the observed time savings are 30 seconds or more higher than predicted.	Journey Time Benefits - £74.2m (Forecast - £68.2m)	As expected
	Reliability	Reliability has improved on former A590. The route stress is also lower on the new A590 bypass than the former route.	Stress on old A590 route before was 61%, Stress on old A590 route at FYA stage is 2%, Stress on new A590 bypass at FYA stage is 20%	As expected (neutral)
	Wider Economic Impacts	The scheme is not in a designated regeneration area, nor were there any significant developments dependent on the proposed bypass.	-	As expected (neutral)
Accessibility	**Option Values**	The scheme has not led to any change in public transport services or infrastructure.	-	As expected (neutral)
	Severance	Reduction in severance in High and Low Newton with more journeys on foot and cycle.	-	As expected (moderate beneficial)
	Access to the Transport System	The scheme has been beneficial in terms of reducing traffic through High Newton which improves journey time reliability. However as the buses still use the old A590 and stop at High Newton, the narrowing of the carriageway at bends was considered to be a safety concern.	-	As expected (neutral)
Integration	**Transport Interchange**	Lighter traffic volumes have facilitated an indirect improvement. No new facilities as a result of the scheme.	-	As expected (neutral)
	Land Use Policy & Other Gov't Policies	The scheme integrates well with the objectives set out in relevant local, regional, and national policy documents, by reducing journey times, enhancing the local environment and supporting economic development.	-	As expected (neutral)

8. Conclusions

8.1 To conclude this report, this section summarises how the scheme is meeting its specified objectives.

Scheme Specific Objectives

8.2 Table 8.1 presents an evaluation of the scheme's objectives using the evidence presented in this study.

Table 8.1 - Success against Scheme Objectives

Objective	Has the scheme objective been achieved?	
Improve the environment by removing through traffic on the existing road in High and Low Newton.	The scheme has removed 97% of traffic on the former road through High and Low Newton.	✓
Provide a new high standard route with improved journey times for road users.	In the AM and PM peak periods, journey times have improved by around three minutes on the route shown in Figure 2.6, while during the Inter-Peak period, this saving was around two minutes.	✓
Provide a road which enhances safety for road users.	Across the COBA area, collisions have reduced from a pre-scheme annual average of five to a post-scheme annual average of one. The collision severity index has reduced from 30% to 17%, and casualties have reduced by an annual average of seven between pre-scheme and post-scheme. When the national background reduction of collisions is taken into account, there remains a statistically significant difference on collision rates between pre-scheme and post-scheme periods.	✓
Provide good accessibility to the existing communities and to areas of industrial, commercial and tourist development.	The A590 bypass links Kendal and Ulverston, and is also important for Barrow. By reducing journey times and route stress, the scheme has improved accessibility between these strategic areas.	✓

9. Appendices

Appendix A Data Requested for Chapter 5: Environment

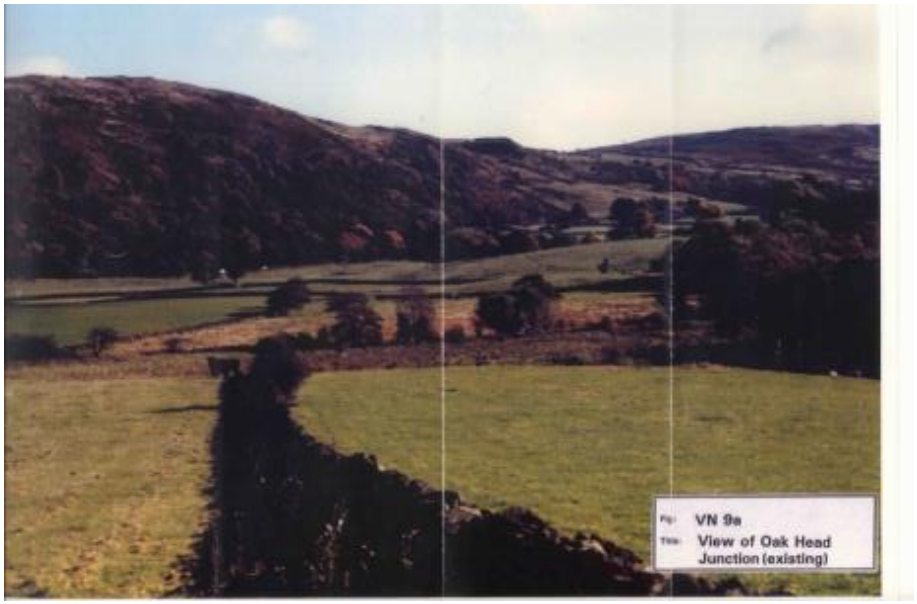
Table 9.1 - Information requested to evaluate the environmental sub-objective

Environment Specific Requirements	OYA Response	FYA Response
Environment Statement (ES) or Stage 3 Scheme Assessment Report (SAR) or Environmental Assessment Report (EAR) including Environmental Masterplan (EMP) drawings.	A590 High & Low Newton Bypass Environmental Statement February 1993 including main text, appendices, figures and non-technical summary	Received at OYA.
AST.	AST version 7th February 2008	Received at OYA.
Any amendments / updates, additional surveys or reports since the ES / SAR / EAR.	No amendments to the ES. Survey information updated prior to construction and provided to POPE	No additional information received at FYA.
Any changes to the schemes since the ES / SAR / EAR e.g. to lighting and signs, retention of material on site in earthworks in the form of landscape bunds or other, or to proposed mitigation measures.	No significant changes to the scheme since the ES.	No additional information received at FYA.
As built drawings for landscape/ biodiversity/ environmental mitigation measures/ drainage/ fencing/ earthworks etc.	Environmental Masterplan sheets 1 to 13 August 2008 Landscape & Ecology Detail sheets 1 to 8 April 2008 Offsite Planting Proposals November 2006 A590 De-trunking Proposals Sheets 1 to 14 May 2008	As Built plans provided at OYA Overview of Management Objectives Sheets 1 – 3 provided at FYA in HEMP
Construction Environment Management Plan (CEMP).	Construction Environment Management Plan 6 Month Update April 2007 (part only – no appendices provided)	Construction Environment Management Plan 6 Month Update April 2007 with Appendices included in HEMP
Landscape and Ecology Aftercare Plan (LEAP) or Landscape Management Plan (LMP).	No	None available at FYA, but may not have been a requirement for this scheme as a HEMP was produced.
Health and Safety File – Environment sections (to include all environment As-Built reports).	-	-
Handover Environmental Management Plan (HEMP).	Handover Environmental Management Plan July 2008	Handover Environmental Management Plan July 2011 with Appendices (except Appendix 10)
Relevant Contact Names for consultation.	Provided.	Some provided, some sourced by POPE.

Environment Specific Requirements	OYA Response	FYA Response
Archaeological Reports (popular and academic).	Archaeological Watching Brief December 2005 Black Beck Hall, Ayside, Cumbria Archaeological Building Recording October 2006 Stratigraphic and Palaeoenvironmental Investigations along the A590 Bypass at High Newton, Cumbria: Final Report November 2006 Archaeological Topographic Survey, Photographic Recording, Evaluation and Watching Brief February 2007	Received at OYA.
The Road Surface Influence (RSI) value of any low noise surface installed.	-	None received.
The insulation performance properties of any noise barriers installed (The BS EN 1794-2 result provided by the noise barrier manufacturer).	-	Noise barriers were not a scheme requirement.
List of properties eligible for noise insulation.	No properties eligible	-
Employers Requirements Works Information - Environment sections.	Volume 6 Environmental Design Information	No additional information received.
Reports for any pre/ post opening survey and monitoring work e.g. for noise, biodiversity, water quality).	Bat Monitoring Interim Report 2007 dated January 2008 Bat Monitoring Interim Report 2008 dated November 2008	• A590 Bat Monitoring Final Report 2007 –2009 dated February 2010 • A Review of Bat Mitigation in Relation to Highway Severance September 2011 • Do Bat Gantries and Underpasses Help Bats Cross Roads Safely? Anna Berthinussen, John Altringham Institute of Integrative and Comparative Biology, University of Leeds, Leeds, UK (an open access article distributed under the terms of the Creative Commons Attribution License) forwarded to POPE by the MAC
Animal mortality data.	Provided	Provided by the MAC.
Pre or Post opening Non-motorised User (NMU) Audits or Vulnerable User Surveys.	Not undertaken.	Not a scheme requirement
Scheme Newsletters / publicity material/ Award information for the scheme.	Newsletters sourced from HA web page. Information on awards provided – CEEQUAL Excellent Award, ICE north west Merit Award and entered for Landscape Institute Awards 2009	No additional information provided at FYA.

Appendix B ES photomontage FYA comparison photos

Figure 9.1 Views VN 9a, 9b and 9cOak Head Junction from ES Landscape Proof of Evidence November 1993 and FYA comparison view November 2013 (bottom left)



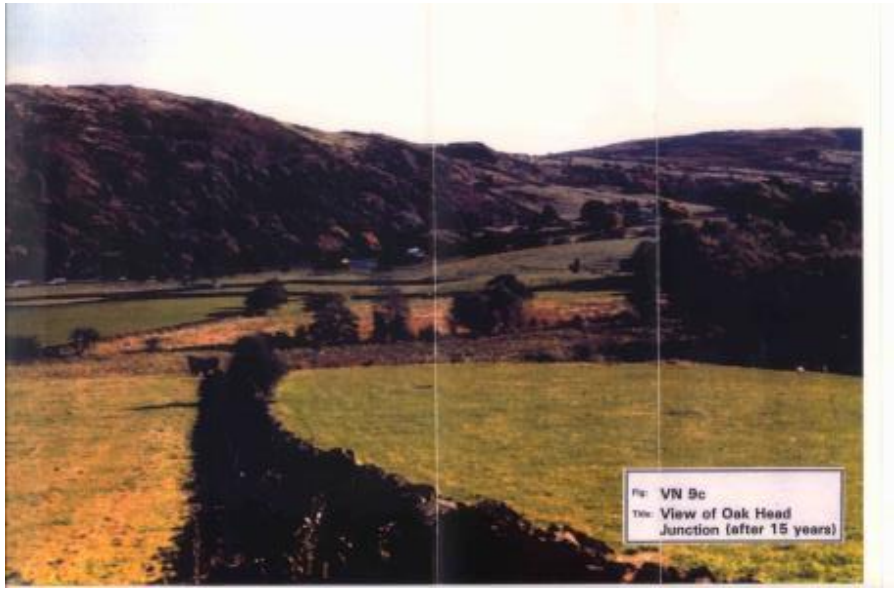


Figure 9.2 - VN 10a Existing View of Barrows Green (top) and VN 10b View of Barrows Green at opening (bottom) from ES Landscape Proof of Evidence November 1993

Appendix C Photo Comparison between OYA and FYA

Figure 9.3 - OYA - Approach to Barrows Green underpass on east side. High Newton properties visible top left and bypass behind false cutting on right. New dry stone walls replicate local boundary patterns.

Figure 9.4 – FYA - September 2013 - planting illustrating good growth on embankment slopes and beginning to form an effective visual barrier

Figure 9.5 – OYA - View towards Low Newton from Cartmel Lane junction with bypass on embankment

Figure 9.6 - FYA September 2013 – hedge generally establishing well although some areas exhibit slower growth. Triangular fenced plot in centre view is establishing as expected for FYA planting. Planting on the main embankment slope is slow to establish and has yet to provide any screening or integration of the Cartmel junction.

Figure 9.7 – OYA - View west from Head House Road over-bridge

Figure 9.8 - FYA September 2013 - illustrating typical good growth within planting plots. Oak Head cutting slopes visible to right with Meadow Croft cutting in middle distance.

Figure 9.9 – OYA – View east towards Head House over-bridge and High Newton to left. Curved alignment avoids 'notch' effect of road cutting through hillside

Figure 9.10 - FYA September 2013 – view from Meadow Croft cutting with evidence of diverse grass sward establishing. The area between the badger fence and new dry stone walling is a difficult area to maintain.

Figure 5.8 – Old A590 in High Newton with reduced carriageway and widened verge

Figure 9.11 - FYA September 2013 – verges being maintained by local residents

Figure 9.12 – OYA - Example plot where gorse is beginning to out-compete other species

Figure 9.13 - FYA September 2013 – example of gorse dominating planting plot

Figure 9.14 – OYA - View to bat guidance structure provided across the bypass near Low Newton

Figure 9.15 - FYA – Adjacent planting is beginning to establish although not yet mature enough to guide bats to closely link to the guidance structure

Figure 9.16 – OYA – Mature pollarded ash trees relocated near to Head House Road bridge

Figure 9.17 - FYA September 2013 – the two translocated Ash trees at Head House are struggling to survive, however, they provide valuable wildlife habitats as standing dead wood and will be retained.

Figure 9.18– OYA - Pig sty converted to be suitable for use by bats

Figure 9.19 – FYA - September 2013

Figure 9.20 – OYA - Culvert and mammal tunnel below bypass at Belman Beck

Figure 9.21 - FYA September 2013 – Belman Beck culvert. Bankside vegetation has not been maintained. The Ayside NMU route and bypass is beyond the stone wall

Figure 9.22 – OYA - View of Oak Head balancing pond east of Oak Head Road underpass

Figure 9.23 - FYA September 2013 – balancing pond retains some open water with marginal planting evident. Some noxious weed present within the grassland areas. Planting generally well established. Individual trees alongside Oak Head Road will take time to develop

Figure 9.24 - Example of toe of embankment drainage ditch with local stone clad headwall

Figure 9.25 - Example of toe of embankment drainage ditch with local stone clad headwall

Figure 9.26 – OYA - Barrows Green balancing pond with marginal planting beginning to establish. Algae noticeable within the water body

Figure 9.27 - FYA September 2013 – the balancing pond has a balance of open water and marginal vegetation. No algae was present

Figure 9.28 – OYA - Naturalistic realignment of Newton Beck which has been culverted under the bypass

Figure 9.29 - FYA September 2013 – exact location could not be accessed due to vegetation

Figure 9.30 – OYA - Oak Head Road underpass incorporating footpath FP573010

Figure 9.31 - FYA September 2013 - Oak Head Road underpass incorporating footpath FP573010

Figure 9.32 – OYA - Ayside underpass incorporating footpath FP 573008, bridleway and access for cyclists

Figure 9.33 - FYA September 2013 – planting either side of the over-bridge is developing well and should in time soften the structure and filter views to the bypass

Figure 9.34 – Cycle / footpath link between the bypass and old A590 near Whitestone

Figure 9.35 - FYA September 2013 – signage changes evident possible by the MAC to take account of the new extension to the cycle/footpath provided since OYA at the northern extents of the scheme

Figure 9.36 - OYA - Eastbound lay-by (looking west)

Figure 9.37 - FYA September 2013 – eastbound layby shrub planting

Appendix D Tables and Figures in this Report

Tables

Figures

Appendix E. Glossary

Terms	Definition
AADT	**Annual Average Daily Traffic**. Average of 24 hour flows, seven days a week, for all days within a year.
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.
ADT	**Average Daily Traffic**. Average daily flows across a given period.
AONB	**Area of Outstanding Natural Beauty**
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**
AAWT	**Annual Average Weekday Traffic**. As AADT but for five days (Monday to Friday) only.
AWT	**Average Weekday Traffic**. As ADT but for five days (Monday to Friday) only.
BCR	**Benefit Cost Ratio**. This is the ratio of benefits to costs when both are expressed in terms of present value i.e. PVB divided by PVC.
Bvkm	**Billion Vehicle Kilometres**
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 collisions), and expresses the results in terms of a monetary valuation. The COBA model uses the fixed trip matrix unless it is being used in Collision-only mode.
CRF	**Congestion Reference Flow**
DfT	**Department for Transport**
Discount Rate	The percentage rate applied to cash flows to enable comparisons to be made between payments made at different times. The rate quantifies the extent to which a sum of money is worth more to the Government today than the same amount in a year's time.
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.
DM	**Do Minimum**. In scheme modelling, this is the scenario which comprises the existing road network plus improvement schemes that have already been committed.
DMRB	**Design Manual for Roads and Bridges**
DS	**Do Something**. In scheme modelling, this is the scenario detailing the planned scheme plus improvement schemes that have already been committed.
EA	**Environment Agency**
ES	**Environmental Statement**
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.
FYA	**Five Year After**
HA	**Highways Agency**. An Executive Agency of the DfT, responsible for operating, maintaining and improving the strategic road network in England.
HGV	**Heavy Goods Vehicle**
KSI	**Killed or Seriously Injured**. KSI is the proportion of casualties who are killed or seriously injured and is used as a measure of collision severity.
MAC	**Managing Area Contractor** Organisation normally contracted in 5-year terms for undertaking the management of the road network within a HA area.

Terms	Definition
MVKM	**Million Vehicle Kilometres**
NATA	**New Approach to Appraisal**. The basis of the standard DfT appraisal approach when this scheme was appraised.
NMU	**Non-Motorised User**. A generic term covering pedestrians, cyclists and equestrians.
NRTF	**National Road Traffic Forecasts**. 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. At the time this scheme was appraised, the most recent one was NRTF97, i.e. dating from 1997.
ONS	**Office for National Statistics**
OYA	**One Year After**
PIC	**Personal Injury Collisions**
POPE	**Post Opening Project Evaluation**. The before and after monitoring of all major highway schemes in England.
Present Value	**Present Value**. The value today of an amount of money in the future. In cost benefit analysis, values in differing years are converted to a standard base year by the process of discounting giving a present value.
PVB	**Present Value Benefits**. Value of a stream of benefits accruing over the appraisal period of a scheme expressed in the value of a present value.
PVC	**Present Value Costs**. As for PVB but for a stream of costs associated with a project
RSA	**Road Safety Audit**
RSI	**Road Surface Index**
STATS19	A database of injury collision statistics recorded by police officers attending collisions.
TAR	**Transport Appraisal Report**
TEE	**Transport Economic Efficiency**
TEMPRO	**Trip End Model Program**. This program provides access to the DfT's national Trip End Model projections of growth in travel demand, and the underlying car ownership and planning data projections.
TIS	**Traffic Impact Study**
TRADS	**Traffic Flow Data System**. Database holding information on traffic flows at sites on the strategic network.
UK	**United Kingdom**
WebTAG	DfT's website for guidance on the conduct of transport studies at http://www.webtag.org.uk/