Post Opening Project Evaluation

A419 Blunsdon Bypass – Five Years After Opening

December 2015

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Executive Summary

The A419 Blunsdon bypass scheme is a Highways England major scheme situated between Swindon city centre and Cirencester, which opened in March 2009. Before the scheme opened, traffic congestion which occurred at the Turnpike Roundabout and at the junction with Lady Lane resulted in long delays, particularly at peak times. This resulted in driver frustration and traffic collisions. In addition, the A419 in Blunsdon was difficult to cross for pedestrians and vehicles. The trunk road severed Blunsdon village and properties adjacent to the trunk road experienced high levels of traffic noise and air pollution.

Scheme Description

The scheme comprised of the following:

- A dual carriageway bypass to the west of Blunsdon, including a short climbing lane in the southbound direction on the approach to Lady Lane junction.
- Two signal controlled junctions (Lady Lane Junction and Turnpike Junction) connected by a local road in place of Turnpike Roundabout.
- A dedicated pedestrian/cycle way on the A4311 with pedestrian/cycle phases incorporated in the signalised Lady Lane Junction.
- A new bridleway bridge at the end of Widhill Lane to allow non-motorised users to cross the bypass safely.
- An underpass provided at the northern end of the bypass to maintain access to a landfill site and Upper Widhill Farm.
- In partnership with Swindon Borough Council, improvements have been carried out on the downgraded former route between Widhill Lane and Lady Lane which is now the responsibility of Swindon Borough Council. These improvements included lighting, a pedestrian/ cycle way and widened grass verges.

Scheme Objectives

Objectives *(Source: Employer's Agent Project Manager)*	**Objective achieved?**
To minimise noise and visual impact on property in Blunsdon.	✓
To improve the safety of the A419 for all road users through Blunsdon and at the Turnpike Junction.	✓
To remove severance through Blunsdon Village and encourage walking, cycling and equestrians.	✓
To remove the bottleneck on the A419 at Lady Lane and Turnpike Junctions and improve journey times and reliability.	✓

Key Findings

- Traffic flows along the new A419 have increased by approximately 5,000 vehicles per day, and traffic has successfully reassigned from the old A419, where traffic flows have reduced by 98%.
- The bypass has reduced journey times across all periods, and most notably reduced times have by 7.5 minutes in the southbound direction in the PM peak, and 3.5 minutes northbound in the AM peak.

- A larger than expected collision saving of 8.2 per annum is seen, which is substantially higher than the forecast saving of 2.2 collisions per annum.
- The majority of environmental impacts are as expected.
- When indirect tax is considered as a benefit, the scheme delivers a Benefit Cost Ratio (BCR) of 2.7, considered to be high value for money by the DfT.

Summary of Scheme Impacts

Traffic

- Traffic flows on the former A419 have reduced by 98%, illustrating the reassignment of traffic onto the bypass.
- There has been an increase in traffic on the A419, north and south of the bypass section, in line with expectations.
- Traffic flows across the network (where observed data is available) are generally closer to the low growth forecast. The exceptions are Lady Lane, where the flows were considerably higher than forecast, and Thamesdown Drive, where the flows were significantly lower. This highlights inaccuracies in assumptions on these two roads before the scheme was implemented.
- Average journey times on the scheme section five years after are consistently lower than pre-scheme journey times on the old route alignment. Journey time variability has also reduced, and journey times are now more consistent throughout the day.

Safety

- Within the area of the bypass, collisions have reduced by an average of 8.2 per annum. This is higher than was forecast at the appraisal stage, where savings of 2.2 collisions per annum were expected. Statistical tests show that this reduction is unlikely to have occurred by chance, and is therefore related to the scheme.
- The collision severity index has increased from 6% to 35% since scheme opening. Whilst the number of slight collisions has fallen by an average of 14.6 collisions per year, there has been an increase in serious collisions of 1.2 collisions.
- Pre-scheme, there was a cluster of collisions at what was formerly the Turnpike Roundabout and on the A419 approaches to it. Post-scheme, collisions at junctions have reduced substantially. However, there were a larger proportion of serious collisions, located on the slip roads west of the junction.
- It is considered that the scheme has had a slight beneficial impact on personal security, reflecting the inclusion of lighting and footpaths as part of the downgrading of the old A419.

Environment

- The reduction in through traffic along the old A419 as a result of the bypass has been more than forecast. Therefore, the impacts for noise and air quality are considered to be better than expected.
- Observed carbon emissions between the pre- and post-scheme periods increased by a lesser extent than forecast.
- Overall, the landscape impacts of the scheme are considered to be as predicted, with screening and integration functions of earthworks, planting, barriers and bunding enabling the scheme to fit well into the surrounding landscape.
- While weed control has been undertaken, the scheme remains affected by noxious weed infestations and will require continuing maintenance. Four plots planted as species rich grassland have reverted to open grassland. Natural colonisation by species-rich grassland has not occurred as expected in the landscape proposals.
- Regarding townscape, the former A419 through Blunsdon is quiet, with road furniture and traffic levels more suited to the village.
- A good proportion of bat boxes, installed under the contract of the scheme, have been observed to be used. Inspections also confirmed badger activity in an artificial badger sett was provided off-site as part of the scheme.
- Community severance and access has improved along the old A419 due to the reduction of traffic.

- The new road layout and segregation of non motorised users from traffic has led to a reduction in fear of collisions and reduced driver stress, which was as expected.

Accessibility and Integration

- The reduction of through traffic in Blunsdon, combined with the provision of pedestrian, cyclist and equestrian facilities, mean that severance has reduced as a result of the scheme.
- The scheme is aligned with local, regional and national policies relating to land-use and development including improving accessibility, protecting and enhancing the built and natural environment, and improving safety.

Summary of Scheme Economic Performance

All monetary figures in 2002 prices and values		Forecast	Outturn Forecast
Investment Cost in Present Value (PVC)		**£53.0m**	**£56.8m**
Journey Time Benefits		£118.1m	£117.0m
Vehicle Operating Cost		- £53.9m	£12.4m
Safety Benefits		£9.3m	£30.4m
Construction Delay		- £0.1m	- £0.1m
Present Value Benefit (PVB)		£73.3m	£159.7m
Indirect Taxation		-£37.7m	£8.7m
Benefit Cost Ratio (BCR)	**Indirect Tax impact Treated as a Cost**	**4.8**	**2.4**
	Indirect Tax Impact Treated as a Benefit	**2.1**	**2.7**

- Journey time benefits are £117.0 million, which is within 1% of the £118.1 million forecast. Due to the nature of the improvements, journey time benefits would be expected from the opening of the scheme due the removal of delays for A419 through traffic.
- The safety benefits are substantially higher than forecast, at £30.4 million, as compared to £9.3 million.
- The overall Present Value Benefit (without indirect tax) is £159.9 million, which is higher than the forecast of £73.6 million.
- The total investment cost for the scheme was £55.7 million (2002 prices not discounted), which is higher than the £51.5 million forecast (2002 prices not discounted).
- When indirect tax is considered as a benefit, the scheme delivers high value for money with a BCR of 2.7.

1. Introduction

Background

1.1 This report presents a Five Years After (FYA) opening evaluation of the A419 Blunsdon bypass scheme which opened to traffic in March 2009. The evaluation has been prepared as part of the Highways England's (formerly known as the Highways Agency) 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 February 2010. The study presents an evaluation of the scheme's impact according to the Department for Transport's (DfT's) objectives for transport: economy, safety, environment, accessibility and integration.

Scheme Context

1.1. The A419/A417 trunk road is part of a strategic route and runs between Junction 15 of the M4 near Swindon and Junction 11A of the M5 on the outskirts of Gloucester. The scheme is situated on the A419, five miles to the north of Swindon City Centre and eleven miles south of Cirencester.

1.2. The route is dual carriageway for much of its length and major junctions are generally grade separated. Prior to this scheme, some at-grade roundabouts did however remain, notably the Turnpike Roundabout to the north east of Swindon where the A4311 forms the main route into Swindon from the north and provides access to one of the town's major development areas. The Turnpike Roundabout falls within the extent of the Blunsdon bypass improvement scheme.

Figure 1.1 Location of A419 Blunsdon Bypass Scheme

Problems Prior to the Scheme

1.3. The main problem prior to the scheme was traffic congestion at the Turnpike Roundabout and at the junction of the A419 with Lady Lane which resulted in long delays, particularly at peak times. This caused driver frustration and traffic collisions. In addition, the A419 in Blunsdon was difficult to cross for non-motorised users (NMUs) and vehicles due to high traffic volumes. The trunk road severed Blunsdon village, and properties adjacent to the trunk road experienced high levels of traffic noise and air pollution.

Scheme Description

1.4. An illustration of the road layout before the scheme was implemented is presented as Figure 1.2 with the locations of key scheme features illustrated in Figure 1.3. More specifically, the scheme comprises of the following:

- A dual carriageway bypass to the west of Blunsdon.
- At the southern end, Turnpike Roundabout has been replaced by two signal controlled junctions (Lady Lane Junction and Turnpike Junction) connected by a local road.
- Lady Lane Junction includes a new bridge over the bypass to allow access to both Blunsdon and Swindon.
- A dedicated pedestrian/cycle way on the A4311. Pedestrian/cycle phases have been incorporated in the signalised Lady Lane Junction.
- A new bridleway bridge at the end of Widhill Lane to allow non-motorised users to cross the bypass safely.
- Between the bottom of Blunsdon Hill and Lady Lane Junction, the bypass has a third (climbing) lane southbound.
- At the northern end of the bypass, an underpass has been provided to maintain access to the landfill site and Upper Widhill Farm.
- The existing dual carriageway on Blunsdon Hill has been downgraded as part of the scheme and is no longer a through route. In partnership with Swindon Borough Council, improvements have been carried out between Widhill Lane and Lady Lane which have now become the responsibility of Swindon Borough Council. These improvements include lighting, a pedestrian/ cycle way and widened grass verges.

Figure 1.2 Road Layout and Features Prior to Scheme

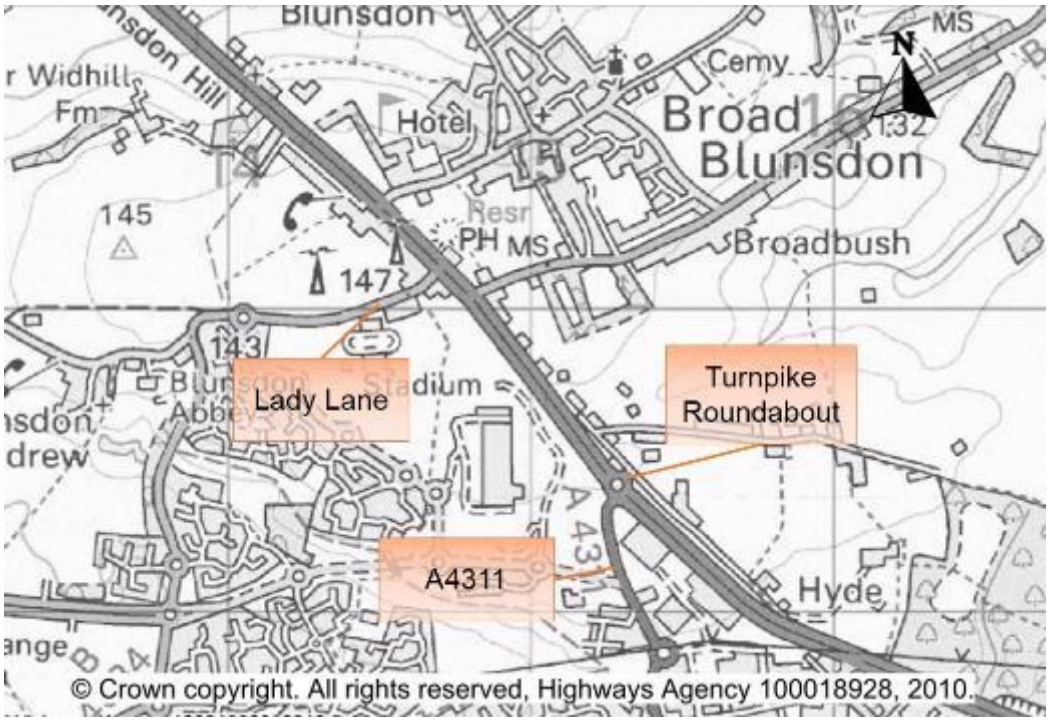
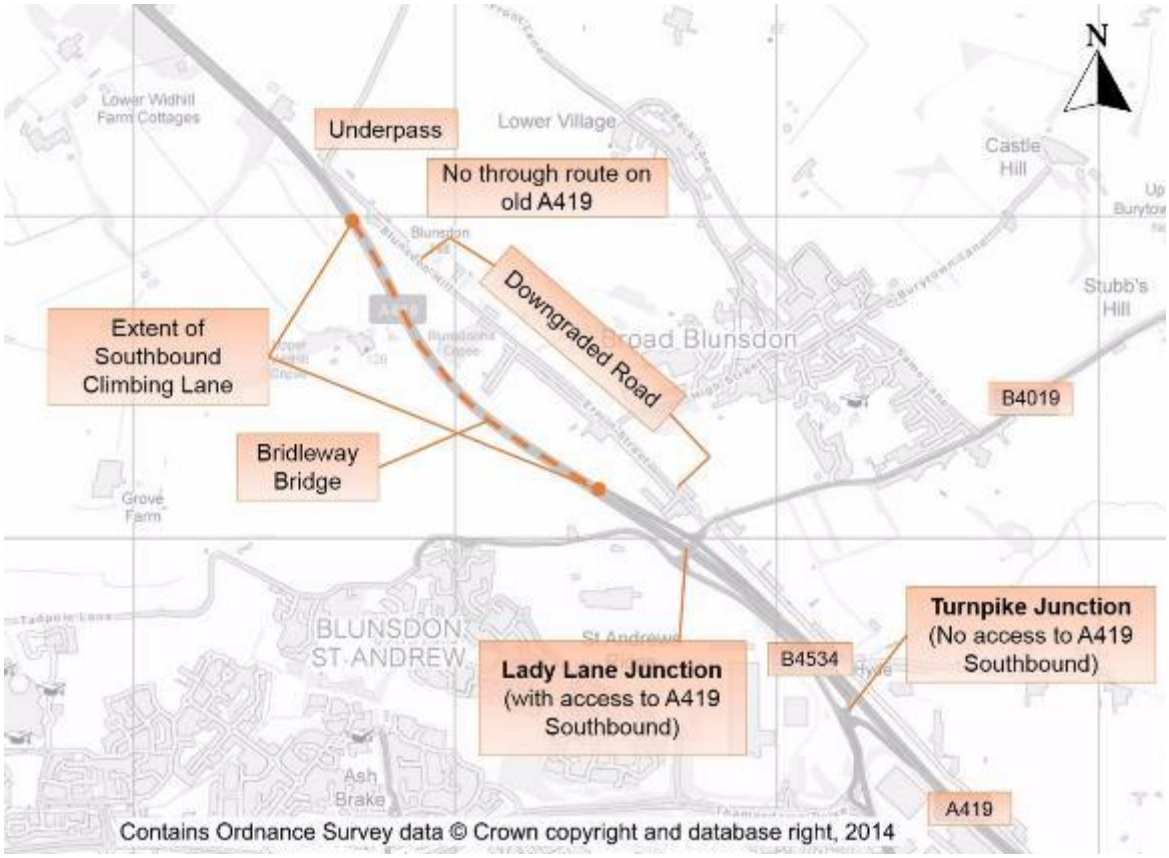


Figure 1.3 Road Layout and Location of Key Scheme Features



Scheme History

1.5. A brief history of the key events involved in the development of the scheme is provided in Table 1.1.

Table 1.1 Chronology of the A419 Blunsdon Bypass

Date	Event
1989	Scheme enters the Trunk Road Programme
June 1990	Public consultation, putting forward a route broadly following that of the current scheme
May 1993	Public consultation on revised junction proposals
1995	Preferred route announced
1996	Scheme withdrawn from the Roads Programme
1998	A New Deal for Trunk Roads in England, identifying the need for a study into the problems of the A419 around Swindon from Blunsdon to the M4. The study identified possible solutions.
2001	Public consultation to seek views on a package of options of on and off line solutions, including a bypass at Blunsdon
April 2002	Announcement of preferred route
March 2004	Publication of draft orders
October 2005	Public inquiry
Spring 2006	Security of State's decision
September 2006	Start of construction work
March 2007	A419 Commonhead Junction Improvement Opened
March 2009	A419 Blunsdon bypass open to traffic
February 2012	Post Opening Project Evaluation One Year After Report published

1.6. As noted in Table 1.1, the A419 Commonhead junction improvement Majors scheme opened to traffic in March 2007. This is approximately 10.5km south of the A419 Blunsdon bypass scheme. This was formerly a signal controlled roundabout, and the improvement involved construction of a new flyover for A419 through traffic above the roundabout, the removal of signals on the approach to the roundabout, an provision of a designated left slip road lane into Swindon from A419 northbound. The main aim of this scheme was to improve journey times on the A419, and improve access from the M5 to Swindon. The overall conclusion of the five years after POPE report published in July 2012 noted that the Commonhead improvement, as well as the Blunsdon bypass has drawn some traffic to the route due to reduced congestion at both locations.

Scheme Objectives

1.7. The primary objectives of the scheme were:

- To minimise noise and visual impact on property in Blunsdon.
- To improve the safety of the A419 for all road users through Blunsdon and at the Turnpike Junction.
- To remove severance through Blunsdon Village and encourage walking, cycling and equestrians.
- To remove the bottleneck on the A419 at Lady Lane and Turnpike Junctions and improve journey times and reliability.

1.8. The objectives have been derived from the Report to the First Secretary of State and the Secretary of State for Transport (December 2005).

Post Opening Project Evaluation (POPE)

1.9. Highways England 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.

1.10. 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[1] 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.

1.11. POPE studies are carried out for all Major Schemes to assess the strengths and weaknesses in the techniques used for appraising schemes. This is 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.

1.12. 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 Highways England in ongoing improvement of appraisal approaches and tools used for major schemes.

Summary of the A419 Blunsdon Bypass One Year After Study

1.1. 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 A419 Blunsdon bypass OYA report were as follows:

- Traffic flows on the old A419 reduced by 93% at one year after compared to pre-opening levels.
- One year after opening, in the AM peak, journey times on the bypass as compared to the former A419 improved by over two minutes in a northbound direction and just less than seven minutes in the southbound direction. In the PM peak, the saving was four minutes and one minute respectively.
- Regarding safety in the opening year, across the modelled network there was an annual collision saving of 9.6 collisions, which represented a statistically significant change. It was considered that the scheme had a 'slight beneficial' impact on personal security.
- Environmental impacts on landscape and cultural heritage were generally as expected. Noise levels and local air quality were likely to be worse than expected. Regarding water, the Parish Council had reported incidents of flooding. Noise levels and local air quality were likely to be worse than expected.

[1] As of August 2011 this approach has been revised. However, POPE is concerned with the evaluation against the appraisal and as such follows the objectives used at that time.

- Regarding biodiversity, there was no information available at the one year after stage to establish the success of mitigation measures for protected species and replacement planting for woodland and hedgerows lost to the scheme.
- The reduction of through traffic in Blunsdon as a result of the downgrading of the A419 had reduced severance.
- The scheme was considered to have had an indirect beneficial impact on major development located in North Swindon.
- The outturn scheme cost was within 8% of that forecast.

1.2. 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.

Report Structure

1.3. 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
- Appendix A – A1 – ES and OYA Comparison Viewpoints
  A2 – Aftercare Regimes
  A3 – Photographic Record of Scheme
- Appendix B – Glossary
- Appendix C – Figures and Tables used in this report

2. Traffic Impact Analysis

Scheme Objective: To remove the bottleneck on the A419 at Lady Lane and Turnpike Junctions and improve journey times and reliability.

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 A419 Blunsdon bypass route, as well as traffic flows for the wider area of the scheme. 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 of:

- A description of national, regional and local background traffic trends.
- A summary of the sources used to compile data for this evaluation.
- A detailed comparison of before, one year after and five years after traffic flows in the study area likely to be affected by the scheme.
- An evaluation of key differences between forecast and outturn traffic flows.
- A comparison of journey times for before scheme opening and the FYA stage, with consideration to journey time reliability.

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 National Transport Model (NTM) Local Growth Factors.

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.

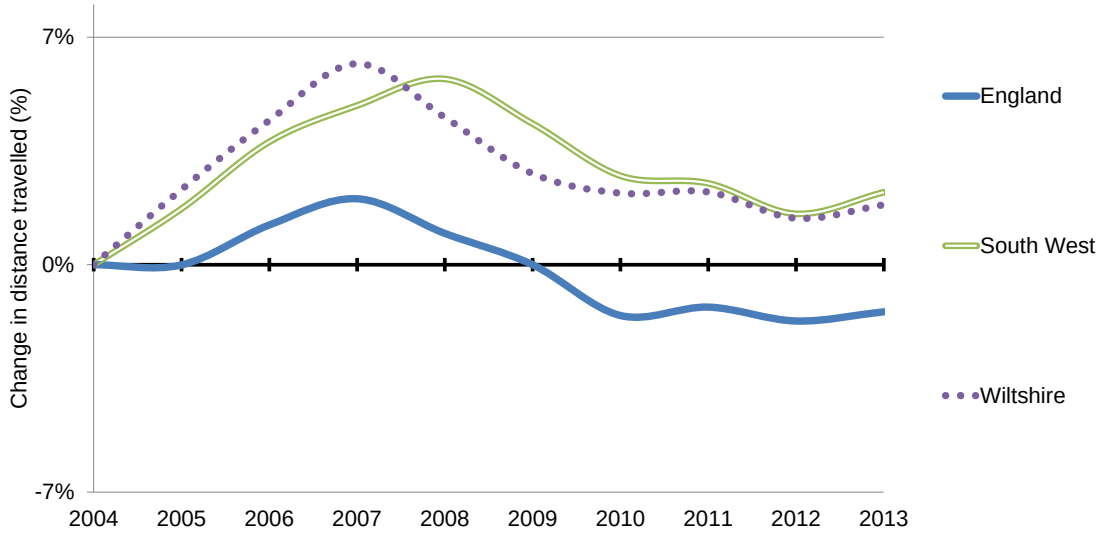
2.5. As such, this section will examine and discuss the regional and local trends in traffic flows.

Local, Regional and National Traffic Trends

2.6. The DfT produces observed annual statistics for all motor vehicles by region and local authority. Data between 2004 (year of traffic appraisal, before construction) and 2013 (the latest available) is shown in million vehicle kilometres (mvkm) for Wiltshire, the South West region and England in Figure 2.1[2].

[2] Department for Transport statistics, motor vehicle traffic (vehicle kilometres) by local authority in Great Britain.

Figure 2.1 Local, Regional and National Trends in Distance Travelled



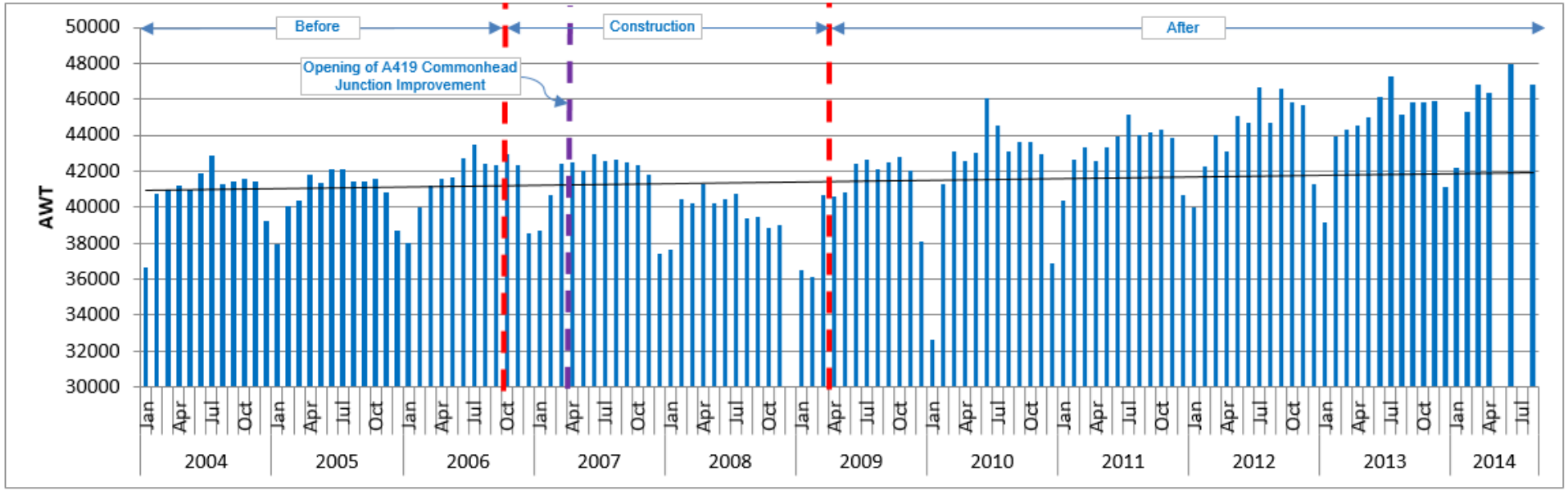
2.7. National trends indicate an increase in distance travelled between 2005 and 2007 with a subsequent decline in their numbers between 2007 and 2010. This is largely related to the economic downturn. Between 2011 and 2013 national trends have remained relatively constant. In 2013, the distance travelled is overall 1% lower than in 2004.

2.8. When compared to national trends, Wiltshire follows a similar general trend, with increases between 2005 and 2007, a subsequent decline between 2007 and 2010, and then a period of relative consistency from then on. However, the initial increase between 2005 and 2007 was steeper than in England overall, resulting in the national vehicle kilometres in 2013 being overall 2% higher than in 2004.

Long Term Traffic Trends

2.9. In order for a greater understanding of the historical fluctuations in yearly traffic flows on the A419, Figure 2.2 presents average weekday traffic (AWT) flow data on the A419 approximately 4.5km north-west of the scheme. This has been sourced through permanent traffic count data obtained from the TRADS database, which contains count locations on the strategic network. It presents this information within the context of the scheme, the opening date of the A419 Commonhead junction improvement scheme as well as the economic downturn.

Figure 2.2 Long Term Trends on the A419 – Average Weekday Traffic (AWT)



2.10. From Figure 2.2, the following can be noted:

- When compared with Figure 2.1, it becomes apparent that the long term traffic trends on the A419 deviate from those observed nationally. While nationally there was a substantial increase in distance travelled before the economic downturn (up to 2007), flows on the A419 remained at a static level. This may perhaps be related to congestion issues on the road. Following the completion of the scheme, traffic flows have increased despite the economic downturn, while national trends have shown a decline.
- There is considerable seasonable variation, with the highest traffic flows generally being during the summer months.

Traffic Volumes

2.11. This section of the report uses data from a variety of sources to inform the before and after analysis of changes in traffic volumes and journey times relating to the scheme. To complete this evaluation, data from before construction (2006), the OYA opening period (2010) and the FYA opening period (2014) are compared.

Traffic Count Data Sources

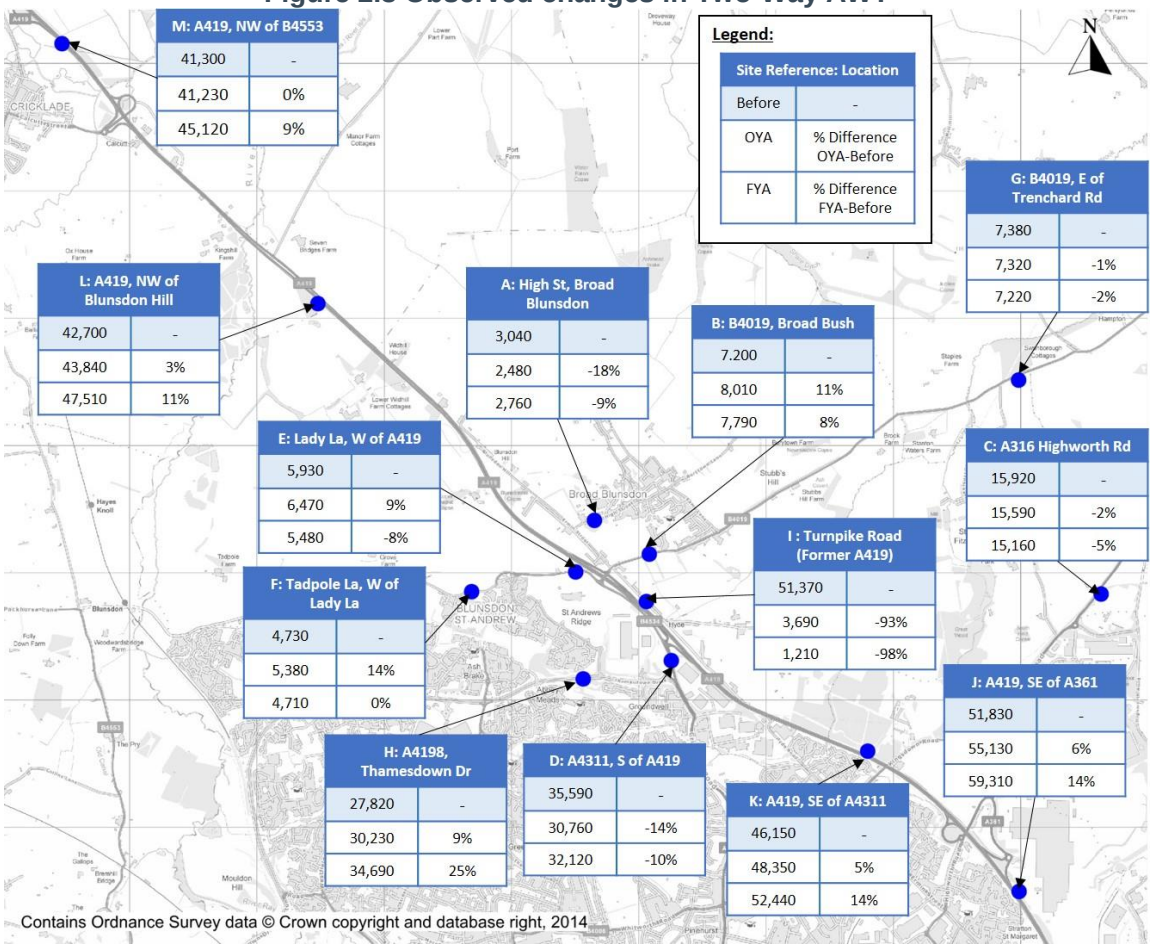
2.12. For the purposes of this evaluation study, the main sources of traffic data include:

- Permanent traffic count data obtained from the TRADS database for count locations on the strategic network.
- Automatic traffic count (ATC) data supplied by Swindon Borough Council.
- Temporary automatic traffic counts (ATC) data commissioned for the purpose of this study.

2.13. The count locations are shown geographically in Figure 2.3. These were taken in the following time periods:

- Pre-scheme: October 2006, May 2006, June 2006.
- One Year After: July 2010, October 2010.
- Five Years After: June 2014, October 2014.

Figure 2.3 Observed changes in Two-Way AWT



2.14. Figure 2.3 shows that traffic flows on the former bypass (site I) have reduced by 98% between pre-scheme and the FYA periods, illustrating the reassignment of traffic onto the bypass.

2.15. There has been an increase along the A419 between the pre-scheme and FYA post-opening periods (sites J, K, L, and M), between Stratton and Cricklade.

2.16. There has been a reduction in traffic flow levels on the High Street of Broad Blunsdon (site A). This is likely to be related to there no longer being direct access to the High Street from the bypass, while there was pre-scheme through the former A419 route. This is supported through the increase in traffic on the B4019 (site B), which represents the nearest connecting road to the east and to Broad Blunsdon along the bypass.

2.17. At the OYA stage, Lady Lane (site E) and Tadpole Lane (site F) showed an increase in traffic levels. As noted in the OYA report, this was potentially due to traffic re-routing along Tadpole Lane and Lady Lane to access the A419 as opposed to via Thamesdown Drive (A4198). This was because the bypass made it no longer possible to access the A419 southbound from the Turnpike Junction, and therefore traffic may have used this route to do so. However, at FYA stage this trend appears to have declined. The traffic at Lady Lane and Tadpole Lane has decreased since the OYA stage, with traffic at Lady Lane showing a reduction of 8% from the level at pre-scheme and Tadpole Lane reverting back to approximately the same levels as before the scheme opened. This is supported by an increase in traffic along Thamesdown Drive (A4198, site H) between the OYA and FYA stages.

2.18. The Orbital Retail Park is located on Thamesdown Drive (A4198), approximately 2km west of Turnpike Junction. There are a number of stores on site, including a supermarket, and it has

around 990 parking spaces. The retail park therefore has an impact on traffic flows on Thamesdown Drive (site H), from which the retail park can be accessed.

2.19. There has been a significant level of new build housing construction in north Swindon between the pre-scheme and FYA post-scheme period. This has included housing developments to the west of site H which are accessible via Thamesdown Drive, including Saddlers Rise, Princess Gate, and Windsor Gate. It is considered that this is related to the increase in traffic levels which has been observed on Thamesdown Drive (site H).

Screenlines

2.20. In order to further investigate reassignment as a result of the scheme, screenline analysis has been undertaken using the screenlines identified in Figure 2.4.

2.21. Screenline analysis allows for a better understanding of vehicular movements across a wider corridor area. Two screenlines have been selected for this study (one to the east and one to the west of the A419). This enables a comparison of how east-west movements have been affected by the scheme. No east to west screenlines have been analysed as there are no comparable strategic routes in the vicinity of the scheme to warrant such analysis.

2.22. The old route versus the bypass have also been compared. As there is not a directly comparable traffic count available to the old road (site I) on the bypass, northbound flows from site L and southbound flows from site K have been combined to produce a two-way flow as a proxy.

Figure 2.4 Location of Screenlines

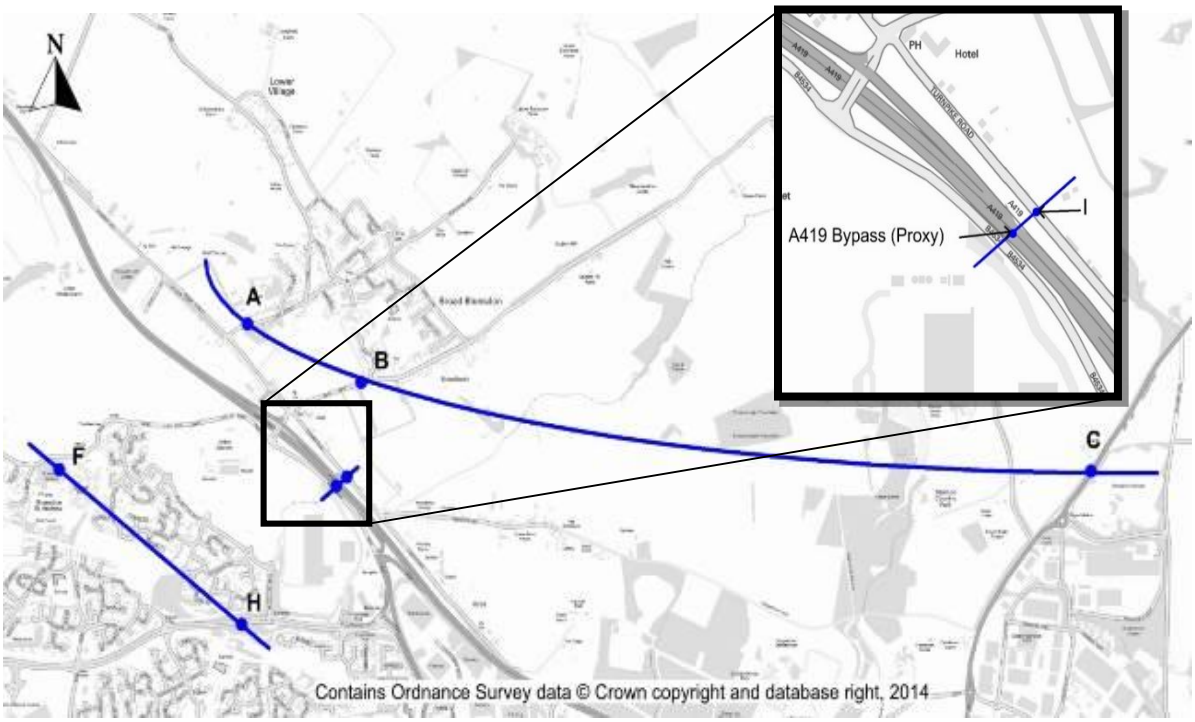


Table 2.1 Flows Across Screenlines

	Site	Location	Average Weekday Traffic (AWT) (Two Way)				
			Before (2006)	OYA (2009)	FYA (2014)	Before to FYA Change	Before to FYA % Change
Eastern Screenline	A	High Street, Broad Blunsdon	3,040	2,480	2,760	-280	-9%
	B	B4019, Broad Bush	7,200	8,010	7,790	590	8%
	C	A316 Highworth Road	15,920	15,590	15,160	-760	-5%
	Screenline Total		**26,160**	**26,080**	**25,710**	**-450**	**-2%**
Western Screenline	F	Tadpole Lane, West of Lady Lane	4,730	5,380	4,710	-20	0%
	H	A4198 Thamesdown Drive	27,820	30,230	34,690	6,870	25%
	Screenline Total		**32,550**	**35,610**	**39,400**	**6,850**	**21%**
Old Route/ Bypass	I	Turnpike Road - Blunsdon (Old A419)	51,370	3,690	1,210	-50,160	-98%
		A419 bypass*	-	45,399	49,140	-	N/A
	Screenline Total		**51,370**	**49,089**	**50,350**	**-1,020**	**-2%**

*Proxy traffic counts represent the combination of northbound flows from site L and southbound flows from Site K.

2.23. Using the data presented in Table 2.1, the following points can be concluded:

Eastern Screenline

- Across the eastern screenline, there has been a negligible reduction in traffic flows of 2% between 2004 and 2014. This change has predominately been since the OYA study in 2009, suggesting that this is linked to the economic downturn as opposed to the scheme.
- The results indicate that there may have been some reassignment from the A316 Highworth Road (site C) and the High Street (site A) on to the B4109 in Broad Bush (site B).

Western Screenline

- Across the western screenline, from 2006 and 2014, there has been an increase in traffic of 21%. This is alongside a reduction in traffic at A4311 South of the A419 (site D) as well as at Lady Lane, west of the A419 (site E).

Old Road/ Bypass Screenline

- The opening of the bypass has resulted in a reduction of traffic of 98% on the old road.
- There has been a decrease of 2% across the screenline containing the bypass and the old road. The changes on the A419 suggest that traffic on the A419 overall would have increased (see Section 2.5). The reduction may be related to the location of the count site L in relation to the new layout. A proportion of traffic using Lady Lane and the B4019 will leave the A419 at Turnpike junction in advance of the count site whereas in the old layout this traffic would continue on the A419 and be included in the count on the A419.

Forecast and Outturn Traffic Flows Comparison

2.24. This section firstly briefly considers the traffic modelling and forecasting approach followed by a comparison of the forecast and observed impacts. This allows an assessment of whether the observed changes in flows are in line with expectations.

Traffic Modelling Approach and Forecasting Assumptions

2.25. The pre-scheme appraisal process for the A419 Blunsdon bypass scheme involved the forecasting of traffic flows for 'Do Minimum' (DM) and 'Do Something' (DS) scenarios. The DS scenario includes the scheme whilst the DM scenario does not. These modelled forecast flows are compared with observed flows in order to ascertain the accuracy of the original predictions.

2.26. Before undertaking an evaluation of the forecast traffic impacts compared to those which have actually occurred, it is first necessary to develop an understanding of how the scheme has been appraised and the key assumptions used. This may then assist in explaining any differences between the traffic forecasts and the observed impact.

2.27. The predicted flows for this scheme have been taken from the addendum to the traffic modelling, forecasting and economic appraisal report (August 2005). The Commonhead Junction scheme was included in both the DM and DS scenarios.

2.28. A Swindon Area Traffic Model (updated to a base year of 2003) formed the basis of the traffic and economic assessment of the scheme. The methodology used to forecast background traffic growth in the appraisal was National Road Traffic Forecasts 1997 (NRTF97) used in conjunction with local TEMPRO factors. Within this assessment, forecast Annual Average Daily Traffic (AADT) was presented for:

- The years 2009 (forecast opening year) and 2024 (scheme design year).
- Low growth and high growth conditions.
- DM and DS scenarios.

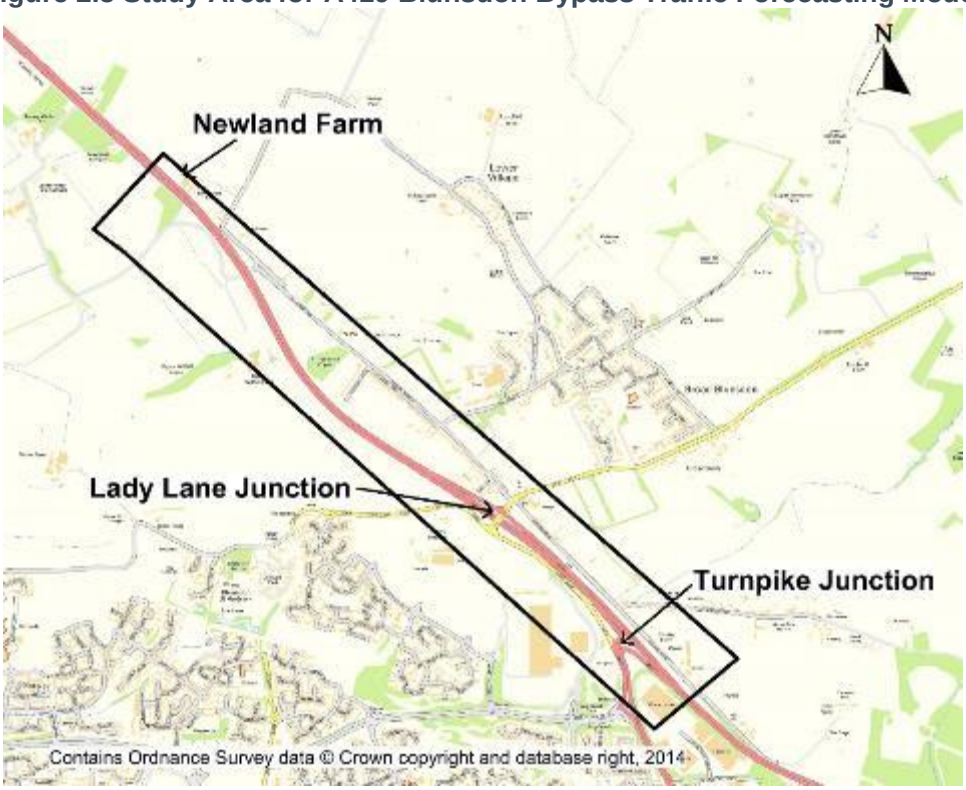
Future Residential and Commercial Developments

2.29. An important consideration to be made is development within the proximity of the scheme, which may have an impact on traffic flows. It should be noted that there are imminent developments in proximity to the A419, which are likely to impact traffic flows in the near future. This includes the land at Tadpole Farm, situated north of Tadpole Lane, which has outline permission for 1,695 houses and work has commenced on site at the time of writing of this report. The land at Abbey Stadium, located between Salzgitter Drive and Lady Lane, also has outline permission for 450 dwellings, commercial space and a care home. There has also been developer interest in Broad Blunsdon, where permission has been granted for a total of 118 dwellings on two sites south west of Ermin Street. During consultation, Blunsdon Parish Council felt that these pending developments will exacerbate flow problems on the B4019, Ermin Street and Lady Lane. None of these developments were included in the forecasting report, and do not affect the information presented in this report.

Study Area

2.30. The modelled area in the appraisal was a narrow strip along the length of the bypass, as presented in Figure 2.5.

Figure 2.5 Study Area for A419 Blunsdon Bypass Traffic Forecasting Model



Forecast versus Observed Traffic Flows

2.31. This section will compare the predicted flows for both the DM (without scheme) and DS (with scheme) scenarios with observed data collected as part of this evaluation.

2.32. The traffic forecasts for the scheme were for two scenarios: high and low growth. In the analysis which follows, the observed flows have been compared with the low growth scenario because, as shown by the One Year After report, flows across the network (where observed flow data is available) were generally overestimated and closer to the low growth scenario in the do-minimum scenario. With this in mind, the forecast flows which the observed are compared to can be considered as a conservative estimate.

2.33. Table 2.2 compares predicted and observed do-minimum flows and Table 2.3 compares predicted and observed do-something flows. Where possible, Annual Average Daily Traffic (AADT) observed flows on the have been used in order to make a direct comparison with the AADT Forecasts. As ATC surveys were undertaken for the duration of a week, it has only been possible to compare Average Daily Traffic (ADT) at particular locations to the AADT forecasts. The figures presented in Table 2.3 therefore do not match the observed flows presented earlier in this chapter, which were average weekday traffic (AWT) flows.

Do-Minimum Forecasts versus Observed Pre-Scheme Traffic Flows

2.34. Table 2.2 presents the forecast 2009 Do-Minimum AADT flows alongside observed flows. Sites K and L represent AADT figures for 2009. Sites E and K are 2006 ADT observed figures which have been factored up to 2009 using factors derived from DfT traffic volume statistics[3]. This is to allow a valid comparison between forecast and outturn flows.

3 DfT Statistics, Motor vehicle traffic (vehicle kilometres) by local authority in Great Britain, annual from 1993.

Table 2.2 Forecast 2009 DM Flows vs. 2009 Observed Flows

		Two Way ADT/AADT Flow			
Site	**Location**	**2009 Forecast (Low Growth)**	**2009 Observed**	**Difference**	**Percentage Difference**
E	Lady Lane, W of A419	4,100	5,520	1,420	35%
H	Thamesdown Drive	34,000	27,380	-6,620	-19%
K	A419, SE of A4311	45,100	42,470	-2,630	-6%
L	A419, NW of Blunsdon Hill	40,500	41,380	880	2%

Note: Observed figures are rounded to nearest 10. Percentage difference is based on non-rounded figures.

2.35. Comparison of the 2009 observed flows with the 2009 Do-Minimum low growth forecast shows that:

- The flows on Lady Lane were considerably higher than forecast while those on Thamesdown Drive were significantly lower. This highlights that the assumptions about routing on these two routes before the scheme was implemented were inaccurate.
- While flows were 2% higher than the forecast for the A419 north of the scheme (Site L), flows south of the scheme (Site K) observed figures were 6% lower than the DM scenario.

2.36. Table 2.3 presents the forecast 2014 Do-Something AADT flows alongside observed flows. At the modelling stage, Do-Something flows were forecast for 2009 and 2024. To allow comparison with observed data in 2014 (for this FYA study), the forecast flows from 2009 and 2014 have been interpolated (assuming a straight line projection). In terms of observed data, due to data availability sites K and L are AADT figures, while sites E and H are ADT figures.

Table 2.3 DS forecast versus observed post-scheme flows

		Two Way ADT/AADT Flow			
Site	**Location**	**2014 Forecast (Low Growth)**	**2014 Observed**	**Difference**	**Percentage Difference**
E	Lady Lane, W of A419	5,070	5,120	50	1%
H	Thamesdown Drive	34,800	32,800	-2,000	-6%
K	A419, SE of A4311	47,100	46,820	-280	-1%
L	A419, NW of Blunsdon Hill	42,400	42,490	90	0%

Note: Observed figures are rounded to nearest 10. Percentage difference is based on non-rounded figures.

2.37. Comparison of FYA observed flows with the Do-Something low growth forecast shows that:

- The sites where FYA observed data is available are generally in line with the low growth forecasts.
- Forecasts for the A419 both north and south of the scheme are in line with the low growth forecasts.
- Thamesdown Drive flows are 6% lower than the low growth forecast, although have seen a large increase from observed pre scheme figures, whereas only a small increase was forecast.

Journey Time Analysis

2.38. A key objective of the scheme was ‘to remove the bottleneck on the A419 at Lady Lane and Turnpike Junctions and improve journey times and reliability’. This section considers the impact the opening of the scheme has had on journey times on the A419 Blunsdon bypass route, and therefore whether it has fulfilled its key objective regarding journey times.

2.39. By comparing journey times taken before the scheme opened 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.

2.40. Pre-scheme journey time surveys were undertaken on the route shown in Figure 2.6 (with dotted green line to show the route along the old road) on the A419 in October 2006 before construction using the moving observer method. Six runs per direction were undertaken.

2.41. At the FYA stage, journey times have been collected on the bypass using satellite navigation data. This route is also illustrated in Figure 2.6 (with solid green line)[4]. This same route was undertaken at OYA stage, by the moving observer method. No journey time surveys were repeated on the old A419 as this is no longer a through route and has very low traffic flows.

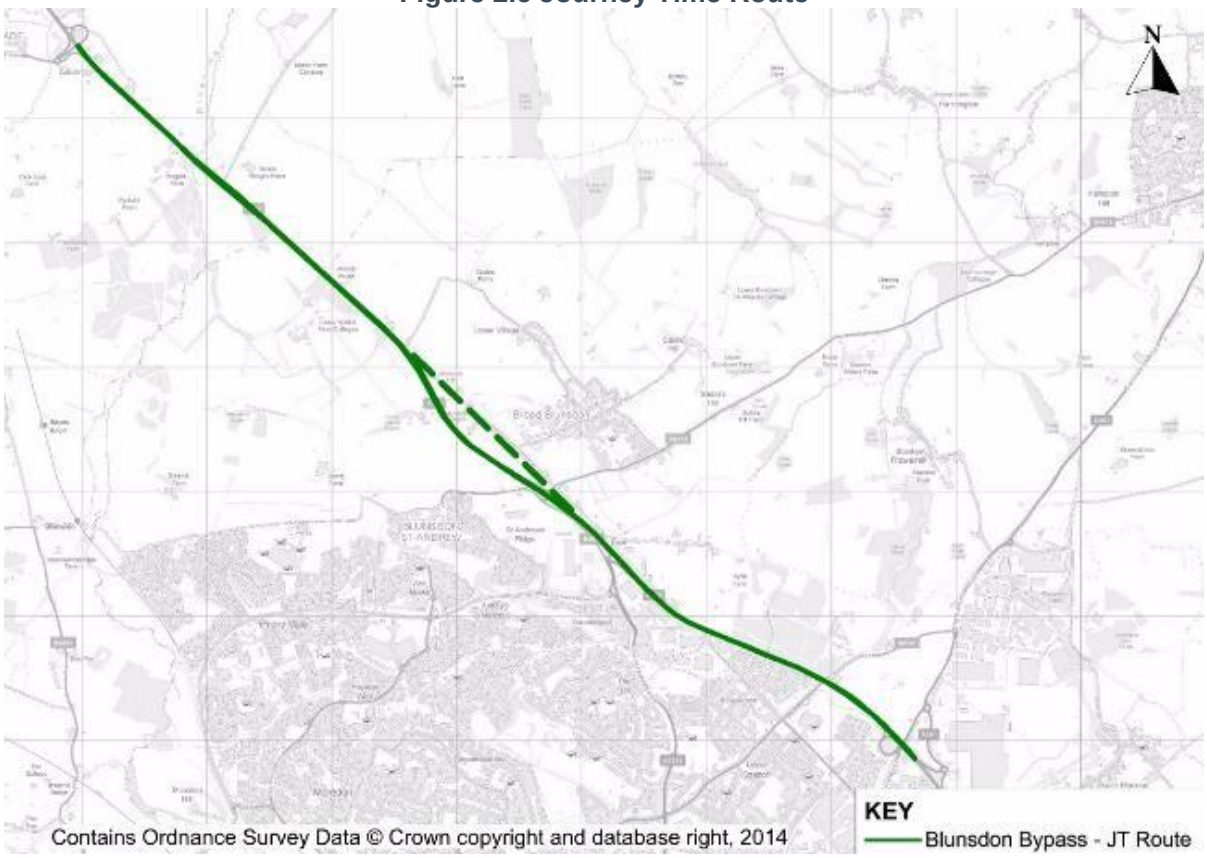
2.42. It should be noted that at OYA stage, journey times were collected for a route through Lady Lane junction to measure the impact of signalisation here via the moving observer method. As the traffic flows along this route have not changed significantly between the OYA and FYA stages, this journey time route has not been repeated and the results reported at OYA therefore still stand. There was an increase in journey times along this route, and it appeared that the signalised layout of Lady Lane junction resulted in an increased delay on local roads joining the A419 at this location.

2.43. The journey time periods used for the journey time analysis were collected on weekdays, in the following time periods:

- AM Peak: 0700-1000
- Inter-Peak: 1000-1600
- PM Peak: 1600-1900

[4] Motorists who use satellite navigation devices have the option to voluntarily allow anonymous data about their journeys to be collected and used to provide a range of services, including the analysis of historic journey times along specific routes. This data is not available for the before start of construction period.

Figure 2.6 Journey Time Route



2.44. As described in the OYA report, the largest delays in the before counts were around the Turnpike junction; in the FYA journey times this is also where the greatest time saving has been made.

2.45. Journey times are analysed based on the old A419 route compared to the bypass. These are shown in **Table 2.4**.

Table 2.4 Journey times by both directions

		Time (min:sec)		
	Time Period	**Before**	**FYA**	**Difference**
Northbound	**AM Peak**	07:54	05:23	- 02:31
	Inter Peak	06:07	05:40	- 00:27
	PM Peak	09:13	05:36	- 03:37
Southbound	**AM Peak**	13:02	05:30	- 07:32
	Inter Peak	06:02	05:13	- 00:49
	PM Peak	06:23	05:05	- 01:18

2.46. From the results in Table 2.4, the following observations concerning journey time savings can be made:

- Average FYA journey times on the scheme section are consistently lower than pre-scheme journey times on the old route alignment.
- The FYA journey time results indicate variability on the A419 between Stratton and Cricklade has reduced and that journey times are now more consistent throughout the day.
- The greatest journey time saving due to the scheme is in the AM peak period in a southbound carriageway, where over 7 minutes have been saved by using the bypass as opposed to the old A419. There is also a very high saving of over 3.5 minutes in the northbound carriageway in the PM peak. This is supported by traffic flow data whereby the

highest flows of traffic are in a southbound carriageway in the AM peak period, and in the northbound carriageway in the PM peak.

Analysis of Forecast versus Outturn Journey Times

2.47. No forecast journey time data was available in the forecast report for comparison with the outturn journey times therefore it has not been possible to undertake a comparison of the forecast journey times against the outturn.

Journey Time Reliability

2.48. The Appraisal Summary Table (AST) for the scheme forecast a 'moderate beneficial' impact on reliability, stating that an 'Assessment based on a reduction in congestion at improved junctions'. No quantified assessment of route stress was recorded.

2.49. The OYA report considered the variability of journey times for traffic using the A419 and noted that post opening journey times were broadly consistent throughout the day in both directions post opening, therefore indicating a good level of reliability.

2.50. As the built scheme has increased capacity for the trunk road and provided free-flow movement for this traffic which previously had to pass through an at-grade junction, it can be concluded that it has improved reliability as forecast.

Residents' Views on Traffic and Congestion

2.51. At the OYA stage, respondents living in the area for more than two years were asked the extent to which they agreed that there had been a reduction in congestion since the scheme opened. Overall, 57% of the respondents either agreed or strongly agreed that there had been a reduction in congestion, while 30% either disagreed or strongly disagreed.

Key Points – Traffic Impact Analysis

Traffic Flow Impacts

- Traffic flows on the former bypass have reduced by 98%, illustrating the reassignment of traffic onto the bypass.
- There has been an increase in traffic along the A419, which is in line with long term traffic trends.
- It is evident that the scheme by itself is unlikely to have resulted in any induced traffic although some local re-assignment may have been brought about by the scheme.
- Traffic screenlines suggest that there may have been reassignment from the A316 Highworth Road and the High Street, on to the B4109 in Broad Bush.

Traffic Forecasting

- In the DM scenario, the flows on Lady Lane were considerably higher than forecast while the flows on Thamesdown Drive were significantly lower. This highlights that assumptions about routing on these two routes before the scheme were inaccurate. While flows on the A419 north of the scheme were 2% higher than forecast, those south were 6% lower.
- In the DS scenario, with the exception of the A419 SE of A4311 (south of the scheme), where flows are 6% lower than forecast.
- There are imminent developments in proximity to the A419 bypass, which are likely to impact traffic flows in the near future.

Journey Times

- Average FYA journey times on the scheme section are consistently shorter than pre-scheme journey times on the old route alignment.
- While no quantified assessment of route stress was undertaken, the scheme has increased capacity for the trunk road and provided free-flow movement for traffic, and therefore it can be concluded that the scheme has had a moderate beneficial impact on reliability, which is as was forecast.
- The greatest journey time saving due to the scheme is in the AM peak period in a southbound direction, where over 7 minutes have been saved by using the bypass as opposed to the old A419. There is also a large saving of over 3.5 minutes in the northbound direction in the PM peak.

3. Safety

Scheme Objective: To improve the safety of the A419 for all road users through Blunsdon and at the Turnpike junction

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 five years 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. In the safety objective, regarding collisions, the AST stated the expectation that 'the removal of through traffic from Blunsdon and at Turnpike roundabout results in a reduction in accidents'.

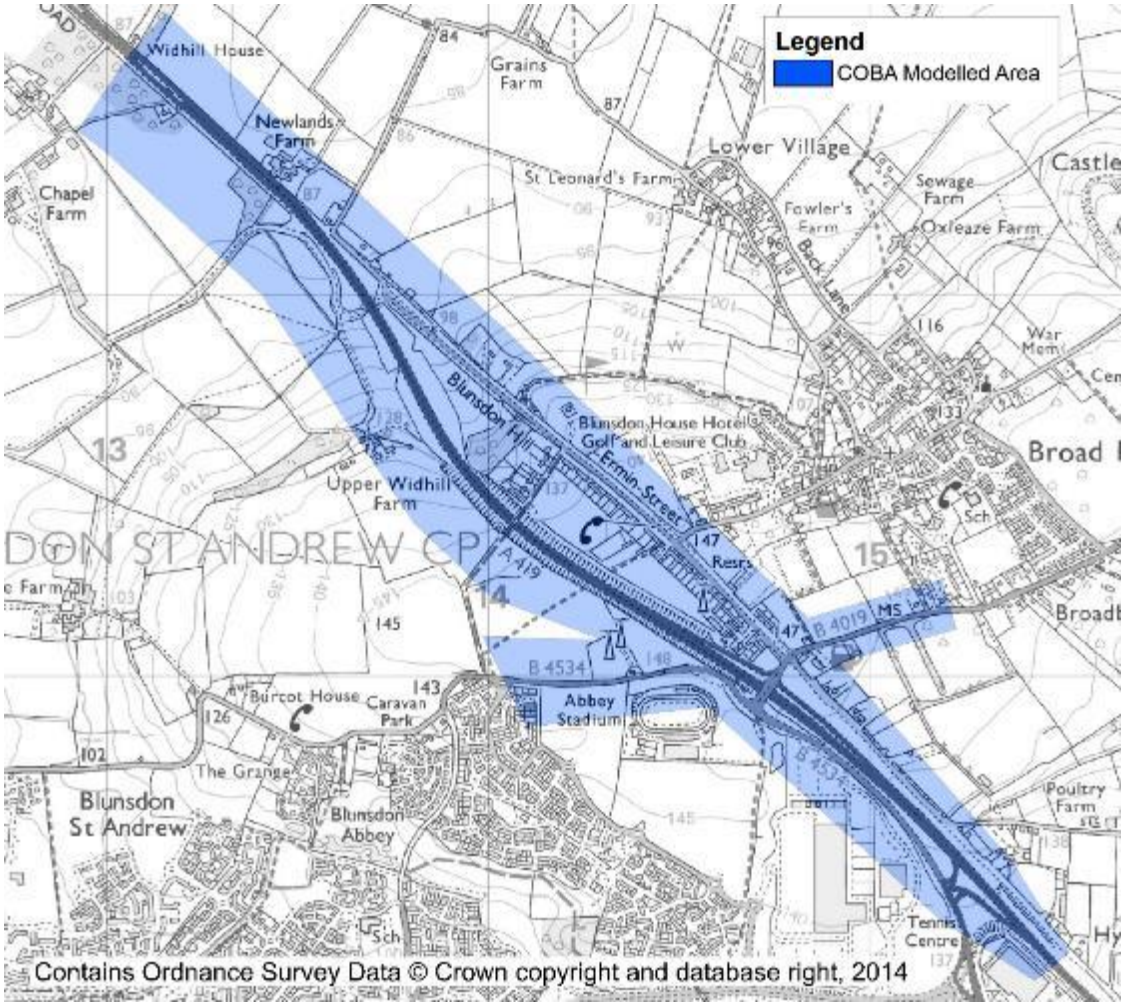
Data Sources

Forecast Data

3.4. For the purpose 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 changes in safety is evaluated in Chapter 4, as opposed to 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. The COBA area does not have a wide coverage, and represents the key links relating to the scheme.

Figure 3.1 COBA Modelled Area



Observed Data

3.6. Collision data has been obtained from Wiltshire Police covering the following time periods:

- Pre-scheme: 1st September 2001 – 31st August 2006
- Construction period: 1st September 2006 – 31st March 2009
- Post-opening: 1st April 2009 – 31st July 2014

3.7. All available data was requested, covering the area presented in Figure 3.1.

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, some of 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.

3.10. The A419 Blunsdon Bypass Stage 4b Road Safety Audit has also informed the analysis in this section, which analyses personal injury collision records along the bypass, identifies similar causes, and makes recommendations for remedial action.

Personal Injury Collisions

1.3 This section analyses the observed trends in PICs following the implementation of the scheme. This includes investigating the changes in the number of collisions and associated casualties as well as whether there has been a reduction in the relative severity of incidents.

Background Collision Reduction

1.4 It is widely recognised that, for over a decade, there has been a year-on-year reduction in the number of personal injury 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 wide ranging and include improved safety measures in vehicles and reduced numbers of younger drivers. This background trend needs to be taken into account when considering the changes in collision numbers in the scheme area in the before and after periods. If the scheme had not been built, collision numbers in the area are still likely to have been influenced by wider trends and fallen.

1.5 When comparing the numbers of collisions and casualties in this area before and after the scheme was built and associated net change with the scheme, the background reduction needs to be taken into account. The best way to do this is to assume that, if the scheme had not been built, the number of collisions on the roads in the study area here would have dropped at the same rate as they did nationally during the same time period[5]. This gives what is known as a counterfactual scenario. This is then compared for the counterfactual 'without scheme' scenario on a like-for-like basis with the observed post opening data which is the 'with scheme' scenario.

1.6 The difference between the numbers of collisions in these two scenarios can then be attributed to the scheme rather than the wider national trends. This result will inform the calculation of monetised safety benefits achieved by the scheme as discussed in the economy chapter of this report.

Evaluation of Safety Numbers

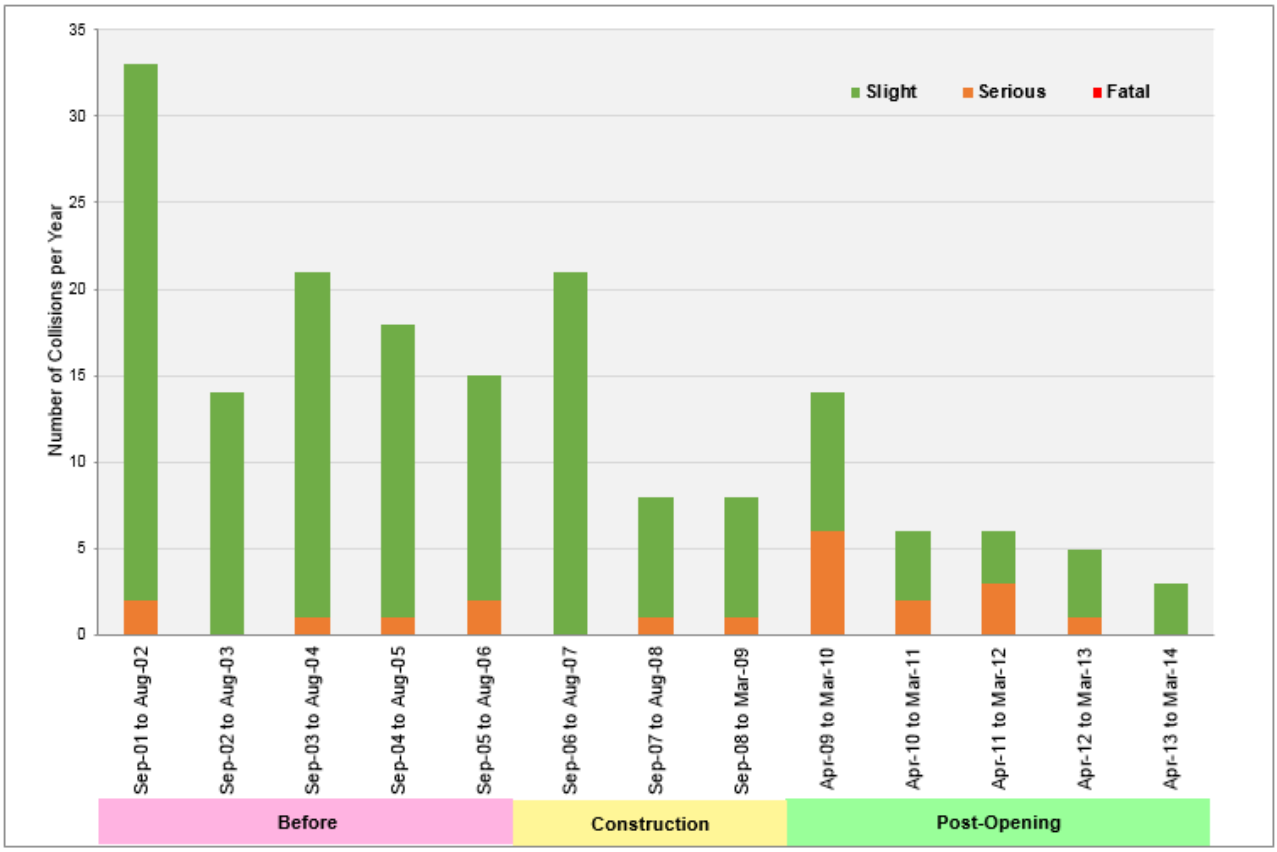
Table 3.1 Number of Collisions by Severity in the COBA Area

Period	Time Period		Number of Collisions				Annual Average			
	From	To	Fatal	Serious	Slight	Total	Fatal	Serious	Slight	Total
Before	Sept-01	Aug-02	0	2	31	33	0.0	1.2	19.0	20.2
	Sept-02	Aug-03	0	0	14	14				
	Sept-03	Aug-04	0	1	20	21				
	Sept-04	Aug-05	0	1	17	18				
	Sept-05	Aug-06	0	2	13	15				
	Without Scheme Counterfactual (adjusted for background reduction)*									15.0
Construction	Sept-06	Aug-07	0	0	21	21	0.0	0.7	11.7	12.3
	Sept-07	Aug-08	0	1	7	8				
	Sept-08	Mar-09	0	1	7	8				
FYA	Apr-09	Mar-10	0	6	8	14	0.0	2.4	4.4	6.8
	Apr-10	Mar-11	0	2	4	6				
	Apr-11	Mar-12	0	3	3	6				
	Apr-12	Mar-13	0	1	4	5				
	Apr-13	Mar-14	0	0	3	3				

***** Background factor in collision numbers for rural A roads 2004-2011 was 0.74.

[5] National trend data is sourced from DfT table RAS10002.

Figure 3.2 Number of collisions by severity on a year-by-year basis



3.11. The following conclusions can be made from Table 3.1 and Figure 3.2:

- The 'without scheme' counterfactual (accounting for the background reduction in collisions over time) is calculated as 15.0 collisions per year. Compared with the post-opening collision rate of 6.8 per year, this represents an annual collision saving of 8.2 collisions. This change is considered to be statistically significant and is likely to be a direct result of the scheme.
- There were no fatal collisions during the period analysed. The annual average number of serious collisions have increased by 1.2 PIC between the pre-scheme and post-scheme periods. However, the number of slight collisions have substantially reduced, by 77%.
- Overall, the average total number of collisions in the post-opening period is significantly lower than in the pre-scheme period.
- The highest rate of collisions post-scheme was in the first year of opening (April 2009 – March 2010) whereby there were 14 collisions, of which 6 were serious. This is compared to an overall annual average across the entire post-opening period of 6.8, of which 2.4 are serious. This may be a reflection of road users adjusting to the new road layout.

Evaluation of Collision Severity Index

3.12. The collision severity index is the ratio of numbers in the serious and fatal categories compared to the total number of collisions. A summary of the before and after opening collision severity indices by year for the COBA modelled area is shown in Table 3.2.

Table 3.2 Collision Severity Index for COBA Area

Period	Collision Severity Index
Pre-Scheme	6%
Construction	5%
Post-Opening	35%

3.13. While the overall number of collisions between pre-scheme and post-scheme have substantially decreased, the collision severity index for the COBA modelled area has increased post-opening, from 6% to 35%. This has been a result of the number of slight collisions falling by 77% (14.6 PICs), while the number of serious collisions have increased. The increase in serious collisions is likely to be a result of the higher speeds on the bypass compared to the previous route. It should, however, be noted that the increase in the number of serious collisions is low, and therefore it is too early to draw conclusions on this.

Table 3.3 Number of Casualties by Severity in the COBA Area

Period	Time Period		Number of Casualties				Average Annual Casualties (Total)	KSI
	From	To	Fatal	Serious	Slight	Total		
Before	Sept-01	Aug-02	0	2	46	48	31.8	5%
	Sept-02	Aug-03	0	0	23	23		
	Sept-03	Aug-04	0	1	34	35		
	Sept-04	Aug-05	0	2	26	28		
	Sept-05	Aug-06	0	3	22	25		
Without Scheme Counterfactual (adjusted for background reduction)*							20.7	-
Construction	Sept-06	Aug-07	0	0	26	26	17.0	4%
	Sept-07	Aug-08	0	1	11	12		
	Sept-08	Mar-09	0	1	12	13		
FYA	Apr-09	Mar-10	0	6	13	19	10.6	25%
	Apr-10	Mar-11	0	2	14	16		
	Apr-11	Mar-12	0	4	5	9		
	Apr-12	Mar-13	0	1	4	5		
	Apr-13	Mar-14	0	0	4	4		

* Background factor in casualty numbers for non-built up A roads in Great Britain 2004-2011 was 0.65.

3.14. The following conclusions can be made from Table 3.3:

- The without scheme counterfactual casualty rate (accounting for the background reduction in collisions over time) is calculated as 20.7 casualties per annum. Comparing this with the post-scheme collision rate, there has been a decrease of 10.1 casualties per annum.
- The proportion of KSIs have increased from 5% pre-scheme to 25% post-scheme. This reflects a small increase in serious casualties (0.7 annual average saving) alongside a large increase in slight casualties (23.5 annual average saving).

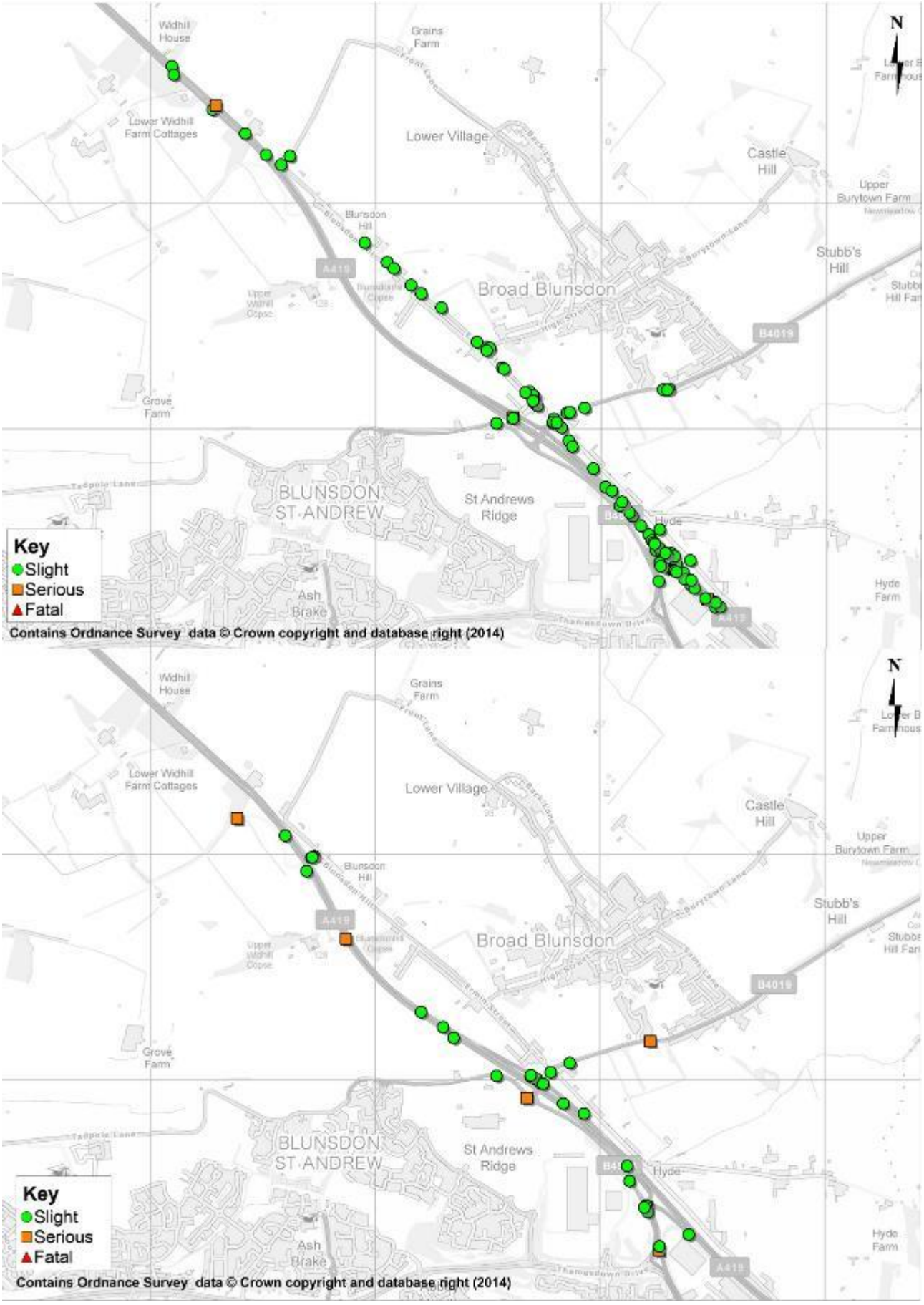
3.15. In order to determine whether the changes in collision numbers observed before and after the scheme opened are statistically significant, a Chi-Square test has been undertaken. This test uses the before and after numbers of collisions and traffic flows to establish whether the changes are significant or are likely to have occurred by chance.

3.16. The result found that the change in the number of collisions is not a result of chance alone and therefore there can be confidence that the scheme has had a direct impact on collision rates along the A419 scheme section.

Collision Locations

3.17. The locations of the collisions on the old A419 route alignment for the pre-scheme period and on the old route and new A30 alignment for the post-scheme period are shown in Figure 3.3.

Figure 3.3 Collision Locations on the A419 Five Years Before Construction (Top) and Five Years After Construction (Bottom)



3.18. Figure 3.3 shows that collisions on the old route have substantially reduced between pre-scheme and post-scheme periods. This is as would be expected due to the reduction in traffic flows by 98%, as well as the speed reduction on the route from 50mph to 30mph. However, post-scheme there was a small cluster of collisions on the old bypass at the underpass, including three incidents at a serious severity level. Examination of the records of collisions occurring at this location show that some at this location were due to road users following their sat nav which was not updated with the new road layout.

3.19. When comparing post-scheme collisions to pre-scheme collisions on the old route compared to the bypass, there was also a reduction. Having said this, the proportion of serious collisions on the bypass is higher. This may be linked to an increase in speeds on the bypass, whereby there has been an increase in speed limit from 50mph on the old route to 70mph on the bypass.

3.20. As shown by Figure 3.3, pre-scheme, there was a cluster of collisions at what was formerly Turnpike roundabout, and on the A419 approaches to the roundabout. Analysis of the collision data shows that these were largely shunt-type collisions, and predominately at a slight severity level. Post-scheme, the number of collisions on the updated Turnpike junction, and the A419 approaches to this junction have substantially reduced. However, there were three serious collisions on the slip roads to the west of the junction. These collisions did not appear to have a recurring collision causation but the increased complexity of the junction may have been related to the higher severity level here. The A419 Blunsdon Bypass Stage 4b Road Safety Audit notes that one collision occurred due to traffic signals not being operational for an extended period post-opening (in November 2012). It therefore suggested developing a simple temporary traffic management plan that could be implemented should the Turnpike signals be expected to be out of order for more than one day.

3.21. There was also a cluster of collisions at Lady Lane junction pre-scheme. This consisted of a large proportion of shunt collisions due to various reasons and circumstances. In the post-scheme period, there remains a cluster of collisions at this location. A number of collisions here post opening were related to vehicles failing to stop at the junction, and therefore colliding with the rear of the vehicle ahead. Regarding Lady Lane junction, the A419 Blunsdon Bypass Stage 4b Road Safety Audit notes that while the speed limit is 30mph, higher speeds are possible on the long slip road. It also highlights that the junction has an unusual layout with a double right turning lane from A419 south eastbound for major traffic flow heading across the bridge towards Swindon.

Road Safety Audit (RSA)

3.22. The Road Safety Audit Stage 4b (April 2013) found 34 personal injury collisions had occurred in the evaluation area based on 45 months of data. This was considered relatively low considering the length of roads under review as well as the volume of traffic. The review of data identified three potential locations where there could be common issues. These were as follows:

- Loss of control at the junction on the former A419 near Chapel Farm underpass.
- Shunts, failure to obey, and traffic signals inoperative at Turnpike traffic signals.
- Shunts and sideswipes at Lady Lane traffic signals and near the A419 south-eastbound slip.

3.23. The RSA report notes that there could be a possible treatable safety problem on the A419 southbound off-slip to Lady Lane traffic signals. It suggests remedial measures which could be considered for implementation for this section. The first suggestion is to add high visibility backing boards to existing ‘traffic signals ahead’ signs (and/ or 30mph signs) which may help to reduce speeds and improve driver concentration. The second aspect was a suggestion to provide lane guidance markings within the junction for right turning traffic from the slip road towards Swindon, which may address the lane-change collisions. No confirmation has been given to POPE as to whether these changes have been made.

Fatal Weighted Injuries

3.24. To analyse the severity of collisions we now present the Fatal Weighted Injuries (FWI) metric which is a combined measure of casualties based on the numbers of fatal, serious and slight casualties. The FWI for the five years before and five years after period are shown in Table 3.1. To take into account the increased traffic on the A419 and for comparison with other schemes, we also present the FWI rate per billion vehicle kilometres (bvkm).

Table 3.4 FWI on A419 Scheme Section

	FWI/collision	FWI/ year	FWI/bvkm
Before	0.023	0.46	8.2
After	0.051	0.34	6.0

3.25. Table 3.4 shows that the FWI/bvkm has reduced, indicating that the seriousness of collisions occurring on the route has decreased. However, the FWI/ collision metric has increased following scheme opening, indicating that the number of fatal and serious injuries has increased in proportion to the total number of collisions, as discussed in Paragraph 3.12.

Forecast versus Observed Collision Savings

3.26. The AST states that the removal of through traffic from Blunsdon and at Turnpike roundabout results in a reduction in collisions. It estimated that there would be a saving of 225 collisions over sixty years.

3.27. This section compares the number of observed collisions, with those predicted at the time of the appraisal. The predictions have been obtained from the COBA model for this scheme and cover the whole of the COBA modelled area. For the observed collisions, the ‘before’ figures are based on the annual average of five years data before the scheme construction started, whilst the ‘after’ figures are based on the annual average of 64 months of post opening data.

3.28. As discussed in Section 2.32, the low growth scenario has been used to compare with the observed (as traffic flows are more aligned), and may therefore be considered as a conservative estimate.

Table 3.5 Comparison of Forecast and Observed Collision Numbers

COBA Area Forecast (Low Growth Opening Year COBA results)	Do-Minimum (without scheme)	21.1
	Do-Something (with scheme)	18.5
	Saving	**2.6**
	% Change	**12%**
COBA Area FYA Annual Average Observed	Before Opening	20.2
	Without Scheme (counterfactual for same period)	15.0
	After Opening	6.8
	Saving	**8.2**
	% Change	**55%**

3.29. It can be seen from Table 3.5 that the collision saving in the opening year is substantially higher that predicted through the COBA forecast. Based on the comparison with the counterfactual value, there has been a saving of 55% of collisions, compared to a forecast of 12%.

3.30. While the before opening collision figure is relatively in line with the DM forecast, the counterfactual figure on which the observed saving has been based upon is below this level. This indicates that the scheme has had a substantially higher collision saving than was forecast.

3.31. It should be noted, however, that while there has been a substantial reduction in overall numbers, the proportion of serious collisions to slight has increased between pre-scheme and post-scheme (with no fatal collisions before or after scheme opening). This was discussed further in Section 3.12.

Collision Rates

3.32. The number of collisions along a length of road used together with the AADT for the same section can be used to calculate a collision rate, calculated as the number of collisions per million vehicle kilometres (PIC/mvkm). This allows comparisons to be made which take into account traffic growth. Table 3.6 compares the forecast and observed collision rate on links and junctions combined for the DM scenario and DS scenario. This covers the COBA modelled area, as shown in Figure 3.1. The observed rate for the DM is the without scheme counterfactual rate.

Table 3.6 Forecast versus Observed Collision Rates (PIC/mvkm) for the COBA Area

Annual Collisions		
COBA Default/ Forecast	Do-Minimum (without scheme)	0.203
	Do-Something (with scheme)	0.125
	Forecast Saving	**0.078**
Observed	Pre-scheme (counterfactual)	0.216
	Post-scheme	0.120
	Observed Saving	**0.096**

3.33. From Table 3.6 it can be seen that before scheme opening, the collision rate (adjusted for counterfactual) was slightly higher than anticipated (+0.013 PICs/mvkm), while post opening the collision rate is marginally lower than forecast (-0.005 PICs/mvkm). There has been an observed saving to the collision rate of 0.096 PIC/mvkm which is higher than the forecast of 0.078.

3.34. This provides further evidence that the scheme has achieved its objective to improve the safety of all road users of the A419 and roads through Blunsdon village and at Turnpike junction.

Personal Security

3.35. 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.

3.36. 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).

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

Forecast

3.38. The AST stated that in terms of security, there would be 'no adverse impact' and that the 'lighting and footpaths as part of the scheme enhance personal security for non-motorised users'. As such the scheme was forecast to have a 'slight beneficial' impact on security.

Observed

3.39. The lighting and footpaths included as part of the downgrading of the old A419, as shown through Figure 3.4, has enhanced personal security along part of this route, however, there are relatively few users benefiting from this. There are not any lay-bys or emergency phones included as part of the scheme and as such there is potential for increased risk of personal injury on the bypass should there be a breakdown or another need to stop. Nevertheless the scheme is too short to warrant new lay-bys or emergency phones and the position of the junctions would likely preclude their use. On balance, the AST prediction of 'slight beneficial' impact on personal security is therefore considered to be correct.

Figure 3.4 Footpath and Lighting on the former A419

Key Points – Safety

Personal Injury Collisions

- With the inclusion of the 'without scheme' counterfactual, there has been an annual average collision saving of 8.2 PICs across the COBA network between the pre-scheme and post-scheme period, representing a reduction of 55%.
- The collision severity index for the pre- and post-scheme opening periods has increased from 6% to 35%. This severity index has increased as a result of the number of slight collisions falling at a faster rate.
- Analysis of the statistical significance of the reduction in collision numbers shows that the reduction in collisions can be attributed to the scheme, rather than chance alone.
- The collision rate across the COBA network has reduced from 0.216 counterfactual PICs/mvkm before scheme opening, to 0.120 PICs/mvkm post-scheme.

Forecast vs. Observed Collision Savings

- At the appraisal stage, a saving of 2.2 collisions per year in the COBA area was forecast, representing an 11% decrease between the DM and DS low growth scenarios. However, observed data, including accounting for the background reduction in collisions (the without scheme counterfactual), indicates a collision saving of 8.2 collisions per year, which is a 55% decrease between the DM and DS scenarios.

Collision Locations

- The number of collisions on the old route have substantially reduced between pre-scheme and post-scheme period. This is as would be expected considering the reduction of traffic flows by 98% as well as the speed reduction on the route from 50mph to 30mph.
- While the number of collisions on the bypass post-scheme are lower than the number of collisions on the old route pre-scheme, the proportion of serious collisions on the bypass is higher. However, it should be noted that the increase in the number of serious collisions is low, and therefore it is too early to draw conclusions on this.
- Pre-scheme, there was a cluster of collisions at what was formerly Turnpike roundabout, and the A419 approaches to it. Post-scheme, with the updated layout at Turnpike junction, the collisions on the approaches have reduced substantially. Having said this, there was a higher proportion of serious collisions, located on the slip roads west of the junction.
- At both pre-scheme and post-scheme stages, there is a cluster of collisions at Lady Lane junction with the A419.

Personal Security

- The lighting and footpaths included as part of the downgrading of the old A419 has enhanced personal security, however, there are relatively few users benefiting from this. There are not any new lay-bys or emergency phones included as part of the scheme, but the short length of the scheme was not enough to warrant these and the junctions would likely preclude their use. Overall, scheme's impact on personal security is considered to be 'slight beneficial'.

4. Economy

Introduction

4.1. This chapter evaluates the costs and economic benefits of the A419 Blunsdon bypass scheme, based on a comparison of before and observed 'five years after' data, and compares this to the forecast economic impact. Outturn journey time and safety economic impacts are based upon the observed results reported in Chapters 2 and 3.

Sources

4.2. The economic evaluation is based on the following sources:

- A419 Blunsdon Bypass Published Scheme Traffic Modelling, Forecasting and Economic Appraisal Report (November 2004)
- Addendum of above report (August 2005)
- TUBA model (2005)
- COBA model (2005)
- QUADRO model (2005)
- Ministerial Approved Budget (August 2006)
- Appraisal Summary Table (AST) ()
- Outturn costs as of June 2010

4.3. The addendum document listed above included changes input assumptions from the appraisal document published in November 2004, including changing the opening year from 2009 to 2008, and including the A419 Commonhead Flyover Scheme within the Do-Minimum scenario. The report gives forecasts in 2002 prices and provides values for low and high growth scenarios.

4.4. In accordance with WebTAG, the appraisal of the scheme's Transport Economic Efficiency (TEE) was undertaken using TUBA Software (Transport User Benefit Appraisal).TUBA considers change in vehicle operating costs (VOCs) and vehicle hour savings. These elements are used to calculate monetised benefits to business users and consumers over a wide area network.

4.5. As TUBA software does not calculate collision benefits, these were calculated using the Department for Transport (DfT) COBA (Cost Benefit Analysis) program. COBA considers collision rates and costs which tend to change after infrastructure improvements. In addition to the COBA and TUBA modelling, QUADRO (Queues and Delays at Roadworks) software was used to assess the potential disbenefits due to construction and maintenance.

4.6. Figure 2.5 shows the study area, as outlined by the Traffic Modelling, Forecasting and Economic Appraisal Report.

4.7. All costs presented in this report are in 2002 prices discounted to 2002 unless noted otherwise.

4.8. It should be noted that while low growth and high growth forecasts have been provided for this scheme, it is the low growth forecasts which have been compared against the observed figures in this report. This is because as shown through the traffic impact analysis, in Chapter 2 (Paragraph 2.32), the observed traffic flows for which data has been available for are more in line with the low growth forecasts.

4.9. Table 4.1 includes a summary of the benefits which have been calculated as part of this post opening evaluation and those which have not been evaluated and have been assumed as forecast.

4.10. A green tick indicates that the element of benefits is considered as part of this evaluation. A red cross indicates that the forecast impact from the appraisal will be used in place of a full evaluation at this stage.

Table 4.1 Economic Impact of Scheme

Benefit Stream	Evaluation		
	£	Evaluate?	Reasons
Journey Times	118.1 million	✓	Represents a considerable proportion of the overall scheme benefits. Outturn journey time impacts in opening year can be calculated with relative ease.
Vehicle Operating Costs	-53.9 million	✓	Represents a considerable proportion of the overall scheme benefits, and therefore outturn costs have been calculated.
Safety	9.3 million	✓	Outturn safety impacts was found to be significant, and therefore has been monetised.
Construction Delay	-0.1 million	✗	Evaluation is outside of the realms of POPE, and therefore outturn is assumed as forecast.
Total	**73.4 million**		

Transport Economic Efficiency (TEE)

TUBA Forecast Benefit

4.11. The TUBA forecast for journey time benefits over the whole appraisal area for both consumers and business users was £118.1m for the low growth scenario and £151.6m for the high growth scenario. As shown through Chapter 2, the low growth scenario is considered to be most realistic forecast.

4.12. It should also be noted that this evaluated is based on a narrower area, and there may be benefits in the wider area which are only covered in the appraised model.

Monetised Journey Time Benefits

4.13. The journey time benefits for this scheme have been evaluated using a Project Appraisal Report (PAR) approach, which is typically adopted by Highways England for smaller schemes[6]. This evaluation is therefore subject to the following caveats and assumptions:

- This evaluation is based solely on savings for trunk road through traffic travelling in the route shown in Figure 2.6. Traffic post-opening on the old A419 route has been excluded due to the low numbers of traffic it experiences at FYA stage. It should also be noted that traffic on local roads joining the A419 are not included.
- Vehicle hour savings for the opening year are monetised to PAR5 values for 2009, assuming an average vehicle value of time of 1,286 pence per hour. Savings are then capitalised from a five year to sixty year assessment period using the National Road Traffic Forecast (NRTF) growth factor. The PAR method provides capitalisation factors which depend only on forecast rate whereas modelling tools used for the appraisal consider the complexity of how traffic growth would affect future traffic behaviour in detail. For this

[6] PAR Guidance Project Appraisal Report Guidance Notes Version 5.0.

scheme, the forecasts for benefits in future years is influenced by the timing and severity of forecast congestion with or without the scheme. This is not considered in the PAR methodology.

4.14. While the caveats are acknowledged above, it is considered that this is the most appropriate methodology given the data available.

4.15. The forecast and observed journey time saving and resulting monetary benefit are presented in Table 4.2.

Table 4.2 Annual Journey Time Saving and Sixty Year Monetary Benefit

PAR method for time saving benefits	
Annual vehicle time saved five years after opening (hours)	228,047
Average value of time in opening year (2002 values) (pence per hour)	1,286
60 year monetary benefit based on value of time (VOT) saving (2002 prices and values)	£117.0m

4.16. Table 4.2 shows that:

- Based on data collected five years after, there is an annual vehicle hour saving of 228,047.
- Re-forecast benefits are projected to total £117.0 million over a 60-year period (using NRTF traffic growth forecasts).

4.17. Compared to the forecast, of £118.1m, the 60 year benefit is therefore within 1% of the low growth forecast.

Vehicle Operating Costs (VOC)

4.18. WebTAG guidance states that the use of the road system by private cars and lorries gives rise to operating costs for the user[7]. These are fuel and non-fuel costs, where fuel is the majority net impact of conventional highways schemes. In the case of this scheme, the forecast changes in VOC are large and make up a considerable part of the overall forecast TEE benefits. For this reason, it has been necessary to evaluate the impact.

4.19. As with journey time benefits, the change in the VOC impact is forecast by TUBA, but this cannot be re-run to evaluate the impact. The alternative approach adopted here is based on using observed changes in traffic at FYA combined with guidance in webTAG and PAR to calculate a re-forecast sixty year impact. This approach consists of the following steps:

- Estimating changes in fuel consumption in the five year after on the A419 using observed data for flows and speeds by time period and based on VOC guidance on calculations given in webTAG[8].
- Monetising the value of change in litres of fuel in the opening year based on webTAG.
- Capitalising the FYA monetary impact to 60 years using the PAR approach for VOC.

4.20. This is based on the assumptions:

[7] WebTAG unit 3.5.6 (April 2011).
8 Function to calculate fuel consumption and fuel costs given in WebTAG unit 3.5.6 (April 2011), section 1.3.

- Fuel consumption is the majority of the VOC impact.
- Changes on the key links are indicative of the changes overall.

Table 4.3 Economic Evaluation of Vehicle Operating Costs (VOC)

	0% Growth	NRTF Growth
Vehicle Operating Costs (VOC)*	£9.7m	£12.4m

*Capitalised over 60 year appraisal period and discounted

4.21. The TUBA model forecast was that there would be large disbenefits to VOC for users arising from the scheme. The low growth VOC forecast was a disbenefit of £53.9m, while the high growth was a disbenefit of £60.3m. The model output from TUBA shows that 90% of the disbenefit arises from fuel costs and that this is primarily from large goods vehicles (OGV1 and OGV2).

4.22. In comparison, the re-forecast of the change to VOC shows a positive benefit, as shown in Table 4.3. This is due to a reduction in fuel consumption on the key links.

4.23. The reasons why TUBA produces such a large disbenefit under the situation as for this scheme this lie in the matrix-based approach. The Do-Minimum scenario on the trunk road in this scheme contains fast links interspersed with congested junctions resulting in a slow average speeds. Average speed results between origin-destinations in the Do-Minimum may thus be close to optimal for fuel efficiency. The Do-Something however removes the high traffic volumes using slow sections and TUBA translates the resulting average speed between origin and destination as less optimal fuel efficiency which is the basis of the assessment of significant disbenefit for fuel costs. In reality, when considered on a link-by-link basis, there should be a fuel cost benefit with the removal of the slow speed sections, which are very fuel inefficient compared with the bypass.

Evaluation of Safety Benefits

4.24. The evaluation of the outturn safety benefits is based on the forecast sixty year safety benefits, and the comparison between the forecast and observed saving of collisions in the five year after opening period. These are based on the impact for the study area as modelled in the original COBA (as shown in Figure 3.1). The outturn collision saving makes a comparison between the observed number of collisions post-opening with the counterfactual scenario based on observed numbers pre-construction. As this is the counterfactual, it means that the background reduction in traffic has been taken into account in the forecast.

Forecast Safety Benefits

4.25. The forecast safety monetary benefit of the scheme have been derived from the COBA model, with the findings being presented in the A419 Blunsdon Bypass Published Scheme Traffic Modelling, Forecasting and Economic Appraisal Report Addendum (2005).

4.26. The predicted monetary safety benefit of the scheme was £9.3m for the low growth scenario, and £12.2m for the high growth scenario. It was predicted that the collision savings would primarily occur due to the removal of through traffic from Blunsdon and at the former Turnpike roundabout.

Evaluation of Safety Benefits

4.27. POPE methodology for evaluating the economic value of benefits arising from safety improvements is based on comparing observed and forecast collision savings at the POPE evaluation stage (in this case, five years after), combined with the assumption that the

observed safety impact at this stage can be taken as indicative of that over the whole sixty year appraisal period.

4.28. The evaluation of the safety benefits is shown in Table 4.4. The methodology for calculating benefits is based on the presumption that the forecast ratio of the number of collisions saved in the first five years to the forecast sixty year monetary benefit can be used to generate a reforecast economic benefit based on the observed saving in collisions as reported in the previous chapter.

Table 4.4 Economic Evaluation of Safety Benefits

Costs in £m 2002 market prices, discounted	Forecast		Outturn
COBA forecast opening year saving– low growth	2.6	Observed annual average saving in first 5 years	8.2
		Net difference from forecast	5.6
Monetary benefit (from EAR)	£9.3m	PAR based monetisation of net difference	£21.1m
		Total safety PVB	£30.4m

4.29. The evaluation of the safety benefits at five year after stage shows a benefit of £30.4m, which is significantly higher than predicted.

Construction Delay

4.30. The DfT's Queues and Delays at Roadworks (QUADRO) programme was used to estimate the impact of the proposed scheme on road users in terms of journey times, operating costs and collisions, due to construction road works.

Table 4.5 Forecast Disbenefits Due to Road Works

	Low Growth	High Growth
Disbenefits Due to Road Works	£0.121	£0.127m

Note: 2002 prices, discounted to 2002

4.31. It is not possible to undertake an evaluation of the monetary impact of construction and future maintenance as this would have required traffic surveys to have been undertaken during periods of roadworks and is outside the scope of POPE. It has therefore been assumed that the construction and future maintenance traffic delays are in line with that forecast, and this has been included in the calculation of the scheme's Present Value Costs (PVC).

Present Value Benefits

4.32. Cost benefit analysis of a major scheme requires the costs to be considered for the whole of the appraisal period. The costs also 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.

4.33. A comparison of all forecast and outturn benefits is presented in Table 4.6.

Table 4.6 Summary of Scheme Present Value Benefits

Benefit	Forecast	Re-Forecast based on FYA Outturn Impacts
Travel Time Benefits	£118.1m	£117.0m
Vehicle Operating Costs (VOC)	- £53.9m	£12.4m
Safety Benefits	£9.3m	£30.4m
Construction Delay	- £0.1m	- £0.1m
Total PVB	**£73.3m**	**£159.7m**

4.34. Table 4.6 shows that the re-forecast figures for travel time benefits was relatively in line with that forecast. However, vehicle operating costs have shown a benefit as opposed to the disbenefit that was forecast. Due to the higher number of collison savings, the safety benefits are considerably higher than the forecast. With these aspects in mind, the total PVB is substantially higher than forecast.

Scheme Costs

Investment Costs

4.35. This section compares the forecast cost of the scheme with the outturn cost. Scheme costs include the cost to Highways England of constructing the scheme and purchasing the land. The forecast cost has been derived from the MP scheme cost summary form dated 24th August 2006 which gave costs in Quarter 1 of 2005. To facilitate comparison with the outturn cost and other schemes, the cost has been converted to 2002 prices.

4.36. The outturn spend profile for the scheme was obtained from the Highways England Regional Finance Manager for the purpose of this study.

Comparison between the forecast and outturn is presented in Table 7.1.

Table 4.7 Summary of Investment Costs (2002 prices, undiscounted)

Cost Type	Forecast	Outturn	Difference
Total Cost	£51.5m	£55.7m	£4.2m

4.37. Outturn costs are higher than forecast (by 8%). This figure represents the cost of the scheme to the Highways England, with the wider cost of the scheme is discussed in the following sub-sections.

Indirect Taxation

4.38. 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.

4.39. The methodology adopted to evaluate the indirect tax impact of the A419 Blunsdon 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. Low growth figures have been used in the calculation outlined.

4.40. Table 4.8 presents a summary of the indirect taxation impact as forecast at the appraisal stage and re-forecast using five years of observed data.

Table 4.8 Summary of Indirect Taxation Impact

£m 2002 prices and values	Forecast (low growth)	Outturn Reforecast
Indirect tax impact on public accounts*	-£37.7m	£8.7m

*Negative values represent increased tax revenue

4.41. The evaluation of indirect tax shows that the reduced fuel consumption (as shown in the VOC assessment) means less tax which increases the cost of the scheme to public accounts over a 60 year period.

Total Present Value Costs

4.42. Table 4.9 presents the costs expressed in terms of present value, including the impact to the Treasury in the changes in indirect taxation, as was done at the appraisal stage. It should be noted that the most recent guidance on indirect taxation is to now include indirect taxation as a benefit. This is taken into account in Table 4.10.

Table 4.9 Summary of Scheme Present Value Costs

Benefit	Forecast	Re-Forecast based on FYA Outturn Impacts
Scheme Costs	£53.0m	£56.8m
Indirect Taxation to public accounts	-£37.7m	£8.7m
Total PVC	**£15.3m**	**£65.5m**

4.43. Table 4.9 shows that the post opening PVC is much higher than forecast. This reflects the change in indirect tax revenue from reducing the cost of the scheme, to increasing it for public accounts.

Benefit Cost Ratio

4.44. 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.

4.45. 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.

4.46. Table 4.10 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.

4.47. 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.

4.48. Table 4.10 shows the BCR calculation the A419 Blunsdon bypass scheme.

Table 4.10 Forecast vs. Outturn Re-forecast Benefit Cost Ratio

		COBA Forecast	Re-Forecast based on FYA Outturn Impacts
Indirect Tax as a Cost	PVB	£73.3m	£159.7m
	PVC	£15.3m	£65.5m
	BCR	**4.8**	**2.4**
Indirect Tax as a Benefit	PVB	£111.0m	£151.0m
	PVC	£53.0m	£56.8m
	BCR	**2.1**	**2.7**

Note: 2002 prices discounted to 2002.

4.49. As indirect tax was forecast to increase, but in fact showed a decrease in the re-forecast, it makes a substantial impact to the BCR if it is classed as a benefit or a cost.

4.50. From Table 4.10, it can be seen that:

- The outturn BCR assessments are over both over 2 representing over £2 of benefits for every £1 spend which is considered as high value for money according to the DfT criteria.
- Whether the indirect impact is part of the costs or benefits, the BCR shows that the scheme is value for money although, as the indirect impact is beneficial to the Treasury, the BCR is higher when this is part of the benefits rather than the benefits.

4.51. It should be noted that the BCR ignores non-monetised impacts. Following the guidance current at the time of appraisal, the impacts on wider objectives such as environmental, accessibility and integration must be assessed, although they are not monetised. These wider objectives are covered in the following chapters.

Wider Economic Impacts

4.52. 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 A419 Blunsdon bypass may have assisted local and regional socio-economic aspirations.

Forecast

4.53. Regarding wider economic impacts, the AST forecast stated that the scheme would have a neutral impact, as there are no issues relating to designated regeneration areas.

Evaluation

4.54. One of the key challenges noted by the Swindon Local Transport Plan (LTP) 3 (2011-2026) is:

'Optimising the operation of key strategic transport corridors and the local road network to allow the efficient and reliable movement of people and goods, which are vital for the economic prosperity of the area'

4.55. The Swindon Core Strategy and Management Policies (2009) document states that the level of growth the Borough is expected to deliver will require significant investment in transport infrastructure, through the delivery of improvements. It also states that improvements will ensure the strategic highway network does not become compromised by Swindon's growth.

4.56. The Wiltshire and Swindon Structure Plan 2016 (adopted 2006) identifies the A419 Blunsdon bypass scheme as being needed in order to resolve congestion and collision issues and to enhance the strategic network to support other polices in the structure plan and the LTP.

4.57. In terms of regional strategy, the 'Developing the Regional Transport Strategy in the South West' document identifies that in Swindon significant levels of growth will mean increased investment, and that this is needed to support the expansion of Swindon. It is also identified that at Swindon there is congestion at key motorway junctions and that bus services are increasingly affected by traffic congestion.

Summary of Wider Economic Impacts

4.58. The A419 route is strategically important in Swindon and Wiltshire, as recognised by local plans and policies. The scheme section considered in this report had problems of traffic congestion and delays, particularly at the Turnpike Roundabout and at the junction with Lady Lane. Evidence in this report has shown that journey times along the scheme section of the A419 have reduced substantially, particularly in the peak periods (Table 2.4).

4.59. Taking into account the importance placed upon efficient transport connections in the LTP, Core Strategy, Structure Plan and Regional Transport Strategy, and the findings in this report, it can be concluded that the opening of the upgraded A419 scheme section will have assisted in improving the wider transport network in Swindon and has therefore assisted the economic priorities at a local and regional scale. Therefore, it is considered that the scheme has had a slight beneficial impact on the wider economy.

Key Points – Economy

Present Value Benefits

- The outturn journey time benefits from the scheme are £117.0 million, which is within 1% of the low growth forecast.
- One of the scheme objectives was to improve the safety of the A419. The COBA forecast a 2.6 collision saving, producing a monetary benefit of £9.3 million. The observed collision saving was substantially higher than anticipated, at a saving of 8.2 per annum, resulting in a collision saving of £30.4m.
- The vehicle operating costs re-forecast was a positive benefit of £12.4m, which contrasts with the forecast undertaken at the appraisal stage, which was a disbenefit of £53.9m.

Costs

- The outturn investment cost was £55.7 million, which is 8% higher than forecast.

Benefit Cost Ratio

- The outturn BCR assessments are over 2 representing over £2 of benefits for every £1 spend which is considered as high value for money.
- The overall outturn BCR is 2.7 when indirect tax revenues are included in the benefits.

Wider Economic Benefits

- The A419 Blunsdon bypass is strategically important in Swindon and Wiltshire. As journey times have improved, it is considered that the upgraded scheme section will have assisted in improving the wider transport network in Swindon, and assisted economic priorities at a local and regional scale.

5. Environment

The scheme specific environmental objectives, as set out in the task orders with the HA (as the objectives are not provided in the ES) were:

- Minimise noise and visual impacts on property in Blunsdon; and
- Remove severance through Blunsdon Village and encourage walking, cycling and equestrians.

5.1. The Environmental Statement (ES, March 2005) stated that the A419 trunk road was a strategic route linking the M4 and M5 motorways, and linked Swindon to the trunk and motorway network. Traffic congestion occurred at Turnpike Roundabout and at the junction with Lady Lane with long delays, particularly at peak times, causing driver frustration and traffic collisions. The A419 in Blunsdon was difficult to cross for pedestrians, cyclists, equestrians and vehicles. The quality of the environment near the trunk road was poor due to high volumes of vehicles, high noise levels and associated uses of facilities at Turnpike.

Introduction

5.2. This section documents the evaluation of the environmental sub-objectives, focussing on those aspects not fully evaluated at the One Year After (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 Five Year After (FYA) stage to confirm the longer term impacts of the scheme on the surrounding environment, these are summarised as follows:

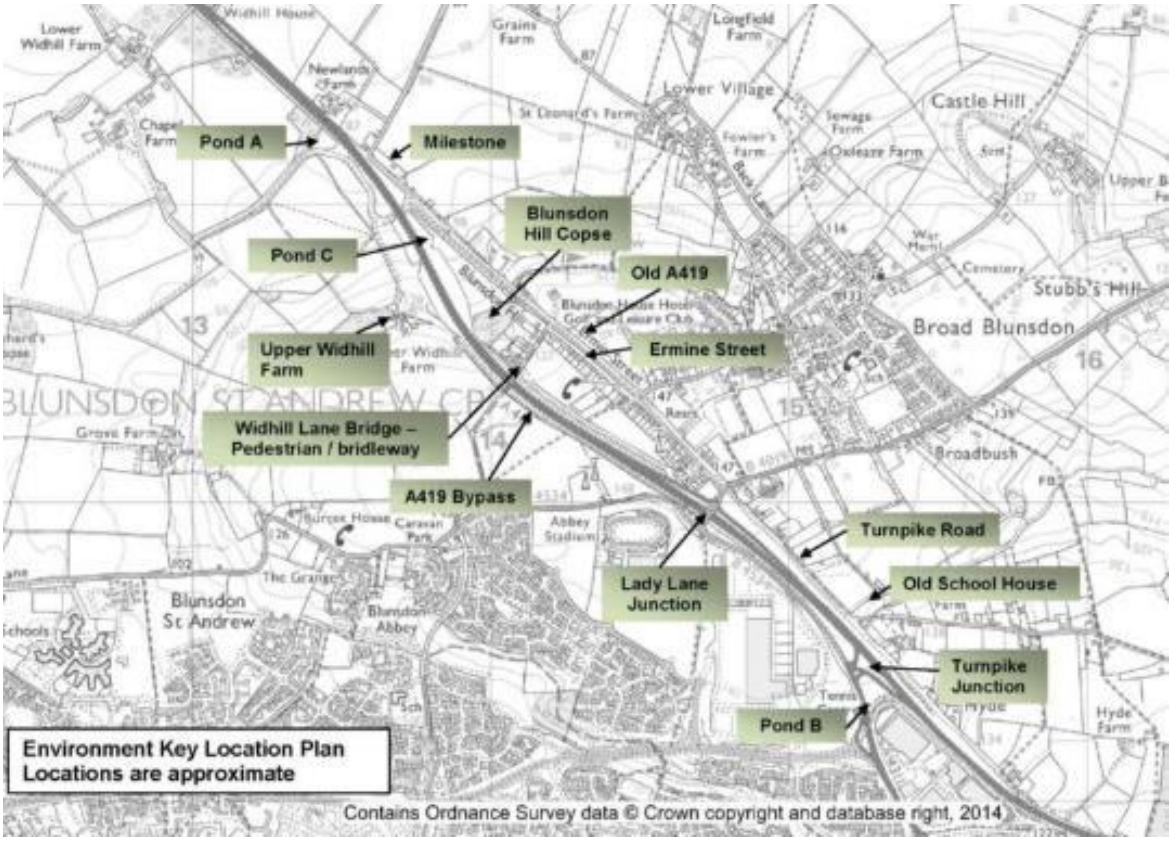
Landscape – No Handover Environmental Management Plan (HEMP) was made available at OYA for the evaluation of landscape management; it was expected that a HEMP would be provided to POPE to assist with the FYA evaluation. It was noted that it was too soon to evaluate the establishment of new planting and seeding which should be reviewed as part of the FYA report. The OYA report further noted that not all landscape planting had been implemented which would require confirmation at FYA. .

Biodiversity -Animal mortality data had not been provided and should be requested again at the FYA stage**.** No survey or monitoring information had been provided to POPE at OYA and it was therefore not possible to evaluate the effectiveness of the mitigation measures, which should be considered in more detail at FYA

Water Quality - It was suggested that water was reconsidered at FYA by which time any localised flooding and surface water drainage issues might have been resolved.

5.3. A key location plan is provided below which serves to identify locations of sites mentioned within this chapter (Figure 5.1).

Figure 5.1 – Key Location Plan – Scheme locations referenced in Environment Chapter



5.4. The following environmental sub-objectives were appraised in the ES and in the Appraisal Assessment Table (AST) according to NATA guidance at that time (2008):

- Noise;
- Local Air Quality;
- Greenhouse Gases;
- Heritage;
- Landscape & Townscape;
- Biodiversity;
- Water Environment;
- Physical fitness; and
- 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 ongoing 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; and
- 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 (with the exception of selected traffic surveys) has been undertaken for this FYA environmental evaluation.

Data Collection

5.9. The following documents have been used in the compilation of this section of the report:

- Appraisal Summary Table (AST), 2005;
- A419 Blunsdon Bypass Environmental Statement, March 2005: Volume 1 – main text; Volume 2 – technical appendices; Volume 3 – figures; Non-Technical Summary;
- ES addendum (August 2005);
- Brett, M. and McSloy, E.R. 2011 'Prehistoric Pits and Roman Enclosures on the A419 Blunsdon Bypass, Blunsdon St Andrew: Excavations 2006–7', Wiltshire Archaeological Natural History Magazine 104, 95-114;
- Project Environmental Management Plan, unknown date;
- Handover Environmental Management Plan – September 2014;
- Surface Water Maintenance Manual;
- As Built drawings for drainage, fencing and acoustic barriers, lighting, environment, 2009 and 2010; and
- Highways England task order.

5.10. A full list of the background information requested and received to help with the compilation of this chapter of the report is included in ***Table B.1*** in ***Appendix A.***

Site Visit

5.11. As part of the FYA evaluation, a site visit was undertaken in August 2014. This included the taking of photographs to provide comparison views with selected ES photomontages and OYA photographs. These are shown in ***Appendix A***.

Consultation

5.12. Three statutory environmental organisations (Natural England, English Heritage and the Environment Agency), Swindon Borough Council, Wiltshire County Council and the Blunsdon St Andrews Parish Council were contacted as part of the FYA evaluation regarding their views on the impacts they perceive the road has had on the environment as shown in ***Table 5.1***.

Table 5.1 – Summary of Environmental Consultation Responses

Organisation	Field of Interest	OYA Comments	FYA Comments
Swindon Borough Council	General	Responses received on air quality, noise, landscape, rights of way and heritage impacts. Impacts are generally as or better than expected.	Response on landscape, noise and air quality received and included within this chapter.
Wiltshire County Council	General	Response received for heritage impacts only. These impacts are generally as expected.	No response to consultation received at FYA
Environment Agency	Water	No pollution or flooding incidents have been recorded in the area.	No response to consultation received at FYA
Natural England	Landscape and Ecology	Declined to comment due to inadequate pre-construction knowledge of the scheme.	No response to consultation received at FYA
English Heritage	Heritage	Impacts to schedules monuments and high-graded listed buildings were as expected – no impacts realised.	No response to consultation received at FYA
Blunsdon St Andrews Parish Council	General	Response received to all environmental queries. Of particular note are; • Overall, the scheme can be considered a success; • Worse than expected impacts on the water environment; • Inadequate seeding/planting on earthworks; • Improvements of noise and emissions on Blunsdon Hill and deteriorations elsewhere.	Response received at FYA – issues and comments raised are included within the various sub-objectives in this chapter.

5.13. At OYA, the DBFO (Design Build Finance and Operate) was asked to provide animal mortality figures but none were provided at the time to POPE. The DBFO contractor has been consulted at FYA with regard to animal mortality figures which have been made available. These figures are discussed in the biodiversity section of this chapter.

Traffic Forecast Evaluation

5.14. 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 Post-Opening Project Evaluation (POPE) and an assumption is made that the level of traffic and the level of traffic noise and local air quality are related.

5.15. The baseline and forecast opening years for the scheme are as follows:

- Base Year – 2003

- Opening Year – 2009

5.16. The traffic forecasts from the addendum to the Traffic Modelling, Forecasting and Economic Appraisal Report (November 2004) and Addendum (2005) and the observed flows are summarised in Table 5.2, Table 5.3 and Table 5.4.

Table 5.2 –Traffic: Opening year Forecasts and Observed

Link Description	Observed traffic (AADT) before scheme	Predicted 2014 AADT (high growth)	FYA Observed with bypass 2014 AADT	Percentage Difference (predicted vs. observed with scheme)
Lady Lane	5,610	5,630	5,120	- 9 %
Old A419	48,560	-	1,080	-
A419 bypass	N/A	46,800	44,360	- 5%

Table 5.3 –Traffic: Opening Year Forecasts and Observed HDVs

Link Description	Observed HDVs (AADT) before scheme	Predicted 2009 HDVs (AADT)	Observed HDVs (AADT) with bypass 2014	Difference (predicted vs. observed with scheme)	Percentage Difference (predicted vs. observed with scheme)
Old A419	6,726	136	34	102	- 75%
A419 bypass	N/A	6,425	6,299	126	- 2%

Table 5.4 –Traffic: Opening Year Forecasts and Observed Average Speeds

Link Description	Observed speed of traffic (AADT) before scheme	Predicted 2009 Speed of traffic (AADT)	Observed Speed of traffic (ADT) after scheme 2014	Difference (predicted vs. observed)
Existing A419	70.4 kph	62.4 kph	58.7 kph	- 3.7 kph
Bypass	N/A	94.4 kph	104.9 kph	- 10.5 kph

Five Years After Assessment

5.17. 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

Forecast

AST

5.18. The AST stated that there would be an overall improvement due to the scheme. There would be substantial reductions in noise at 20 properties close to the existing A419 and a substantial increase in noise at 1 property on Widhill Lane and another in Lady Lane. The AST also

reported that mitigation was designed to reduce noise impacts where practicable and effective. With the scheme, the AST predicted that **83 fewer** properties would be annoyed than without.

Environmental Statement

5.19. The ES stated that the following noise mitigation measures would be included in the scheme design:

- Low noise surfacing across the length of the scheme (however this would also be implemented on the existing A419 by Design Year with the Do-Minimum scenario);
- Installation of noise barriers and bunds near properties close to the bypass (notably at Lady Lane, Widhill Lane, Ermin Street and between Turnpike Road and the new alignment); and
- 2 properties could potentially be eligible for noise insulation.

5.20. Most properties to benefit from a reduction in noise faced onto the existing A419. Of almost 1850 properties assessed in the ES over 400 would experience at least a perceptible 1dB decrease in noise between 2009 without the scheme, and 2024 with the scheme. Of these, 32 would benefit from slight (3dB to 5dB) decreases, 18 would benefit from moderate (5bB to 10dB) decreases and 19 would experience substantial decreases of >10dB in noise.

5.21. 670 properties would experience a perceptible increase in noise, of which 1 property would experience a slight increase, 8 properties would experience a moderate increase and 2 properties would experience a substantial increase in noise.

5.22. Of the properties that would receive increases in noise, 18 would also receive substantial decreases in noise on the opposite façade due to the shifting of traffic from in front of the properties, to the rear, with the scheme.

OYA conclusions

5.23. The OYA report stated that traffic had reduced significantly (by 93%) on the existing A419 due to the scheme, and this was seen as a major success by the parish council, significantly reducing noise at a number of receptors. However, there was 37% more traffic overall and 35% more HDVs on the existing A419 than predicted and so it was likely that the noise benefits were not as large as expected.

5.24. Observed average speeds were within 10kph of those predicted along the bypass and existing A419, meaning that there were unlikely to be differences in the noise climate due to vehicle speeds, and the observed traffic and HDVs on the bypass were roughly as predicted.

5.25. The OYA report noted that at Lady Lane, observed traffic was 27.5% more than predicted, due to rat-running by road users wishing to avoid queuing at the bypass junction with Cricklade Road. It was therefore stated that it was likely that noise impacts were worse than expected here.

5.26. It was confirmed that low noise surfacing had been used throughout the scheme. It was understood that no post opening noise surveys had been undertaken.

Mitigation

5.27. The OYA report confirmed that environmental barriers for noise mitigation had been incorporated into the scheme at the locations identified in the ES. The three areas with mitigation were noted to be between the bypass and the old A419 separating the bypass from properties. These key areas were:

- Along Turnpike Road (bund and acoustic fence);
- At properties near the Lady Lane Junction; and
- At Ermin Street and Widhill Lane properties.

5.28. At the Lady Lane Junction, acoustic fencing had been installed at the top of a cutting, as expected to shield properties from noise generated from the bypass (see *Figure 5.5*). The property shown in the FYA view had been moved closer to the traffic due to the scheme and

was identified by the ES and AST as being one of the two properties which would experience a substantial increase in noise due to the scheme.

5.29. A length of 1.8m high fencing had been installed at the top of the bypass cutting, as expected, at the end of Widhill Lane and behind properties on Ermin Street (see FYA view - Figure 5.3).

FYA Consultation

5.30. The Swindon Borough Council (SBC) stated that although they have no empirical data on noise it is confirmed that as the source of noise has been relocated further away from receptors the effect will be positive. As a 'line' source; a doubling of distance between source and receptor will, generally, effect a 3dB reduction in a weighted noise at the receptor. With regard to the scheme, the source has been moved some distance further away from most receptors, and has also been placed in a cutting and behind noise barriers; all of which will be positive for noise. These positive effects will be offset somewhat by the increased traffic speeds and the potential for the carriageway to carry more traffic, but the council would expect the changes to be nett positive. For some dwellings; the source has been moved closer, and so noise may have been increased but the net effect of the changes are certainly positive. SBC notes however that additional screening seems to have been provided to mitigate this.

5.31. The SBC state that as they have had cause to inspect some 'screening' barriers it is noted that they appear substantial and well constructed and are presumed to be working as intended

5.32. Blunsdon St Andrew Parish Council (BSAPC) state that they feel that traffic noise has increased along Turnpike Road (southern end in particular) and Lower Village due to the constant increased traffic speeds on the A419 bypass following the removal of the Turnpike Roundabout which necessitated slower speeds and queuing. They feel that additional noise barriers are required in these locations.

FYA Evaluation

5.33. Further to Blunsdon St Andrew Parish Council comment stating that they felt that traffic noise had increased along the southern end of Turnpike Road, it is confirmed in the ES Environmental Design Drawing (south) figure 5.0b that there were no proposals for acoustic barriers along the southern end of Turnpike Road based on noise modelling which is presumed to be correct.. Figure ***5.2*** is an extract of this drawing with red mark-ups showing the installed mitigation including acoustic barrier and earth bund for screening and noise attenuation.

5.34. In the ES, within the section on the justification for the scheme, it states that traffic congestion occurred at the Turnpike Roundabout and at the junction with Lady Lane with resultant long delays, particularly at peak times, causing driver frustration and traffic collisions.

5.35. The ES also states in the Noise and Vibration section that during the operation phase of the scheme, the realignment of the A419 would bring the main carriageway closer to some of the properties on Turnpike Road and the speed of the through traffic would increase, resulting in an increase in total noise levels. The ES stated that the increase in speed and traffic would be offset by the use of a quiet road surface. The ES notes that there would be an increase in traffic along Turnpike Road for properties north east of Kingsdown Lane due to it being a no through road pre-scheme which would be opened to provide access to Kingsdown Lane as a part of the scheme. The ES further states that "for properties further along Turnpike Road there would be no change in noise (Receiver ID 108) where the route of the proposed bypass is similar to the existing A419. Properties which are south of the existing Turnpike Junction would receive a perceptible decrease in noise levels due to the resurfacing of the carriageway (Receiver ID's 243, 244 and 247)." Based on this, it is confirmed that change in speed was taken into account on the basis of the information in the traffic model available at the time.

Figure 5.2 – Environmental Design Drawing (south) figure 5.0b with annotations showing installed features and the original location of Turnpike Roundabout

5.36. The BSAPC noted that they felt that noise had increased for residents along Widhill Lane due to the limited vegetation removal on the edge of Blunsdon Hill Copse, necessitated as a part of the scheme. In response, it should be noted that vegetation alone does not provide noise attenuation, but rather the exposure of the visual element of the road allows for the perception of increased noise. It is confirmed that mitigation as required in the ES has been installed and is presumed to be providing noise attenuation as required. The ES states that the scheme noise mitigation measures would reduce the noise levels by approximately 5dB at properties close to the bypass on Lady Lane. The bund along the top of the cutting between Lady Lane and Widhill Lane would provide between 2 and 3dB of screening for the properties on Ermin Street. The barrier on the bund north west of Widhill Lane would provide a reduction of 5dB for The Beeches, on Widhill Lane. These comparisons were made with the situation if the barriers were not built.

Figure 5.3 – View taken from Widhill Lane looking north towards Blunsdon Hill Copse

5.37. The OYA report stated that there was 37% more traffic overall on the old A419 than predicted and so it was likely that the noise benefits were not as large as expected. At FYA it is noted that daily traffic numbers have decreased from 3,512 to 1,080. This result indicates that noise through Blunsdon is likely to be **better than expected**.

5.38. The OYA report noted that at Lady Lane, observed traffic was 27.5% more than predicted. At FYA flows on Lady Lane are 10% less than predicted with the reduction between OYA and FYA flows amounting to around 1,400 vehicles per day. This reduction amounts to an assessment of **as expected** at FYA for noise.

5.39. Predicted traffic flows for the bypass at FYA are 5% less than predicted which translates to an **as expected** assessment.

5.40. It was confirmed that low noise surfacing had been used throughout the scheme although no information had been made available to POPE regarding the RSI value (Road Surface Influence). It was understood that no post opening noise surveys had been undertaken.

5.41. As discussed at OYA, acoustic barriers and earthworks were constructed alongside the southbound carriageway in order that the local residents on Ermin Street/ Turnpike Road would experience no significant noise increases as a result of the scheme. Similarly, acoustic fences were constructed to reduce noise levels received at properties north of the Lady Lane junction (southbound exit).

Figure 5.4 – Environmental barrier between the A419 and Turnpike Road

Figure 5.5 – 1.9m high environmental barrier at properties near Lady Lane Junction.

5.42. The Handover Environmental Management Plan (HEMP) confirms that the environmental barriers installed as a part of the scheme are designed to have a serviceable life of 40 years with minimal maintenance, other than cleaning or repair of damage, for at least 20 years. The HEMP notes that no maintenance operations had been undertaken during the 5 year landscape maintenance period.

Figure 5.6 – Environmental barrier near Lady Lane Overbridge (view looking north across the bypass)

Sub-Objective	AST	FYA
Noise	Population annoyed Do Minimum 654 Population annoyed Do Something 569	As expected

Local Air Quality

Forecast

AST

5.43. The AST stated that no Air Quality Management Areas (AQMAs) would be affected by the scheme and that there would be no exceedances of EU limit values. There would be a slight increase in particulate matter (PM_{10}), but this would be well below EU limit values. 207 properties were predicted to experience an improvement in air quality, and 140 a deterioration.

Environmental Statement

5.44. The ES predicted that there would be an improvement in air quality near to the existing A419 in Blunsdon and a slight deterioration at the few properties close to the bypass. Air quality objectives would be achieved both with and without the scheme and there would be both slight beneficial and slight adverse impacts due to the scheme.

OYA conclusions

5.45. The OYA report stated that traffic had reduced significantly (by 93%) on the old A419 due to the scheme and it was noted that air quality was likely to have improved in its vicinity. The report did note, however, there was 37% more traffic overall on the old A419 than predicted and so it was likely that the air quality improvements were not as large as expected.

5.46. Observed average speeds were within 10kph of those predicted along the bypass and existing A419, meaning that there were unlikely to be differences in air quality due to vehicle speeds. Observed traffic was roughly as predicted on the bypass, but there were 486 fewer HDVs, daily, on the bypass than predicted, meaning air quality was likely to be better than expected within the vicinity of the bypass.

5.47. At Lady Lane observed traffic was 27.5% more than predicted and it was therefore likely that air quality was worse than expected along Lady Lane. Concentrations at a typical property near this link were therefore calculated following the DMRB method using observed traffic data. The annual mean NO_2 concentration was calculated to be 18.4 µg/m³ which was below the AQS objective and EU Limit Value of 40 µg/m³.

Consultation

5.48. The Swindon Borough Council stated although they had no empirical data on the topic, they can say with certainty that the relocation of the carriageway further away from receptors, both horizontally and vertically, will have had positive benefits.

5.49. The Blunsdon St Andrew Parish Council (BSAPC) notes that it is felt that Air quality has been improved for residents on Ermin Street, however, prevailing winds can increase air pollution on Widhill Lane. The council also notes that there have been reports of an increase in noticeable particulate matter on cars, conservatories, windows etc.

Evaluation

5.50. The traffic flows provided in **Table 5.2** show that along the bypass observed flows are lower than those predicted. Hence although properties near the bypass will still experience an increase in pollutant concentrations, the increase may not be as large as expected. Along the old A419, the observed daily traffic flows are lower than those predicted by a significant amount (more than 1000 AADT). The observed flows are significantly lower than those in the base year of 2006, indicating that pollutant concentrations would have decreased as expected.

5.51. The observed traffic flows are lower than predicted along the bypass, which indicates that any increase in pollutant concentrations as a result of the bypass may not be as high as initially expected. Along the old A419 observed traffic flows are lower than predicted and are much lower than the base flows, indicating that pollutant concentrations would have decreased as expected. Overall, air quality is generally as expected at FYA, perhaps better than expected along Lady Lane.

Sub-Objective	AST	FYA
Local Air Quality	PM_{10} Assessment Score: -208.6 NO_2 Assessment Score: -630.6	Generally as expected. Perhaps better than expected on Lady Lane

Greenhouse Gases

5.52. The assessment of the impacts of transport schemes on emissions of greenhouse gases is one of the environment sub-objectives. WebTAG notes that carbon dioxide (CO_2) is considered the most important greenhouse gas which is therefore used as the key indicator for the purposes of assessing the impacts of transport options on climate change. Changes in CO_2 levels are considered in terms of equivalent tonnes of carbon released as a result of the scheme. Carbon emissions are therefore estimated for the DS and DM scenarios using forecast and observed FYA data.

Forecast Greenhouse Gases

5.53. Since this scheme was appraised, greenhouse gas emissions are now measured in terms of tonnes of Carbon rather than CO_2.

5.54. The scheme's impact was modelled using a version of the TUBA programme which pre-dated the inclusion of greenhouse gases. Therefore, the forecast impact on greenhouse gases would have been undertaken using the methodology described in the Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 1.

5.55. The ES for the scheme states the same quantitative assessment of the impact on greenhouse gases as the AST (an increase of 5kt/ year of CO_2 equivalent to 1349 tonnes of Carbon); however this differs from the ES Addendum which states there was an error in the value

reported in the ES. It is the figures stated in the ES Addendum which has been used as the forecast for the purpose of this evaluation as this is the most recent forecast assessment.

5.56. The ES Addendum estimated 12 kt/year of CO_2 (3,270 tonnes of Carbon) in the Do-Minimum scenario and 18 kt/year of CO_2 (4,910 tonnes of Carbon) in the Do-Something scenario. This represents an increase of 6 kt/year of CO_2 (1,640 tonnes of Carbon), which equates to a forecast increase of 51%.

5.57. The AST explains that the increase in Carbon emissions in the Do-Something scenario was expected as a result of increased traffic speeds and the distance travelled. This is because CO_2 is a direct product of the burning of fuel and will increase with increased traffic speed and distance travelled.

Evaluation of Greenhouse Gases

5.58. Using the current Design Manual for Roads and Bridges (DMRB) guidance, it has been possible to calculate pollutant emissions for the DM and DS scenarios using observed traffic data. These calculations have been based on traffic flow data, HGV percentages, and average speeds on the bypass the old A419. Table 5.5 shows the results of this exercise.

Table 5.5 – Forecast and Outturn Change in Carbon Emissions (carbon tonnes/ year)

	Forecast (ES Addendum)	Observed
Do-Minimum	3,270	3,444
Do-Something	4,910	4,291
Net Change	**1,640**	**847**
Percentage Change	**50%**	**25%**

5.59. Table 1.1 shows that observed carbon emissions increased by 25% between the DM and DS scenarios, equivalent to 847 tonnes of carbon. However, the ES Addendum forecast data predicted a 50% increase in carbon emissions between the DM and DS scenarios, equivalent to 1,640 carbon tonnes. Therefore, whilst the carbon emissions released by vehicles using the A419 have increased between the DM and DS scenarios, as a result of higher speeds on the bypass, the increase is not as great as the forecast estimated.

5.60. Therefore, it can be concluded that whilst the scheme has led to an increase in carbon emissions from vehicles travelling on the A419 scheme section, this net increase is not as great as expected.

5.61. While the net gain in tonnes of carbon in the first year after opening is significant, as stated in the ES in the context of both Swindon-wide and national emissions this change is very small.

Landscape & Townscape

Forecast

AST

5.62. The AST predicted that the scheme would have a slight beneficial impact on landscape due to reduced lighting combined with landscape mitigation proposals, which would improve views in the north and central sections of the scheme – designated as an Area of Local Landscape Interest (ALLI) in the Adopted Local Plan. New planting would provide enhancement at the southern end of the scheme, and there would be a visible reduction in traffic through Blunsdon.

5.63. The AST stated that there would be no effect on townscape with a **neutral** impact overall.

Environment Statement

5.64. The ES predicted that the scheme would have overall benefits in both landscape and visual terms. The local landscape character areas in the vicinity of the scheme were assessed as having a low or medium value and impacts on the Thames Vale, Blunsdon Midvale Ridge Slopes and the North East Swindon Urban Area were predicted to be **neutral**. However, there would be some **residual adverse** impact in the Blunsdon Midvale Ridge Slopes due to the retained section of the A419 climbing Blunsdon Hill and the introduction of the bypass, though this impact would be minimised through planting of screening vegetation. Vehicles moving on the bypass embankment would remain as a detracting influence on the landscape at day and night but the removal of existing lighting would have a **slight beneficial** impact on the Blunsdon Midvale Ridge Plateau, with bypass embankments strengthening the wooded character of the ridge.

5.65. At the North East Swindon Urban Fringe landscape character area a **moderate beneficial** impact was predicted in the ES due to the removal of the BP filling station, Burger King and Little Chef building and associated lighting, signage and car parking; and the implementation of new landscaping and screen planting, although much of this planting would not be effective at opening year.

5.66. The ES stated that the ALLI running along either side of the existing A419 would benefit from the scheme. The ALLI comprises the Blunsdon Midvale Ridge Slopes and Blunsdon Midvale Plateau character areas. No other national or local landscape designations would be affected by the scheme.

5.67. The large reduction in traffic along the old A419 was predicted by the ES to reduce the visual impacts experienced by receptors. Conversely, properties situated within view of the bypass may experience an increased visual impact due to the scheme. Distant views of the scheme from the wide visual envelope from south of Cricklade (a Conservation Area) to Newlands Farm would, at most, experience only a minor change in view, although Newlands Farm itself would experience visual intrusion.

5.68. Along Turnpike Road, visual impacts would generally be reduced with the scheme, with many properties experiencing a **slight beneficial** impact due to the movement of traffic away from the road, the removal of Burger King/Little Chef and BP filling station, and the implementation of screening earthworks.

5.69. In the vicinity of Abbey Stadium there would be **moderate adverse** impacts at opening year due to new lighting columns and the new elevated junction and associated slip roads, new cutting and acoustic barriers. The same impacts would also affect receptors to the east of the junction towards Lady Lane and Ermin Street.

5.70. Along the existing A419, along Ermin Street and at Widhill Lane, some properties would benefit from moving traffic away from the existing A419. However, views at the rear of properties would be adversely affected due to the bypass and embankments being in view.

5.71. There would be a **moderate adverse** impact to the bridleway at Widhill Lane at opening year due to the right of way passing over a new bridge over the bypass. There would be **slight adverse** impacts at a number of other rights of way, again reducing to **neutral** or **beneficial** after 15 years.

5.72. Widhill Farm and other receptors in its vicinity would also experience **moderate adverse** impacts due to the close proximity of the bypass.

5.73. The elements of design proposed to mitigate landscape impacts were:

- Removal of lighting columns from existing A419 and limited lighting of bypass;

- New ponds engineered with a natural character with gently graded banks;
- Implementation of earthworks to screen properties and continue the raised landform of Blunsdon Ridge;
- Screening planting of acoustic barriers;
- Retention of existing vegetation where possible;
- Planting of semi-mature and advanced nursery stock trees;
- Replacement planting for existing highway vegetation lost to the scheme (4.5ha of vegetation to be lost and 14.5ha to be planted);
- Reinforcement planting at Blunsdon Copse; and
- Planting to be of native UK species.

OYA conclusions

5.74. The OYA report confirmed that mitigation had largely been implemented as expected and appeared to be establishing satisfactorily with some larger sizes stock included within the mixes.. It was noted at OYA that the level of mitigation earthworks varied between the ES photomontages and actual views observed in the POPE site visit, although they were not vastly different.

5.75. The report noted that during detail design, the junction with Turnpike Road at Lady Lane Junction was altered to become a small roundabout to improve traffic safety and turning conditions for HGVs.

5.76. Construction of a gym complex near the existing Motorola Factory by the Turnpike Junction had also changed views to those expected when the ES was produced. Improvements in this area were expected due to the removal of Burger King, Little Chef and the BP filling station, which had been realised and improved views along Turnpike Road, as expected.

5.77. The OYA report confirmed that environmental earthworks had generally been implemented as expected, and their associated planting had also been implemented and appeared to be well maintained in most areas, with planting protected by shelters. However, it was noted by the Parish Council, that some of the earthworks seeding along the old A419 was patchy and weedy and confirmed in the site visit. Other seeded earthworks observed during the site visit, were however noted to be in good condition. It was also noted that towards the foot of Blunsdon Hill a small amount of planting/seeding remained to be implemented. This was highlighted by the as built drawings, which showed that planting was yet to be undertaken and was due in 2011.

5.78. It was noted that distant views of the scheme were as expected, and there had been no impact on Conservation Areas in the furthest edge of the scheme's visual envelope. The ALLI had benefited as predicted, with removal of lighting along the old A419, and planting along the new embankment extending the ridge of Blunsdon Hill. Planting adjacent to Blunsdon Copse was expected to mature which would improve the character of the area.

5.79. The OYA report noted that as predicted, the elevated nature of the Lady Lane junction had an adverse impact on local receptors such as the Abbey Stadium and properties close to Lady Lane, which also experienced visual intrusion due to the implementation of environmental barriers.

5.80. The OYA report confirmed that no Handover Environmental Management Plan (HEMP) had been available at OYA to evaluate landscape management and it was expected that a HEMP would be provided to POPE to help with the FYA evaluation.

FYA Consultation

5.81. The Swindon Borough Council (SBC) stated that it was not aware of any negative comments in relation to landscape works associated with the scheme. SBC confirmed that the scheme had been mitigated with substantial planting which they considered a success and the retention of existing vegetation well considered. The earthworks and ground modelling were confirmed as well considered.

5.82. In contrast to the comment received from SBC, the Blunsdon St Andrew Parish Council (BSAPC) feel that there has been a detrimental impact on the parish given the lack of established tree cover which has resulted in an exposed and windy area. The Parish Council also states that the hedgerows and landscaping around the new road and old road are marred by the fact that the protective sheathing on plants, shrubs and trees has not been removed. It has led to many of the aforementioned becoming disfigured and misshapen and not surviving. There seems to have been a total lack of management of the landscaping of the whole area. The Parish Council felt that, with the removal of trees and thinning of Widhill Copse (presume writer means Blunsdon Hill Copse); noise has significantly increased in Widhill Lane, with vehicle lights now also clearly visible.

5.83. The SBC noted that the old A419 remained a prominent feature but one which would be resolved by the town of Blunsdon in time. They noted that local changes from elevated side roads (such as near Abbey Stadium) made Swindon's urban edge more prominent. Materials and finishes to structure were generally appropriate, but key gateway structures (similar to A419 Commonhead) could have been more imaginative and distinctive. BSAPC concurs stating that finishes had no village character.

5.84. The BSAPC stated that the banking of earth and tree planting had helped in mitigating the visual effects of the scheme although they felt that the removal of existing vegetation had left the area with the "feel of a barren desert landscape". Again, this is in direct contrast to the SBC.

5.85. The BSAPC noted that they felt that the lighting provided as a part of the scheme was too modern and lacking village character, more suited to urban town setting. They stated that in some parts of the village of Blunsdon, there is no lighting; in others some lighting, but overall rural ambience is compromised by light pollution levels.

FYA Landscape and Visual Evaluation

5.86. Comparison views with selected ES photomontages and FYA photographs are shown in Appendix A.

5.87. The contrasting responses received from the Swindon Borough Council and the Blunsdon St Andrew Parish Council on the planting undertaken as a part of the scheme is unusual. Based on the site visit undertaken by POPE, the assessment provided by the SBC is in line with observations made by POPE. The planting has progressed well, and the appearance is far from a 'barren desert landscape' as intimated by the BSAPC.

5.88. The lighting concern raised by the BSAPC is appropriate and perhaps its design through the village could have been more considered in terms of place and setting. It is noted that it is now an issue that should be raised with the SBC as the old A419 through Blunsdon has been de-trunked and handed over to the SBC.

5.89. The POPE site visit undertaken in August 2014 assessed the progress of planting based on assumptions noted at OYA as included above. Generally the planting included in the scheme has progressed well with good growth achieved in most areas.

5.90. The OYA report stated that, as predicted, the elevated nature of the Lady Lane junction had an adverse impact on local receptors such as the Abbey Stadium and properties close to Lady Lane, which also experienced visual intrusion due to the implementation of environmental barriers. At FYA, the visual impact on properties close to Lady Lane remains adverse as expected, although the impact on Abbey Stadium is reduced due to maturing of woodland plots.

Figure 5.7 – View looking north from Lady Lane junction

5.91. The visual impact schedules for the design year (year 15) within the ES record either **no change** as a result of the scheme; **slight beneficial** where proposed woodland planting would effectively filter views of the new A419 alignment and the old A419 would be more effective in screening receptors to the east. The ES further stated that a **slight adverse** impact would result from proposed woodland planting in view of the track between Blunsdon Hill Copse and Upper Widhill Farm with views to the west and southwest foreshortened by an introduced landform and associated woodland planting. (See ***Figure 5.8***).

Figure 5.8 – View taken from Widhill Lane overbridge looking towards Upper Widhill Farm

5.92. The ES visual impact schedules noted that for Blunsdon Hill Baptist Church there would be a slight adverse effect at opening year and moderate beneficial at the Design Year (year 15) effect where proposed woodland and hedgerow planting would filter some views of the road improvement scheme and associated traffic although planting along the old A419 would be more effective in screening whilst not fully blocking distant views to countryside. During the POPE site visit, the church was visited and it is clear that the church itself is unaffected by the scheme due to mature surrounding vegetation, whilst benefitting from a reduction in the carriageway width to single of the old A419. ***Figure 5.9*** shows the church viewed from the old A419 and the view from the pedestrian pathway running parallel to the old A419, on the same side as the church.

Figure 5.9 – Blunsdon Hill Baptist Church with view adjacent to the church towards the A419 Blunsdon bypass

Landscape Evaluation

5.93. With reference to the Handover Environmental Management Plan (HEMP) (an extract is included in ***Appendix A***), the following information is a summary of the content and is used as a base for discussion on landscape concerns:

- Overall, grassed areas have received chemical and physical weed control treatment throughout the aftercare maintenance period; although it appears that this has had a limited effect on weed control. The HEMP notes that despite this control, significant weed growth continues to re-emerge on an annual basis and will need to be maintained with care in perpetuity in accordance with the schedule set out in the HEMP.

Figure 5.10 – Thistles and Docks shown in images below are prevalent in areas not received regular mowing

Figure 5.11 – Thistles and docks emerging in recently cut verge

- Four areas of species rich grassland (SRG) have converted to open grassland due to not being managed in accordance with the contract. The HEMP recommended that success in restoration back to SRG at this stage was unlikely and plots would be managed as open grassland on handover to the DBFO. The areas are located on the northbound Turnpike junction and along the northern end of the old A419. It is unclear in reports available to POPE why proposed maintenance has failed / not undertaken in these areas.
- A small area of rocky outcrop was constructed and left exposed on the northbound carriageway within the scheme. The HEMP states that the area was left without topsoil to allow the establishment of wildflowers. The HEMP notes that wildflower establishment is slow, but the lack of nutrients has inhibited undesirable weed growth. During the POPE site visit it is noted that no vegetation has established which is a concern given the time period that has past for colonisation and questions the implementation of the feature.

Figure 5.12 – Rocky outcrop left exposed on the northbound carriageway (image on the left taken from Google Maps, dated September 2012, image on the right taken during August 2014 site visit)

- Grassland planting omitted during construction was completed in 2011 with plant failure replacement planting undertaken in March 2014, where plant establishment rates were considered to be unacceptably low and plant failures which had occurred during the aftercare period.

Figure 5.13 – Native Woodland Mix planted in March 2014 south of Lady Lane Overbridge

- The target percentage cover by year 5 required in the contract and tender information appears to have not been reached in the majority of woodland and shrub plots due to plant failure in the first year after opening. These failures were reported in the HEMP as being not excessive when considered as a whole and are not considered to prevent plots from fulfilling their objectives. Maintenance schedules within the HEMP note high mortality especially in hedges towards the southern end of the scheme. Figure 5.14 and
- Figure 5.15 below show varying growth achievements within the scheme from good to poor.

Figure 5.14 – Hedgerow between Turnpike Road and A419 and Shrub and tree planting between old and new A419 in the northern end of the scheme showing good growth

Figure 5.15 – Limited growth in some plots has resulted in areas of replacement planting as seen on the northbound slope between Lady Lane and Lady Lane overbridge.

- Individual standard and semi mature standard trees were planted as a part of the scheme. Limited individual trees failed to establish satisfactorily within the first year and were replaced in March 2014. No record of future maintenance and growth achievement targets of these newly planted trees is noted in the HEMP although it is presumed that it is expected that the DBFO will assume responsibility for their growth. Standard trees that have established satisfactorily are showing good growth, although they could benefit from removal of spiral guards and future removal of tree stakes (see **Figure 5.16**).

Figure 5.16 – Standard trees in Pond C surrounds

- In 2011 and 2013, Japanese Knotweed was found on site in the planting area south of Lady Lane overbridge between Turnpike Road and the A419 as noted in Landscape Works Inspection reports and reflected on the HEMP drawings. No further information has been provided in the HEMP with regards to its treatment or future management at handover. In 2011 Himalayan Balsam was located near Widhill Farm, northbound; it is presumed that this was controlled as there is no further mention in the HEMP and no plants were noted during the POPE site visit.
- In June 2013 brown tail moths were found on site in pond C. It is noted that brown tail moth caterpillars have small hairs all over their bodies, which can break off very easily and irritate the skin, in some cases severely. The species is distributed mainly around the south and east coasts of England and in some years can become locally abundant. They feed in a communal web on the leaves of hawthorn (Crataegus) and blackthorn (Prunus spinosa) which may prove detrimental to these species included in the planting mix for this scheme. There is no legislated requirement to control these moths.
- Planting associated with water bodies is discussed in the Water Quality and Drainage section.

5.94. 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.

Sub-Objective	AST	FYA
Landscape and Visual	Slight beneficial	As expected

Townscape Evaluation

5.95. The ES references Townscape once stating that due to the urban fringe nature of the study area, some Landscape Character Areas contain distinctly urban characteristics and descriptions related to these areas have taken account of DMRB Volume 11, Section 3, Part 5, Chapter 8 that relates to the specific consideration of townscape. GOMMMS[9] townscape indicators had not been used given the dominant semi rural nature of the study area.

5.96. The former A419 through the village of Blunsdon was accessed during the site visit in August 2014. Traffic volumes through the village appeared limited to local users and those accessing the facilities offered (see ***Figure 5.17***).

Figure 5.17 – Former A419 through the village of Blunsdon

5.97. The former A419 has been de-trunked and adopted by the Swindon Borough Council (SBC). A planting feature and facilities sign has been installed at the eastern entrance to the village by the SBC as seen in Figure 5.18.

Figure 5.18 – Former A419 has been de-trunked and adopted by the Swindon Borough Council

5.98. The patchy seeding on the earth mound on the western approach to Blunsdon as noted at OYA remains as seen in the Figure 5.19. Without information on what the makeup of this bund is, it can only be presumed that the material used in the bund was compacted and contains little suitable growing media to support amenity grass species.

[9] Guidance on the Methodology for Multi-Modal Studies - The appraisal framework facilitates the appraisal of the impacts of different transportation options (environment, economy, accessibility and intergration)

Figure 5.19 – Earthworks along old A419 with patchy seeding and weeds at OYA and FYA.

OYA	FYA
	

5.99. Townscape - Traffic levels through Blunsdon are low at FYA as predicted which has improved visual amenity and in turn local village character. Maintenance of verges and an entrance feature installed by the SBC are being well maintained.

Sub-Objective	AST	FYA
Townscape	Neutral	As expected

Biodiversity

Forecast

AST

5.100. The AST predicted that there would be loss and severance of species rich hedgerows from Lady Lane to the bottom of Blunsdon Hill affecting habitat connectivity and a main badger sett would be lost. It was considered that appropriate mitigation would be implemented in order to mitigate these impacts and the overall scheme impact would be **slight adverse**.

Environment Statement

5.101. The ES stated that there would be no impacts to any nationally or internationally important designated sites – none of which lie within 2km of the scheme. Only one non-statutory designated site lies within 1km of the scheme – the Site of Nature Conservation Interested (SNCI) of Upper Widhill Copse, which at 200m from the scheme would not be impacted upon.

5.102. The habitats affected by the scheme generally comprised improved and semi-improved grassland and agricultural land, with one area of developing, species poor broadleaf woodland – Blunsdon Hill Copse. A number of hedgerows would also be lost or severed by the scheme.

5.103. Some dewatering of drainage ditches might be caused by the scheme, which may have a slight adverse impact to amphibians.

5.104. With regard to protected species, the ES predicted impacts due to the loss of one main badger sett and an outlier sett and the effective division of the social group territory in two parts. There were predicted to be impacts to reptiles due to loss of grassland habitat and there would be loss of 6 sites with bat roosting potential. Breeding birds would be impacted upon by the scheme due to loss of hedgerows, scrub and woodland and there would be loss to foraging

habitat and breeding sites for barn owls, although it was considered in the ES that there were other suitable breeding sites in the area.

5.105. The ES noted that deer and badgers were found in the area and considered that road kill during operation of the scheme was a potential risk.

OYA Evaluation

5.106. The OYA report stated that most mitigation proposed by the ES had been implemented, including a badger tunnel, equestrian bridge with facility for wildlife access, planting and installation of badger and deer fences. The managing agent had confirmed that a new badger sett had been constructed before the scheme was implemented, and that bat and bird boxes had been installed. It was confirmed that the reptile hibernacula were not installed, as following further survey work it was deemed that this mitigation was not necessary as reptiles were not found during vegetation clearance.

OYA conclusions

5.107. Although mitigation measures had been confirmed as provided, monitoring reports had not been provided which would have confirmed whether the features installed has been effective.

Consultation

5.108. The BSAPC felt that the planting within the scheme was too generic, and one type of plant; rather than habitat creation.

FYA Evaluation

5.109. Annual inspections of bird boxes and replacement badger setts was recommended by the ES during operation, to be implemented through a management plan, which has not been made available to POPE at FYA.

5.110. Further to the statement made by the BSAPC, it is noted based on the FYA site visit and asbuilt information that there is an accepted mix of shrubs, trees and grassland within the scheme acceptable for habitat connectivity and support. Shrubs were found to be fruiting abundantly at the time of the site visit providing a source of food for birds and mammals.

Figure 5.20 – Viburnum opulus (Guelder Rose) in fruit shrub within the scheme

5.111. The HEMP states that during the 5 year maintenance period an annual inspection of the bat boxes was carried out. Bats, including Pipistrelle and Brown Long-eared species, were found to be using a good proportion of the boxes installed under the Contract. Recommendations were made for the replacement of missing boxes which, it is understood, were replaced within the aftercare period.

5.112. Bird boxes were not subject to detailed inspections during the 5 year maintenance period. However, the annual Ecological Monitoring report (within the HEMP) did note that a number of boxes were stolen or damaged and that these have been replaced.

5.113. An artificial badger sett was provided off-site as a part of the scheme. The sett was inspected on an ad-hoc basis during the 5 year maintenance period by the Project Ecologist. The inspections confirmed badger activity, including prints of young cubs and bedding material which would indicate successful breeding. Further entrances were also dug by badgers, extending the size of the artificial sett. All management responsibilities are undertaken by the land owner. During the FYA site visit, possible badger faeces were located near Turnpike Road, although it was not located in the usual latrine typical of badgers. The mammal tunnel located to the north of the scheme adjacent to pond C is shown in ***Figure 5.21***).

Figure 5.21 – Possible badger faeces and Mammal tunnel

5.114. Mortality figures received from the DBFO show high mortality figures despite mammal fencing and badger tunnel in place. A summary of the mortality figures reflected in ***Table 5.6*** below show that 14 deer, 12 badgers and 28 foxes have perished within the bypass boundaries since scheme opening. As the ES identified the mortality of Deer and Badger species as a risk of the scheme during operation, an assessment of the location of mammal fencing should be considered to determine whether increased mammal fencing is required in addition to mammal fencing installed as a part of the scheme.

Table 5.6 – Post opening animal mortality figures

Year	Deer	Badger	Fox
2009	1	1	3
2010	2	1	6
2011	3	1	5
2012	5	2	6
2013	1	4	5
2014	2	3	3

5.115. As noted in the Landscape Evaluation section of this report, four areas of species rich grassland (SRG) have converted to open grassland due to not being managed in accordance with the

contract. Based on this and the high mortality of deer and badgers within the five year maintenance period, the scheme is **worse than expected** for biodiversity.

Sub-Objective	AST	FYA
Biodiversity	Slight Adverse	Slightly worse than expected due to a number of animal mortalities post opening, although not likely to reach Moderate Adverse.

Heritage of Historic Resources

Forecast

AST

5.116. The AST predicted slight adverse impacts upon the rural historic landscape and the setting of the listed building at Upper Widhill Farm. The overall impact was assessed as **slight adverse**.

Environmental Statement

5.117. The ES predicted slight adverse impacts to the following archaeology due to construction of the scheme:

- Prehistoric pits;
- Iron Ages ditch;
- Undated stake holes;
- Ermin Street Roman road;
- 2 Roman findspots and 1 medieval findspot; and
- Potential 'Brick Kiln' and 'Barn Field'.

5.118. A **slight adverse** impact was also predicted on Upper Widhill Farmhouse Grade II Listed Building, due to the bypass being visible from the upstairs rear windows of the buildings and due to increased traffic noise.

5.119. A slight beneficial impact was predicted on The Old Schoolhouse and Milestone in Blunsdon, also grade II listed structures, due to traffic moving away from them, and the relocation of the milestone.

5.120. The ES also predicted moderate adverse construction impacts to the rural historic landscape and two hedgerows of historic value would be lost to the scheme.

5.121. Other cultural heritage assets within the vicinity of the scheme would not be affected. These included the scheduled monuments of the Saxon town walls of Cricklade and the site of Roman building at Kingshill Farm, and the conservation area at Castle Eaton. The Roman building had no over-ground features and so its setting could not be affected by the scheme while Castle Eaton and Cricklade were very distant from the scheme, at the very edge of the visual envelope.

OYA Evaluation

Listed Buildings and Structures

Built Heritage

5.122. The OYA report confirmed that the Old Schoolhouse, a thatched building of rubble construction benefited from the scheme due to traffic reassigning from the old A419 onto the bypass, which

had been screened by an environmental bund. Traffic along the old A419 had significantly reduced, improving the setting of the building, as expected.

5.123. The Milestone formerly located on the old A419 was moved to accommodate the scheme and relocated on a new grass verge at the foot of Blunsdon Hill. The milestone was located away from traffic in an improved setting, predicted by the ES.

5.124. The construction of the bypass had moved traffic closer to the Upper Widhill Farmhouse grade II listed building and the scheme was visible from the upper floors of the building as expected.

5.125. As expected, there had been no impact to any conservation areas or scheduled monuments. During the OYA site visit it was not possible to see the scheme from Cricklade town walls scheduled monument, and the Castle Eaton Conservation Area was too distant from the scheme for any impact to be realised. This was as expected.

5.126. The scheme also runs through the rural historic landscape and had caused the destruction of pre-1850 hedgerows, as expected. It was likely that over time, with the maturing of landscape planting, the impacts on the historic landscape would be reduced, as predicted in the ES.

Archaeology

5.127. The OYA report noted that archaeological evaluation was undertaken prior to construction (supported by the scheme archaeology report). There were no significant unforeseen impacts on historic resources.

FYA Consultation

5.128. The BSAPC notes that the old track between the Cold Harbour pub (Old Roman staging post) and Groundwell Ridge (Old Roman Villa site) was compromised by the scheme, however, the housing in Abbey Meads/St Andrew's Ridge had ploughed most of it up already before the bypass “finished it off completely”.

FYA Evaluation

5.129. With reference to the OYA on the effects of the scheme on Heritage of Historic Resources, no further assessment is required at FYA due to no outstanding issues remaining. However, OYA/FYA comparison photos have been included to demonstrate the progress of planting and maintenance in ensuring that impacts are as predicted in the ES.

5.130. Figure 5.22 shows the effect of the scheme on the Old Schoolhouse where the hedgerow to the left of the FYA view combined with the landscape mound between the A419 and Turnpike Road is providing screening as intended in the ES.

Figure 5.22 – The Old Schoolhouse Grade II Listed Building

OYA	FYA
	

5.131. The milestone comparison view demonstrates that maintenance is being undertaken by the Swindon Borough Council. The hedgerow planted between the old A419 and the Grade II listed milestone is progressing satisfactorily (see Figure 5.23).

Figure 5.23 – Grade II listed Milestone

OYA	FYA
	

5.132. Whilst the comparison view is not taken from the Upper Widhill Grade II listed building in both OYA and FYA views due to there being no public access, it is expected that the screen planting on the embankment between the A419 and Upper Widhill Farm, installed landscape mound and existing semi-mature vegetation will provide screening as required in the ES.

Figure 5.24 – Upper Widhill Farm Grade II Listed Building

OYA	FYA (similar location)
	

5.133. It is therefore concluded that the effects of the scheme on the overall heritage resources are generally **as expected.**

Sub-Objective	AST	FYA
Heritage of Historic Resources	Slight adverse	As expected

Water Quality and Drainage

Forecast

AST

5.134. The AST stated that features and elements present in the water environment were typical of the locality, and the scheme would have negligible impacts on surface and ground water quality, quantity and flow. The overall impact was predicted to be **neutral**.

Environmental Statement

5.135. The ES stated that the scheme lies in an area of minor aquifer, underlain by a non-aquifer in an area of high or medium groundwater vulnerability. The minor aquifer discharged through a number of springs, which fed into a number of streams. Groundwater varied between 8m and 2m below ground level.

5.136. The scheme would cross an area of high ground characterised by an absence of surface drainage and no surface watercourses would need to be redirected. Surface water run-off would be increased, but this would be captured by the scheme's drainage system and fed into attenuation and water treatment ponds/interceptors, with no discharges from the scheme going directly into watercourses or groundwater, untreated.

5.137. An attenuation would be required within the River Ray catchment; and petrol interceptors would be required within the Bydemill Brook catchment to contain spillages.

5.138. Due to drainage design, mitigation measures and flood compensation (installation of attenuation ponds) the scheme was predicted to have a neutral impact on surface and groundwater quality, quantity and flow.

OYA Evaluation

5.139. The OYA report stated that, with reference to the as-built drainage drawings and Surface Water Drainage Maintenance Manual, mitigation had been implemented as expected.

5.140. At the northern end of the scheme, existing road drainage was used to carry runoff from the scheme. Where new drainage had been installed it diverted runoff to one of three attenuation/treatment facilities. The Surface Water Drainage Maintenance Manual stated that ponds A and C (which lie within the Bydemill catchment) had been installed with interceptor baffle walls, as set out in the ES. The ponds themselves provided an opportunity for suspended solids in the water draining from the scheme to settle, and vehicular access had been provided for removal of silt from the ponds.

5.141. It was suggested that drainage is be reconsidered at FYA by which time any localised flooding and surface water drainage issues may have been resolved.

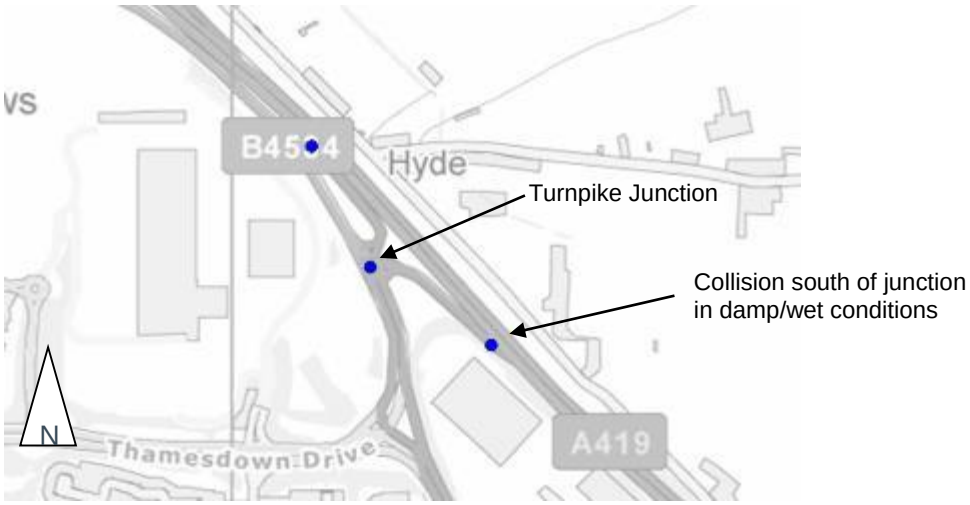
FYA Consultation

5.142. The BSAPC states that the dispersal of water from the new A419 south of the new junction at Turnpike junction is poor and in heavy rain causes aquaplaning at speed.

FYA Evaluation

5.143. In response to the BSAPC it is noted that only one collision has occurred in wet and damp conditions south of the Turnpike junction in the five year period since opening. Figure 5.25 below demonstrates the locations of collisions in wet and damp conditions in the proximity of the Turnpike Junction in the five years after opening.

Figure 5.25 – Collision locations within the vicinity of Turnpike Junction during wet and damp conditions



5.144. The Surface Water Drainage Maintenance Manual (SWDMM) notes that Sustainable Drainage Systems (SUDS) have been installed as a part of the scheme in the form of combined surface water and groundwater filter drains. This provides water quality improvement and infiltration giving both attenuation and replenishment of groundwater benefits as well as protecting the road construction. Conventional kerb and gully systems have been used elsewhere in the scheme.

5.145. Deep drainage has been provided to lower the water table where it would otherwise have a detrimental effect on embankment stability. This system does not collect surface water runoff from the highway, but does discharge to the highway drainage system.

5.146. Three water bodies were provided by the scheme. The responsibility for the maintenance of all water bodies, including the monitoring of inlets, outlets, siltation, and litter collection was

handed over to the Highways England (formerly the Highways Agency) managing agent upon Practical Completion. Long term maintenance operations were included within the HEMP for reference purposes.

5.147. The HEMP states that the landscape aftercare maintenance was limited to areas of open grassland and aquatic marginal planting. Pond C was designed as a dry pond, subject only to seasonal flooding and was seeded with a flood-tolerant grass mixture, which was maintained during the establishment and overall 5 year maintenance period as open grassland.

5.148. The SWMM notes that monthly inspections of retention and detention ponds were recommended as guidance only. POPE is unsure whether this guidance has been taken up by the DBFO maintenance contractor as the landscape inspections reports note that due to a blockage in the outfall at pond C, the pond remained flooded for extensive periods during the maintenance phase and no maintenance of the grass banks was possible during this time. It was noted that at FYA that the outfall to Pond C remains blocked resulting in retention of water within the pond (Figure 5.26).

Figure 5.26 – Pond C Outfall

5.149. Ponds A and B were designed to accommodate a permanent open body of water with aquatic marginal planting to the perimeter between outlet and inlet positions. All aquatic marginal planting was to be inspected twice per year in February and October. As no inspection reports were provided by the Specialist Subcontractor during the aftercare period (as stated in the HEMP), it is not known whether any maintenance operations were undertaken during the maintenance period. However, reed beds have established successfully and are in accordance with the design.

5.150. During the FYA site visit, all scheme ponds were visited and assessed to be performing as expected. It is noted, however, that the access gate for pond C was unsecured and the lifebuoy missing. Based on the rate of growth of the vegetation within the ponds, regular maintenance and inspections do not appear to being undertaken.

Figure 5.27 – Pond A (retention basin)

Figure 5.28 – Pond C (detention basin)

Figure 5.29 – Pond C – gate is unsecured and lifebuoy missing

Figure 5.30 – Pond B (detention basin)

5.151. No further information regarding the drainage system has been made available for this report. Without drainage motoring reports, an assessment cannot be made of the effect of the scheme on surrounding water quality and without monitoring reports confirming whether maintenance / inspections have been undertaken to ensure whether the required drainage functions are performing as required.

5.152. POPE is not aware that there have been any pollution incidents and that, based on the information available it is likely that the effects of the scheme are **as expected**.

Sub-Objective	AST	FYA
Water Quality and Drainage	Neutral	As expected

Physical Fitness

Forecast

AST

5.153. The AST predicted the scheme would not result in a significant increase in pedestrian journey times, and would provide new facilities and non-motorised user (NMU) amenity that could facilitate increased future use. The overall scheme impact was noted as "**minor beneficial to health**".

Environmental Statement

5.154. The ES noted that there would be direct impacts to 5 public rights of way (PROW) (BA17, BA18, BA20, BA24 and BA32) as a result of the scheme, diverting them and in all but one case increasing their length. The scheme would also provide links between existing cycle routes due to implementation of new cycle paths, and new opportunities for circular walking routes within the Blunsdon area. NMU facilities would be improved with a new equestrian bridge and signalised junctions.

5.155. A significant reduction in traffic along the existing A419 was predicted to reduce community severance, with moderately beneficial impacts.

OYA Evaluation

5.156. The OYA report stated that significant reduction in traffic along the existing A419 (a reduction of 93%) had been realised with community severance and access therefore improving in the area – especially through Broad Blunsdon and Blunsdon village to Swindon.

Figure 5.31 – FYA view of old A419 including footway/cycleway and A419 in the background

5.157. An NMU post opening survey had not been undertaken for the scheme and therefore there was no information which would have provided quantifiable data for usage of the PROW network. No new surveys had been undertaken specifically for the OYA POPE report.

5.158. Diversions to rights of way had been implemented as expected and NMU facilities had been improved, as expected due to implementation of new signalised junctions and separation of footways/cycleways from traffic. Rights of way were safer and new opportunities for circular walks and links between cycle routes in the wider area had been realised. Along the old A419, a footpath and cycleway segregated from the traffic and the equestrian overbridge had been implemented, as expected.

FYA Consultation

5.159. The BSAPC states that the cycleway created through Lady Lane Junction was created on one side of the bridge where it would have been better to have the cycleway on both sides.

5.160. The Parish Council notes that Widhill Lane has not yet been reinstated to its condition prior to the construction of the road and that the future of this route has yet to be announced.

FYA Evaluation

5.161. Further to comment received from the BSAPC, it is noted in the ES that allowance was made for the Lady Lane public footpath (BA24) to be replaced by signalised crossing facilities at the proposed Lady Lane Junction. The route would enable access to Blunsdon Village and Broad Blunsdon via the signalised crossing facility.

5.162. Highways England confirmed in consultation that no evidence could be found that Wildhill Lane had been used or requisitioned for access as a part of the scheme.

5.163. As a part of the FYA site visit, all footpaths installed as a part of the scheme were visited. Use of the footway/cycleway along the old A419 was noted to be in use by pedestrians accessing local facilities with Blunsdon Hill appearing to be used for fitness training by a local resident. The bridleway and Lady Lane bridge was in use by pedestrians during the site visit. It is noted that POPE does not usually undertake surveys of PROW use and as such cannot comment on their actual usage as a result of the scheme.

Figure 5.32 – Widmill Overbridge incorporating bridleway

Figure 5.33 – Bridleway access to the Widmill Lane Bridge which includes a dismount block

Sub-Objective	AST	FYA
Physical Fitness	Neutral	As expected

5.164. Based on the information presented in this evaluation, it is concluded that the effects of the scheme on physical fitness are likely to remain **as expected**.

Journey Ambience

Forecast

AST

5.165. The AST stated the scheme would have significant beneficial impacts in relation to driver stress, but would result in loss of driver facilities. The overall impact was predicted to be **neutral**.

Environmental Statement

5.166. The ES predicted that:

- Traveller views would generally be more restricted with the scheme due to the bypass running through cutting and planted embankments, but the quality of views would not change significantly. There would be some improvement in the roadscape, especially once landscape planting matured, with the overall impact on views expected to be **slight beneficial**.
- Driver stress would be improved by reduced fear of collisions due to separation of NMUs from the traffic on the bypass and the reduced gradient of the route. The effects of the scheme on driver stress would be **beneficial** – reducing from high to low.
- Traveller care would **deteriorate** with the scheme due to the loss of a BP filling station, Little Chef, Burger King and a lay-by with a mobile refreshments van. The impact was not considered to be significant due to the nearby presence of other facilities such as a filling station and modern café 2.5km north of the scheme.

OYA Evaluation

Traveller Views

5.167. At OYA, traveller views were considered to be as expected, and should improve with maturing of landscape planting.

Driver Stress

5.168. At OYA, congestion had decreased and there was less queuing, as predicted, and driver stress should have generally reduced with the scheme due to improved route certainty and reduced fear of collisions because of the separation of NMUs from the trunk road. The scheme had also installed new signage. However, there was rat-running along Lady Lane and it was thought that queuing at the new junctions and confusing junction layout may have been responsible for this.

Traveller Care

5.169. The scheme resulted in traveller care facilities being removed as expected and existing facilities in the vicinity still existed.

FYA Consultation

5.170. The BSAPC notes that the 'poor design of approach roads' to the bridge (Lady Lane junction) and the Cold Harbour junction (roundabout connecting Blunsdon to Turnpike Road and Lady Lane junction) has resulted in excessive queuing.

5.171. The BSAPC states that the traffic signal timings on the Lady Lane bridge are not flexible enough to handle differing traffic flows at different times of day. They also feel that increased traffic from pending developments will exacerbate flow problems on B4019, the bridge, Ermin Street and Lady Lane.

FYA Evaluation

5.172. With reference to the comment from the BSAPC regarding queuing south of Blunsdon, no journey time analysis has been undertaken by POPE in this location and as such have no evidence to comment further. The BSAPC should approach the SBC for comments regarding the traffic light timing for Lady Lane junction and the impacts of pending developments.

5.173. Table 5.7 summarises the evaluation of the various elements of journey ambience and the scheme's impact on this sub-objective. Overall the scheme impact is neutral **as expected**.

Table 5.7 – Summary of Journey Ambience Evaluation

Traveller Factor	AST Score	FYA evaluation
Views	Slight Beneficial	Vegetation is providing screening and integration as expected with views limited due to cuttings and planted embankments
Driver Stress	Beneficial	Driver stress is expected to have reduced considerably due to journey time savings, reduced accident rates and clear signage.
Care	Deterioration not considered significant	Former traveller facilities were removed as a part of the scheme, although there are other facilities
Summary Score	**Neutral**	As expected

Key Points – Environment

Noise & Vibration and Air Quality

- The reduction in through traffic along the old A419 as a result of the bypass will have benefitted residential properties adjacent to the scheme in Blunsdon. The observed reduction in traffic flows is greater than forecast and impacts for noise and local air quality is considered to be better than expected based on traffic flows.
- As expected the bypass has introduced a new source of noise into the countryside for the few properties nearer to the route. Traffic is slightly lower than expected (-5%) along the bypass; noise is likely to be as expected (observed traffic within 20% of forecast) and local air quality is as expected.

Greenhouse Gases

- A 25% increase in CO_2 emissions have been observed on the scheme section, lower than the forecast of a 50% increase. While the net gain in tonnes of carbon is significant, as stated in the ES in the context of both Swindon-wide and national emissions, this change is very small.

Landscape & Townscape

- Overall the landscape impacts of the scheme are considered to be as predicted in the Environmental Statement with screening and integration functions of earthworks, planting, barriers and bunding enabling the scheme to fit well into the surrounding landscape.
- Although weed control has been undertaken within the aftercare period, it is noted that the scheme remains affected by noxious weed infestations and will require continuing maintenance to ensure the control of weeds within the planted areas. It is a concern that four plots planted as species rich grassland have been allowed to revert to open grassland. There does not appear to be a reasonable explanation for this within the HEMP.
- One area within the scheme was identified to be left as a rocky outcropping to be colonised by species rich grassland. It is noted at FYA that this rocky outcropping is nothing more than a benched slope not lending itself to any natural shape. It is also noted that natural colonisation by species rich grassland has not occurred as required within the landscape proposals.
- The former A419 through Blunsdon is quiet with road furniture and traffic levels more suited to the village it is without continuous traffic flow experienced prior to the scheme. It is noted that the Parish Council has objected to the lighting within the village of Blunsdon. Overall the impact of the scheme is considered to be as expected for townscape.

Biodiversity

- During the five year maintenance period annual inspections of bat boxes was carried out. Bats, including Pipistrelle and Brown Long-eared species, were found to be using a good proportion of the boxes installed under the Contract. Recommendations were made for the replacement of missing boxes which were replaced within the aftercare period. Bird boxes were replaced as required after incidents of vandalism.
- An artificial badger sett was provided off-site as a part of the scheme. Inspections confirmed badger activity, including indications of successful breeding. Further entrances were also dug by badgers, extending the size of the artificial sett. Overall, the impact of the scheme on biodiversity is considered to be slightly worse than expected.

Cultural Heritage

- No further evaluation of the effects on the scheme on Heritage of Historic Resources is required at FYA as there were no outstanding issues from OYA, therefore the impact of the scheme is considered to be slight adverse, as expected. A visual assessment of the effect on listed buildings has been undertaken and found that generally, the effect of the scheme on these resources has reduced at FYA through the good growth of trees planted as a part of the scheme. A reduction in the observed traffic flows along the bypass will assist in reducing noise impacts through the scheme being located closer to listed buildings.

Key Points – Environment

Water

- Based on the HEMP and confirmed in the POPE site visit it appears that maintenance of the detention basins is not being undertaken to allow drainage from the basins which are supposed to remain dry during times of dry weather providing attenuation during rainfall events
- No other information has been made available to POPE which would indicate that the scheme drainage measures are performing other than as intended. Based on the FYA site visit, the Landscape As-Built drawings, and consultation comments received, it is likely that the overall effect of the scheme on water quality and drainage remains neutral, as expected.

Physical Fitness

- Community severance and access has improved along old A419 due to the significant reduction in traffic. An NMU post opening survey had not been undertaken for the scheme and therefore there was no information which would have provided quantifiable data for usage of the PROW network. No new surveys had been undertaken specifically for the FYA POPE report. Overall the assessment of the impact of the scheme on this sub objective is neutral, as expected.

Journey Ambience

- New road layout and segregation of NMUs from traffic has led to a reduction in fear of collisions and reduced driver stress, as expected. Traveller care has been reduced, as expected, due to loss of roadside restaurants and a filling station. Traveller views are largely unchanged in quality but are more restricted with the scheme, as expected. Quality of the roadscape should improve as landscape planting matures. Overall, the assessment of the impact of the scheme on this sub objective is neutral, as expected.

6. Accessibility and Integration

Scheme Objective: To remove severance through Blunsdon Village and encourage walking, cycling and equestrians.

6.1. This chapter evaluates the impact of the scheme in terms of the accessibility and integration objectives. This involves comparing qualitative forecast assessments from the scheme AST (as shown in Chapter 7) with post-opening findings and analysis of policy objectives.

Accessibility

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 sub-objective regarding option values, the AST states that the scheme has 'no adverse impact'. As such, the AST regarded this sub-objective as 'neutral'.

Evaluation

6.5. For this evaluation, consultation has been undertaken with Stagecoach and Thamesdown Transport which operate in the vicinity of the scheme to establish how the opening of the bypass has impacted the bus network in the immediate locality.

6.6. Stagecoach operates the Service 51, which runs between Swindon and Cheltenham. Pre-scheme, this service had a stop at Ermin Street in Blunsdon in both directions. However, since the opening of the bypass, the Service 51 no longer stops at the village of Blunsdon. Adding to the route to serve the village with the new road layout in place would add considerable running time to the service, thereby deterring existing through customers from using the bus.

6.7. Thamesdown Transport Ltd operates Services 24 and 24A, which runs between the Swindon town centre and Blunsdon village. The service 24 has had various changes since the bypass has opened for various reasons.

6.8. From May 2008, the Service 24 increased in frequency to provide a service every thirty minutes, and therefore this mitigated the impact of Stagecoach's Service 51 no longer stopping at Blunsdon. Due to financial cutbacks, this service merged with Service 11 (to become Service 12), running every thirty minutes. However, largely due to punctuality issues, the Service 12 route was reduced and Service 24 was restarted in September 2013, providing an hourly service linking Blunsdon to the town centre. However, this was not a commercial success and has subsequently been reduced in frequency to every two hours. As raised by Thamesdown Transport, this latter change perhaps highlights that the village of Blunsdon itself only generates a small number of passengers. However, the reduction in service to Blunsdon village has received complaints, petitions, and requests for an improved service. Also, option values relates to the availability of different transport modes even if they are not used.

6.9. Thamesdown Transport Ltd have also raised that in providing lengthy queuing capacity for traffic joining the southbound A419 from Thamesdown Drive, the revised Turnpike junction has assisted car-based commuter flows out of North Swindon. However, the Service 24 experiences delays at peak times on the northbound approach to the overbridge junction due to the lengthy queue of traffic wishing to head south down the A419.

6.10. It has also been raised that the removal of through traffic from Ermin Street at Blunsdon have made it marginally easier for buses to travel in Blunsdon.

6.11. Regarding other transport modes, the scheme has improved access for pedestrians and cyclists by including a shared pedestrian and cycleway and incorporation of pedestrian and cycle phases at Lady Lane junction.

6.12. To summarise the above, the scheme has made it more difficult for buses to serve the Blunsdon village in an economic and efficient way, which is related loss of Stagecoach's Service 51 serving Blunsdon village. While Thamesdown's Service 24 compensated for this immediately after closing, there is now only a service every two hours at Blunsdon village. With the increased queuing capacity for southbound A419 joining Turnpike junction, delays of the Service 24 have been caused at peak times on the northbound approach. With these aspects in mind, as well as the improved pedestrian and cycle facilities, it is considered that the scheme has had a 'slight adverse' impact on option values, as expected.

Access to the Transport System

Forecast

6.13. For the access to the transport system sub-objective, the AST states that there has been 'no overall impact on alternative modes'. Given the anticipated impact, the AST forecast a score of 'neutral' for this objective.

Evaluation

6.14. The access to the transport system has been impacted for bus users, as shown through the Option Values section above. With this in mind, an AST score of 'Slight Adverse' has been applied, slightly worse than expected

Severance

Forecast

6.15. Severance is concerned with the effects of traffic on those using non-motorised modes, especially pedestrians. For the severance sub-objective, the AST states:

'The scheme will reduce severance for known NMU movements and the improved facilities may increase usage as a result of the scheme'

6.16. Given the forecast impact, severance was scored as 'large beneficial' in the AST.

Evaluation

6.17. An NMU post opening survey has not been undertaken for the scheme, and no new surveys have been undertaken specifically for this report. Therefore the evaluation of severance has focused on the qualitative impacts of the scheme as well as the residents' survey responses conducted at the One Year After (OYA) stage.

6.18. The scheme included the provision of:

- A dedicated pedestrian/cycle way on the A4311. Pedestrian/cycle phases have been incorporated in the signalised Lady Lane Junction (Figure 6.1).
- A new bridleway bridge at the end of Widhill Lane to allow non-motorised users (NMUs) to cross the bypass safely (Figure 6.2).

6.19. These features have reduced severance for pedestrians, cyclists and equestrians.

6.20. It is likely that the downgrading of the old A419 has made travelling on foot and by cycle in the village of Broad Blunsdon more appealing. Figure 6.3 shows the route of the former A419 which has been downgraded and a wide pedestrian/cycle way provided. These facilities were observed being used by multiple pedestrians on the site visit completed in August 2014.

Figure 6.1 Pedestrian crossing at Lady Lane signalised Junction

Figure 6.2 Bridleway Bridge

Figure 6.3 Ermin Street including Pedestrian/ Cycle Way

6.21. At the OYA stage, local residents who had lived in the area for more than two years were asked a number of questions on severance related issues. Some key points from this are listed below:

- Residents were asked whether they believed there had been more on-street interaction since scheme opening, of which 22% of respondents strongly agreed or agreed, 25% disagreed or strongly disagreed, while 31% answered 'neither'.
- Over a third of respondents agreed or strongly agreed that there was a more pleasant community atmosphere since scheme opening, while 48% neither agreed or disagreed or answered 'don't know'.
- 37% of respondents agreed or strongly agreed that there was a safer environment for horse riders since scheme opening, while 35% answered 'don't know'.
- Residents were asked whether the amount they travel by different modes had changed since the opening of the bypass. Over half of the respondents answered that they had not changed the amount they travel since the bypass opened. Walking and cycling were the modes with the highest proportion of respondents that stated that their use of these modes had increased (35% and 36% respectively). 29 of respondents stated that their use of public transport had decreased since the opening of the scheme, however reasons for this were not provided. This may be related to the loss of Service 51 provided by Stagecoach, as discussed in the section on Option Values.

6.22. Taking account of the results from the OYA residents' survey, and the reduction of 98% of traffic flows using the old route, the assessment score of large beneficial in the AST is considered to be correct.

Integration

6.23. 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

6.24. The transport interchange sub-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 is that the scheme will not have an impact on transport change, and therefore has a score of 'neutral'.

Evaluation

6.25. As noted in the One Year After study, following a site visit and consultation with the local bus operator, it has been confirmed that the bus stop facilities on Ermin Street have been replaced following the downgrading of the road (Figure 6.4)

Figure 6.4 Updated bus facilities on Ermin Street

6.26. The reduced traffic volumes on the former A419 have facilitated indirect public transport interchange improvements including:

- 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.

6.27. Any impacts on transport interchange are a result of both improvements to facilities due to the installation of new bus shelters and also as a result of the removal of through traffic. The AST assessment of 'neutral' impact is considered an underestimation and therefore a more appropriate assessment would be that there has been a 'slight beneficial' change. This is due to the fact that new facilities have been installed as part of the downgrading of the road.

Land Use Policy

Forecast

6.28. This section looks at the scheme in context with national, regional and local level land use and development policies (whereas Section 4.52 considers the impact of the scheme in relation to economic policies and objectives). For the land use policy objective, the AST forecast stated:

'The scheme has indirect beneficial impact on major development allocated in North Swindon although these are not dependent on the scheme'

6.29. As such, the AST forecast was that the scheme would be 'beneficial' for the land use policy objective.

Evaluation

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

	Policy/Document	Relevant Policy Objective/Reference	Relevant Scheme Impacts	Alignment
Local and Sub-Regional Policies	**Swindon Local Transport Plan Local Transport Plan 2** **(2006-2011)**	This five year strategy sets out the transport objectives which the Council wants to achieve over the LTP period. The LTP contains three main elements which are to maximise existing junction efficiency, maximise bus efficiency and to work to raise awareness of opportunities for alternatives to driving alone. The LTP has ten key objectives, including: • To maintain and make best use of the existing transport infrastructure to provide the optimum level of service for all users, with selective infrastructure improvements where an acceptable level of service cannot otherwise be achieved. • To improve road safety. • To promote travel choice and increase opportunities for travel by public transport, cycling and walking. • To improve rights of way to, from and within Swindon's urban fringe and rural buffer, to enhance access to the countryside and improve pedestrian/cycle links with the urban networks.	• The scheme has improved safety through the reduction in collision numbers. • The scheme has improved access for pedestrians and cyclists by providing a shared pedestrian and cycleway and the incorporation of pedestrian/ cycle phases at Lady Lane junction. • A new bridleway bridge at the end of Widhill Lane has been provided to allow non-motorised users (NMUs) to cross the bypass safely, reducing the A419 as a barrier. • The bypass has caused difficulty for bus services serving Blunsdon, and the frequency of services have now reduced (although this is demand related as well as due to the bypass). This may be thought to make the A419 more of a barrier between Blunsdon village and Swindon town centre.	**Partial**
	Swindon Core Strategy and Management Policies Proposed Submission Document (2009)	The proposed submission document of the core strategy plays a crucial role in providing the policy framework to deliver sustainable growth up to 2026. It states that the level of growth the Borough is expected to deliver will require significant investment in transport infrastructure, through the delivery of new and/or improvements to the existing network including the need to overcome physical barriers such as the A419 and the railway lines. Improvements will also ensure the strategic highway network does not become compromised by Swindon's growth.	• The provision of a new bridleway bridge at the end of Widhill Lane has been provided, reducing the A419 as a barrier for NMUs. • The improvement to the strategic road network inhibits it from becoming compromised by Swindon's growth.	✓
	Wiltshire and Swindon Structure Plan 2016 **(2006)**	The Structure Plan sets out strategic planning policies for the area of Wiltshire County and Swindon Borough for the period up to 2016, in support of a strategy for their future development and the conservation of their heritage. The structure plan identifies the A419 Blunsdon bypass as being needed in order to resolve congestion and collision issues, and also to enhance the strategic network to support other polices in the structure plan and the LTP.	• Journey times have reduced on the scheme section, thereby improving the strategic network. • The scheme has improved safety through the reduction in collision numbers.	✓
	Swindon Transport Strategy **(2009)**	The Swindon Transport Study provides a comprehensive understanding of the transport interventions necessary to facilitate and support sustainable growth in Swindon. The study identifies that the A419 acts as a barrier for east-west movement, particularly for pedestrians and cyclists.	• The scheme includes the Bridleway bridge for NMUs which improves the opportunity for east-west movements.	✓
Regional Policy	**South West Regional Transport Strategy** **(2006-2011)**	The key transport issues for the region have been identified through extensive consultation and partnership working as well as derived from factual evidence and studies. The key issues identified are: • Peripherality • Sustainable Transport in the Principal Urban Areas • Accessibility and social exclusion • Reducing the impact of transport on the environment • Inter-urban routes • Regeneration and Objective One The A419 Blunsdon bypass is identified as an infrastructure improvement for encouraging sustainable transport systems within and between Principle Urban Areas (PUAs) to support inter-regional movement to aid economic growth and regeneration and reduce peripherality.	• By improving the strategic road network in the area, the scheme enhances the integrated transport network at both a local and regional level, supporting economic growth objectives.	✓
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.	• Enhancements to the environment have been implemented, athough outstanding issues remain. • The scheme has improved safety through the reduction in collision numbers. • The scheme has improved access for pedestrians and cyclists by providing a shared pedestrian and cycleway and the incorporation of pedestrian/ cycle phases at Lady Lane junction. A new bridleway bridge at the end of Widhill Lane has been provided to allow users to cross the bypass safely, reducing the A419 as a barrier. • The bypass has caused difficulty for bus services serving Blunsdon, and the frequency of services have now reduced (although this is demand related as well as due to the bypass). This may be thought to make the A419 more of a barrier between Blunsdon village and Swindon town centre. • By improving the strategic road network in the area, the scheme enhances the integrated transport network at both a local and regional level, supporting economic growth objectives.	**Partial**

Key Points – Accessibility and Integration

Accessibility Impacts

- Regarding bus services, as a result of the scheme, Stagecoach's Service 51 no longer serves the village of Blunsdon. However, this is still served by Service 24, although this has been reduced to a two hourly service as it was not commercially viable for a higher frequency. Queuing at peak hours on the northbound approach to Turnpike junction has been raised as an issue during consultation with bus companies. However, it has been raised that the removal of through traffic from Ermin Street has made it marginally easier for buses to travel in Blunsdon.
- The scheme has improved access for pedestrians and cyclists by providing a shared pedestrian and cycleway, and the incorporation of pedestrian and cycle phases at Lady Lane junction.
- With the above aspects in mind, it is considered that the scheme has had a 'neutral' impact on option values, and a 'slight adverse' impact on the access to the transport system.
- Taking into account the provision of pedestrian, cyclist and equestrian facilities, the scheme has been considered to have had a 'large beneficial' impact on severance, which is in line with the AST.

Integration Impacts

- On the former A419, there has been the removal of through traffic as well as the installation of new bus shelters, leading to a 'slight beneficial' improvement in transport interchange.
- The scheme is aligned with local, regional and national policies relating to land use and development.

7. Appraisal Summary Table (AST) & Evaluation Summary Table (EST)

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 A419 Blunsdon bypass scheme.

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)

A419 Blunsdon Bypass		**Description:** 3.5km of dual carriageway bypass of Blunsdon village with a grade separated junction which provides a free flowing A419	**Problems:** High level of congestion particularly at peak times, and a high accident rate	**Scheme Cost:** £65.490 m
Obj	**Sub Objective**	**Qualitative Impacts**	**Quantitative Measure**	**Assessment**
Environment	**Noise**	Overall improvement due to the scheme. Substantial reductions in noise at properties on existing route of A419. Substantial increases in noise at the end of Widhill Lane. Mitigation designed to reduce noise impacts where practicable.	Do minimum 654 people annoyed, Do something 569 people annoyed	Estimated population annoyed by noise – 83 people less annoyed.
	Local Air Quality	Does not affect an AQMA. No predicted exceedences of the objective. >1µg/m^3 increases in PM_{10} concentration, but concentrations well below objective.	207 properties with an improvement, 140 properties with a deterioration.	PM_{10} -208.6 NO_2 -630.6
	Greenhouse Gases	Increase due to increase in speed and distance travelled.	Neutral (0.0011% increase in UK)	5980 tonnes CO_2 increase
	Landscape	Reduced lighting combined with landscape mitigation will improve views in the north and central sections of the scheme (designated Area of Local Landscape Interest). To the south of the scheme new planting will provide enhancement. There will be a reduction in visible traffic movements through Blunsdon.		Slight Beneficial
	Townscape	No effect on Townscape.		Neutral
	Heritage of Historic Resources	Slight adverse impacts upon the rural historic landscape and the setting of the Listed building at Upper Widhill Farm.		Slight adverse
	Biodiversity	Loss and severance of species rich hedgerows from Lady Lane to the bottom of Blunsdon Hill affecting habitat connectivity. Main Badger sett would be lost. Appropriate mitigation for these impacts has been identified.		Slight adverse
	Water Environment	Features and elements present in the water environment are typical of the locality and the scheme will have negligible impacts on surface and ground water quality, quantity and flow.		Neutral
	Physical Fitness	The scheme will not result in a significant increase in pedestrian journey times, and will provide new facilities and improve NMU amenity which could facilitate increased future use.	1155-Pedestrians, 394 – cyclists current number of non motorised users	Minor health benefits
	Journey Ambience	There are significant beneficial impacts in relation to driver stress, but the scheme will result in the loss of traveller facilities.		Neutral
Safety	**Accidents**	The removal of through traffic from Blunsdon and at Turnpike roundabout results in a reduction in accidents.	Accidents -225, Deaths -6, Serious -28, Slight -233	PVB £9.3m to £12.2m
	Security	No adverse impact. Lighting and Footpaths as part of the scheme enhance personal security for non-motorised users.		Slight beneficial

Obj	Sub Objective	Qualitative Impacts	Quantitative Measure	Assessment
Economy	**Public Accounts**	.	Investment cost = £58m Indirect tax revenues = -£40.8m	PVC £17.2m (average high and low growth)
	Transport Economic Efficiency	Blunsdon Bypass scheme provides benefits to Swindon. A BCR ratio ranges between 3.6 and 7.4	Provides benefits to the business users and transport of £14.8m Provides benefits to the consumers of £62.8m	PVB £14.8m (average high and low growth) PVB £62.8m (average high and low growth)
	Reliability	Congestion affects journey time reliability. At present, there is evidence of queuing at Turnpike junction, especially in the peaks. By better segregation of local and through traffic, there should be a reduction in queuing and consequent improvement in journey time reliability	N/A	Moderate beneficial
	Wider Economic Impacts	Not a Regeneration Area.	N/A	N/A
Accessibility	**Option Values**	No Adverse Impact	Neutral	Neutral
	Severance	The scheme will reduce severance for known NMU movements and the improved facilities may increase usage as a result of the scheme.	N/A	Large Beneficial
	Access to the Transport System	No overall impact on alternative modes.	Neutral	Neutral
Integration	**Transport Interchange**	None	N/A	N/A
	Land Use Policy	The scheme has indirect beneficial impact on major development allocated in North Swindon although these are not dependent on the scheme.		Beneficial
	Other Gov't Policy	Assists in achieving Government policies through improving a strategic route and contributing to economic prosperity and social integration in an environmentally conscious manner.		Beneficial

Table 7.2 Evaluation Summary Table (EST)

Obj	Sub Objective	Qualitative Impacts	Quantitative Measure	Assessment
Environment	**Noise**	Based on traffic flows, reduction in traffic flows on the old A419 route suggest that noise through Blunsdon is better than expected. At FYA stage, flows for the bypass are 5% less than predicted, while at Lady Lane they were 10% less than predicted. Noise is therefore considered to be as expected.	-	Better than expected on old A419, as expected on the bypass and Lady Lane.
	Local Air Quality	While traffic flows on the bypass and the old A419 are lower than predicted, overall, air quality is generally as expected at FYA.	-	As expected.
	Greenhouse Gases	Carbon emissions have increased since the bypass opened due to vehicles travelling at higher speeds on the bypass, although this was not as high as expected.	Re-forecast = +1,640 tonnes of Carbon Observed = +847 tonnes of Carbon	Better than expected
	Landscape	Overall the landscape impacts of the scheme are considered to be as predicted in the Environmental Statement with screening and integration functions of earthworks, planting, barriers and bunding enabling the scheme to fit well into the surrounding landscape.	-	As expected (slight beneficial)
	Townscape	The former A419 has been de-trunked, and a planting feature and facilities sign has been installed at the entrance of the village. Overall, this is considered to be neutral.	-	As expected (neutral)
	Heritage of Historic Resources	Visual assessment of the effect on listed buildings found that generally the effect of the scheme on these resources has reduced at FYA through the good growth of trees planted as a part of the scheme. Reduction in the observed traffic flows along the bypass reduces noise impacts through the scheme being located closer to listed buildings.	-	As expected (slight adverse)
	Biodiversity	Bats were found to be using a good proportion of the bat boxes installed under the contract. Bird boxes were replaced as required after incidents of vandalism. Inspection confirmed badger activity in an artificial badger sett which was provided off-site as part of the scheme. Issues with fencing.	-	Worse than expected (but not reaching moderate adverse)
	Water Environment	It appears that maintenance of the detention basins is not being undertaken to allow drainage from the basins which are supposed to remain dry during times of dry weather providing attenuation during rainfall events. No other information has been made available to POPE which would indicate that the scheme drainage measures are performing other than as intended.	-	As expected (neutral)
	Physical Fitness	Community severance and access has improved along old A419 due to the significant reduction in traffic.	-	As expected (minor health benefits)
	Journey Ambience	New road layout and segregation of NMUs from traffic has led to a reduction in fear of collisions and reduced driver stress. Traveller care has been reduced, as expected, due to loss of roadside restaurants and a filling station. Traveller views are largely unchanged in quality but are more restricted with the scheme. Quality of the roadscape should improve as landscape planting matures.	-	As expected (neutral)
Safety	**Collisions**	The annual collision saving since scheme opening is 8.2. Statistical tests indicate that this is not a result of chance alone, and there can therefore is likely that the scheme has had a direct beneficial impact since scheme opening.	-	PVB = £30.4m
	Security	As part of the downgrading of the old A419, the lighting and footpaths has enhanced personal security along part of the route. Having said this, relatively few users benefit from this. No lay-bys or emergency phones have been included as part of the scheme although the scheme is too short to warrant such facilities and the position of the junctions is likely to preclude their use.	-	As expected (slight beneficial)

Obj	Sub Objective	Qualitative Impacts	Quantitative Measure	Assessment
	Public Accounts	The outturn cost was slightly lower than anticipated.	Forecast PVC (without indirect taxation) = £58.1m Observed PVC (without indirect taxation) = £47.1m	-
Economy	**Transport Economic Efficiency**	Journey times for through traffic have reduced across the AM peak, the PM peak, and the Inter-peak periods.	Reforecast Journey Time Benefits = £117.0m (Forecast - £118.1m)	As expected
	Reliability	Reliability has not been assessed.	-	-
	Wider Economic Impacts	The A419 is strategically important to Swindon and Wiltshire. The scheme has assisted in delivering local and regional policy aspirations by improving journey times on the scheme section.	-	Better than expected (slight beneficial)
Accessibility	**Option Values**	Since the opening of the bypass, the number of bus services to Blunsdon village have reduced for various reasons.	-	Worse than expected (slight adverse)
	Severance	Reductions in severance have been achieved as a result of the implementation of a dedicated pedestrian/cycle way on the A4311, pedestrian and cycle phases being incorporated in the signalised Lady Lane junction and the installation of a new bridleway bridge at the end of Widhill Lane to allow users to cross the bypass safely.	-	As expected (large beneficial)
	Access to the Transport System	Since the opening of the bypass, the number of bus services to Blunsdon village have reduced for various reasons, however, this was initiated through the opening of the bypass.	-	Worse than expected (slight adverse)
Integ	**Transport Interchange**	There have been improvements to Transport Interchange facilities due to the installation of new bus shelters and as a result of the removal of through traffic. Although the road has benefited from new shelters, this work was carried out in order to replace existing facilities due to the down grading of the route to single carriageway. Therefore it is considered that a neutral assessment is accurate.	-	As expected (neutral)
	Land Use Policy & Other Gov't Policy	The scheme has had a beneficial impact on land use policy and other government policies.	=	As expected (beneficial)

8. Conclusions

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

Scheme Specific Objectives

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

Table 8.1 Success against Scheme Objectives

Objectives	Has the scheme objective been met?	
To minimise noise and visual impact on property in Blunsdon.	Traffic levels on the former A419 have reduced by 98%, therefore reducing noise for property nearby in Blunsdon, and improving visual impact. The former A419 has been de-trunked and adopted by Swindon Borough Council. Planting feature and facility sign has been installed, improving visual impact.	✓
To improve the safety of the A419 for all road users through Blunsdon and at the Turnpike Junction.	Collision benefits hasve been substantially greater than expected, with a collision saving of 8.2 PICs per annum across the COBA network. The number of collisions at Turnpike junction, at on the approach to it, have reduced substantially.	✓
To remove severance through Blunsdon Village and encourage walking, cycling and equestrians.	Severance has reduced through the Blunsdon Village as a result of the implementation of a dedicated pedestrian/ cycle way on the A4311 and pedestrian and cycle phases being incorporated in the signalised Lady Lane junction. There has been the installation of a new bridleway bridge at the end of Widhill Lane which allows non-motorised users (NMUs) to cross safely.	✓
To remove the bottleneck on the A419 at Lady Lane and Turnpike Junctions and improve journey times and reliability.	The bottleneck on the A419 has been removed, with improved journey times across all time periods. The scheme has increased capacity of the trunk road.	✓

9. Appendices

Appendix A. Environment Information Provided

Table A.1 – Information requested to evaluate the environmental sub-objective.

Environment Specific Requirements	OYA Response	FYA Response
Environmental Statement	Environmental Statement, Volumes 1 to 2 (March 2005).	As for OYA
AST	**AST 2005 version**	As for OYA
Any amendments/ updates/addendums etc to the ES or any further studies or reports relevant to environmental issues. Have there been any significant changes to the scheme since the ES.	ES addendum (August 2005)	As for OYA
'As Built' drawings for landscape, ecological mitigation measures, drainage, fencing, earthworks etc. Preferably electronically or CD.	Received drawings for drainage, acoustic barriers, lighting and environment (2009 and 2010)	As for OYA
Copies of the H&S File, Construction Environment Management Plan Landscape/Ecology Management Plan, Handover Environmental Management Plans	Draft CEMP provided (no date)	As for OYA
Contact names for consultation	Provided	No updates received at FYA
Archaeology - were there any finds etc. Have any Archaeological reports been written either popular or academic and if so are these available?	Archaeology report not yet available to POPE at OYA.	As for OYA
Have any properties been eligible for noise insulation? The insulation performance properties of any noise barriers installed (The BS EN 1794-2 result provided by the noise barrier manufacturer) The Road Surface Influence (RSI) value of any low noise surface installed	No noise insulation information provided to POPE	None received at FYA
Have there been any Part 1 Claims regarding noise, air quality or lighting? Have any post opening surveys been undertaken?	Part 1 information not provided – considered too early to provide information. No information relating to surveys provided to POPE	Not required in current POPE reports
Has any post opening survey or monitoring been carried out e.g. for ecology/biodiversity or water quality and if so would copies of the reports be available?	No information provided to POPE	HEMP received with some monitoring information
Animal Mortality Data	No information provided to POPE	Received from the DBFO co
Copy of post opening Non-motorised User Survey	Not undertaken (may not have been a requirement at the time of the scheme contract)	No further updates received at FYA
Any publicity material	Available from the Highways England web page	As for OYA
Information may be available regarding environmental enhancements to streetscape/townscape for bypassed settlements	No information provided to POPE	As for OYA
Employer's Requirement works Information for environment	Not provided	As for OYA
Employers Requirements Works Information – environment section	Not made available to POPE	As for OYA

A.1. ES and OYA Comparison Viewpoints

Selected views from the ES have been compared with photographs taken during the August 2014 site visit. Not all views were available from the ES site locations plans

Figure A.1 – Planting on north east embankment between Blunsdon Hill and Bypass

Figure A.2 – Hedgerow progress adjacent to listed milestone

Figure A.3 – Pond A showing reed growth around the edges of the pond

Figure A.4 – Mixed growth of trees evident south of Lady Lane junction

Figure A.5 – Selection of PROWS along and across the Lady Lane Overbridge

A.2. Aftercare Maintenance Regimes

1. This section has been extracted from the Handover Environmental Management Plan and is summarised in the relevant sub-objectives with the environment chapter summarising the operations which have been undertaken within the 5 year maintenance period in relation to each of the Landscape Elements and Environmental Elements identified in accordance with DMRB Volume 10, Section 0, Parts 2 and 3. The maintenance operations specified in the MCHW (Manual of Contract Documents for Highway Works), documentation for the scheme and the DMRB Landscape Management Handbook (Vol 10, section 3, part 2) were used to inform these maintenance operations

LANDSCAPE ELEMENTS

LE1 GRASSLAND

LE1.1 Amenity Grass Areas

2. Amenity grass was initially cut to a height of between 50-70mm once the sward reached a height of 100-150mm. All cuttings were removed off site. Subsequent cuts were undertaken to a height of between 80-100mm, under a low frequency regime of at least 3 times a year, during the growing season. All grass areas were treated by selective weed control of target species once per year.
3. Overall, grass swards have established successfully although selective weed control has only had a limited impact on preventing the spread of agricultural weeds such as Dock, Thistle, Ragwort and Hawkweed.

LE1.3 Species Rich Grassland

4. During the first spring following sowing, after the 1st April, species rich grassland (wildflower) areas were cut to a height of 75mm. Subsequently, all areas were cut to a height of 50 to 60mm in late July or early August each year, including the year of the first spring cut. All arisings were removed off Site. For all wildflower areas, weed control was carried out once per year using spot treatment with a translocated herbicide to remove undesirable species.
5. Any weed growth that could not effectively be controlled by chemical means without risk of damage to wildflowers was to be hand-weeded during each maintenance visit. Note that four areas of designed Species Rich Grassland were not managed in accordance with the Contract and have consequently reverted to Open Grassland (Figures 1 and 4). It is proposed that restoration to Species Rich Grassland is now unlikely to be successful and these areas are therefore to be managed on-going as Open Grassland.

LE1.4 Rock and Scree

6. During construction a small area of rocky outcrop was left exposed to the northbound carriageway embankment. The area was left without topsoil to allow the establishment of wildflowers. No maintenance operations have been undertaken to this area during the five year period. Wildflower establishment has been slow but the lack of nutrients have inhibited undesirable weed growth.

LE1.6 Open Grassland

7. Open grassland was initially cut to a height of between 50-70mm once the sward reached a height of 100-150mm. All cuttings were removed off site. Subsequent cuts were undertaken to a height of between 80-100mm, at a low frequency regime of at least 3 times a year, during the growing season. On all banks and ditches, grass was cut to a height of between 60 and 80mm, at a frequency of once per year. The arisings on banks and ditches were dispersed evenly over the sward avoiding blockages of drains and ditches.
8. All grass areas were treated by selective weed control of target species once per year. Overall, open grassland swards have established successfully although selective weed control has only had a limited impact on preventing the spread of agricultural weeds such as Dock, Thistle, Ragwort and Milk Thistle.

LE2 NATIVE PLANTING

LE2.1 Woodland

9. During the establishment period (the first year of the aftercare period following planting), plants were watered to ensure establishment and survival; stakes, tubes and guards were inspected and adjusted for growth or removed and disposed of off Site if no longer required; plants were straightened to an upright position and the ground firmed if required during maintenance visits.
10. It was the intention that the Contractor replaced all plants which were missing, had died, or were failing to make satisfactory growth. A number of plants failed to establish satisfactorily during the overall five year aftercare period and it is noted where such plant failures occurred after the initial 1 year establishment period. During March 2014 replacement planting works were undertaken to a number of areas where plots had been omitted in error or where plant establishment rates were considered to be unacceptably low. These works are noted in the Schedule in Appendix 5.
11. During the five year maintenance period, the areas of Woodland were maintained by spot application of herbicide and received weed control treatment four times per year until the end of the five year maintenance period. Despite this, significant weed growth continues to reemerge on an annual basis and will need to be maintained with care in perpetuity in accordance with the schedule set out in this HEMP.
12. As set out in Appendix K, Volume 2 of the Contract and Tender Information, the target percentage cover by year 5 was 80% for Woodland plots. Not all plots achieved the target coverage within this time period due to small groups of plant failures following the first year establishment period. These failures are not considered to be excessive when considered as a whole and are not considered to prevent the plots from fulfilling their objectives. Projected achievement periods are highlighted on Table 2. During the 5 year maintenance period no health (e.g. disease) or pest issues with the planting were encountered.

LE2.6 Shrubs/Native Shrub Mix

13. During the establishment period (the first year of the aftercare period following planting), plants were watered to ensure establishment and survival; stakes, tubes and guards were inspected and adjusted for growth or removed and disposed of off Site if no longer required; plants were straightened to an upright position and the ground firmed if required during maintenance visits.
14. It was the intention that the Contractor replaced all plants which were missing, had died, or were failing to make satisfactory growth. A number of plants failed to establish satisfactorily during the overall five year aftercare period and it is noted where such plant failures occurred after the initial 1 year establishment period. During March 2014 replacement planting works were undertaken to a number of areas where plots had been omitted in error or where plant establishment rates were considered to be unacceptably low. These works are noted in the Schedule in Appendix 5.
15. During the five year maintenance period, the areas of Shrubs were maintained by spot application of herbicide and received weed control treatment four times per year until the end of the five year maintenance period. Despite this, significant weed growth continues to re-emerge on an annual basis and will need to be maintained with care in perpetuity in accordance with the schedule set out in this HEMP.
16. As set out in Appendix K, Volume 2 of the Contract and Tender Information, the target percentage cover by year 5 was 90% for Shrub plots. Most plots failed to achieve the target coverage within this time period due to small groups of plant failures following the first year establishment period. These failures typically limited overall coverage to between 70 and 80%. This is not considered to be excessive when considered as a whole and are not considered to prevent the plots from fulfilling their objectives. Projected achievement periods are highlighted on Table 2. During the 5 year maintenance period no health (e.g. disease) or pest issues with the planting were encountered.

LE5 TREES

LE5.1 Individual Trees

17. During the establishment period (the first year of the aftercare period following planting), trees were watered to ensure establishment and survival; stakes, and tubes were inspected and adjusted for growth; trees were straightened to an upright position and the ground firmed if required during maintenance visits. A residual herbicide was also applied in a circle around all individual trees to minimise weed growth during the growing season.

18. It was the intention that the Contractor replaced all plants which were missing, had died, or were failing to make satisfactory growth following the establishment period. A number of plants failed to establish satisfactorily during the overall five year aftercare period and it is noted where such plant failures occurred after the initial 1 year establishment period. During March 2014 replacement planting works were undertaken to a number of areas where trees had been omitted in error or where plant establishment rates were considered to be unacceptably low. These works are noted in the Schedule in Appendix 5.

LE6 Wetlands

Banks and Ditches (LE6.2)

19. The intention during the initial 5 year maintenance period, was for grass on banks and in ditches to be cut to a height of 60-80mm, at a frequency of once per year. The arisings were to be dispersed evenly over the sward, avoiding blockages of drains and ditches.
20. The responsibility for the maintenance of all banks and ditches was handed over to the Highways England (formerly the Highways Agency) managing agent upon Practical Completion. A summary of the intended maintenance operations during the 5 year period is included within this HEMP although no further comment is provided on the performance of these tasks. Long term maintenance operations are included within this HEMP for reference purposes.

A.3. Photographic Record of Scheme

Figure A.6 – Figure 2.11a & b from ES. Representative View (foot of Blunsdon Hill) during summer: Before Scheme.

Figure A.7 – Figure 2.11a from ES. Representative View (foot of Blunsdon Hill) during summer: Indicative photomontage of scheme proposal at year 1 (Predicted)

Figure A.8 – Recreation of photomontage from Figure 2.11a from ES. Representative View (foot of Blunsdon Hill) taken during autumn 2010 (After scheme opening)

Figure A.9 – Recreation of photomontage from Figure 2.11a from ES. Representative View (foot of Blunsdon Hill) taken during Summer (August) 2014 (After scheme opening)

Figure A.10 – Figure 2.11c from ES. Representative View (Highworth Road Junction) during summer: Indicative photomontage of scheme proposal at year 1 (Predicted)

Figure A.11 – Recreation of photomontage from Figure 2.11c from ES. Representative View (Highworth Road Junction) taken during autumn 2010 (Actual)

Figure A.12 – Recreation of photomontage from Figure 2.11c from ES. Representative View (Highworth Road Junction) taken during Summer (August) 2014 (Five Years After scheme opening))

Figure A.13 – Figure 2.11e from ES. Representative View (Turnpike Roundabout) during summer: Indicative photomontage of scheme proposal at year 1. (Predicted)

Figure A.14 – Recreation of photomontage from Figure 2.11e from ES. Representative View (Turnpike Roundabout) taken during autumn 2010 (After scheme opening)

Figure A.15 – Recreation of photomontage from Figure 2.11e from ES. Representative View (Turnpike Roundabout) taken during Summer (August) 2014 (Five Years After scheme opening)

Appendix B.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.
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.
CEMP	**Construction Environment Management Plan**
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.
DBFO	**Design Build Finance and Operate.** The scheme was built on this arrangement, and operated for an agreed number of years
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.
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**
EAR	**Economic Assessment Report**
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 Years After**
Highways England	Formally known as the Highways Agency. Highways England is the new government company charged with driving forward our motorways and major A roads. This includes modernising and maintaining the highways, as well as running the network and keeping traffic moving.
HEMP	**Handover Environmental Management Plan**
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.
LEAP	**Landscape and Ecology Aftercare Plan**

Terms	Definition
MAC	**Managing Area Contractor** Organisation normally contracted in 5-year terms for undertaking the management of the road network within a Highways England area.
MVKM	**Million Vehicle Kilometres**
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.
NTM	**National Transport Model**
NTS	**Non-Technical Summary**
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.
PROW	**Public Right of Way**
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
QUADRO	**Queues and Delays at Roadworks**. A software program for calculating the monetary impacts of delays at roadworks.
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.
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/

Appendix C. Tables and Figures in this Report

Tables

Figures