

Safe roads, reliable journeys, informed travellers

Post Opening Project Evaluation

A27 Southerham – Beddingham
Improvement

Five Years After Study



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Executive Summary

Scheme Description

The A27 Southerham to Beddingham Improvement was a Highways Agency major scheme to improve the A27 near Lewes in East Sussex and removed the existing half barrier level crossing at Beddingham. The scheme opened in August 2008 and included the following key features:

- Grade separation involving the construction of a new bridge carrying the A27 trunk road over the Lewes to Eastbourne railway line at Beddingham, replacing the existing level crossing;
- Widening of the westbound carriageway to two lanes along its 1.4 mile length between Southerham and Beddingham roundabouts;
- Widening of the entries with segregated left hand turns at Southerham and Beddingham roundabouts; and
- Extension of the existing combined footpath and cycleway running along the northern edge of the A27, to just east of Beddingham roundabout.

Objectives (as at entry into major schemes programme)	Has the scheme objective been achieved?
To make the crossing of the A27 over the railway line safer	✓
To reduce delays for road users	✓
To cater more effectively for traffic using the route	✓
To provide better facilities for cyclists and pedestrians	✓

Summary of Scheme Impacts

Traffic

- Traffic flows on the A27 within the scheme have increased on weekdays on average by 4,800 to 36,300 vehicles per day (vpd) (15%) five years after opening compared with the before period. Likewise, the sections of A27 road east and west of the scheme have increased in contrast to the general reductions seen on the roads regionally during this time period.
- Analysis of traffic flows on alternative roads in the wider area has shown that additional traffic on the A27 corridor has reassigned from the wider road network.
- Compared with the forecast, traffic on this section of the A27 has 2,000 vpd less than expected but this is only a 6% difference from forecast and is largely in line with the national and regional trends of the reduction in traffic in recent years.
- On the scheme's section, journey time savings were observed in the peak and inter-peak periods in both directions. The greatest savings are 2.5 minutes for PM eastbound traffic and 1.2 minutes in the AM westbound traffic.
- Reliability for road users has improved through the provision of the bridge over the railway line and removal of the level crossing. This is an improvement on the situation with the crossing that existed before, with half-barriers and up to 8 closures per hour. Had the A27 bridge over the railway not been built, reliability in future years would have become substantially worse for road users with the introduction of full barriers at the level crossing, resulting in delays of up to 24 minutes per hour.

Safety

- Although traffic levels have increased on the A27, the collision rate for vehicles has reduced by 38% and this is statistically significant.
- Collision numbers have reduced by 3.4 per year once national trends are taken account of, but this is not statistically significant, due to the extra traffic.
- The greatest change has occurred with the prevention of collisions at the level crossing and improvement to the road standard north of the new railway bridge.
- Saving in collisions on the scheme is half that forecast.
- Removal of the level crossing has a large benefit for rail safety due to the important reduction in the risk of a road/rail collision at this point.

Environment

- Traffic flows are slightly lower than predicted (12%), although not sufficient to influence the expected score for Noise & Vibration and Air Quality.
- A slightly restricted growth rate was noted within the scheme. This is likely due to plant spacing of up to two metres for planting plots combined with chalk soils with limited topsoil.
- Monitoring of ecological features has ceased after the one year after point (OYA), hence evaluation within the biodiversity section is limited, although installed features appear to be developing as required.
- Subsequent to this scheme, an extension has been constructed provide a connection between the extended shared-use footpath/cycleway just east of Beddingham, to the Regional Cycle Route 90, linking towns and villages along the A27 corridor. It was observed during the site visit that this extension appears well-used with five cyclists noted within one hour.

Economy

All monetary figures in 2002 Prices and values		Forecast	Outturn re-forecast	
Indirect Tax impact as increasing the cost	Present Value Benefits	Journey Times	£359.1m	£286.0m
		Vehicle Operating Costs (VOC)	£60.8m	£141.3m
		Safety	£66.0m	-
		Total	£485.9m	£427.3m
	Present Value Costs (includes indirect tax)	£51.9m	£81.3m	
Benefit Cost Ratio (BCR)		9.4	5.3	
Indirect Tax impact as reducing the benefit	Present Value Benefits (including indirect tax)	Total	£463.9m	£376.2m
	Present Value Costs		£29.9m	£30.2m
	Benefit Cost Ratio (BCR)		15.5	12.5

- The scheme investment cost was £29.1m in 2002 prices, very similar to that forecast.
- The outturn assessment of the scheme's benefits show that it will provide £427.3m in present value benefits in 2002 values over 60 years, only 12% below that expected.
- The outturn BCR according to current guidance is 12.5 which represents over £12 for every £1 spent.
- Monetary benefits from safety improvements over a wide area cannot be confidently attributed to this scheme, which is worse than expected. This is due to higher than forecast level of collision reduction observed nationally; this would have reduced collisions in the area even if the scheme had not been built.
- Rail safety benefits are not included in these monetised benefits.
- Newhaven Port is linked to the strategic road network by the A26 which meets the A27 at the Beddingham roundabout so this scheme's improvements will benefit freight accessing the port.

1. Introduction

- 1.1. This report presents the Five Years After (FYA) opening evaluation of the A27 Southerham to Beddingham Improvement undertaken as part of the Highways Agency's (HA) Post Opening Project Evaluation (POPE) process.

Description of Scheme

- 1.2. The A27 Southerham to Beddingham Improvement scheme was a Highways Agency major scheme to improve a section of the A27 in East Sussex, to the south-east of Lewes. At this point the railway between Lewes and Eastbourne crosses the A27.
- 1.3. The key feature of this scheme was the replacement of the railway level crossing with an overbridge. The scheme also included improvements to the junctions at Southerham and Beddingham, and widening of the existing single carriageway to two lanes westbound. The scheme was fully opened to traffic on 22nd August 2008.
- 1.4. The location of the scheme is summarised in Figure 1.1.

Figure 1.1 – Location of scheme



Problems prior to the scheme

- 1.5. The scheme was designed to address a number of problems on this part of the network, particularly associated with the level crossing. The level crossing was located where the A27 trunk road crosses the Lewes to Eastbourne railway line, and was an automatic half-barrier crossing, which was closed up to 8 times per hour in the peak period for about 45 seconds resulting in closure of the A27 for up to 6 minutes per hour.
- 1.6. The problems before construction were:
- Congestion at the level crossing due to frequent closures
 - Congestion at the roundabouts due to limited capacity
 - Journey reliability problems due to the closures at the level crossing
 - Safety problems at level crossing for road users due to stationary traffic during level crossing closures

- Concerns over risks of road/rail collisions at the level crossing meant that, without road improvements, the crossing would be altered to a full barrier with longer closures¹.
- Rat-running of trunk road traffic avoiding this section of the A27 and travelling on less suitable roads.

Objectives

1.7. The objectives of the scheme as set out in the Explanation of the Scheme and Non – Technical Summary of the Environmental Statement (2005) were:

- To make the crossing of the A27 over the railway line safer for all
- To reduce delays for road users
- To cater more effectively for traffic using the route
- To provide better facilities for cyclists and pedestrians

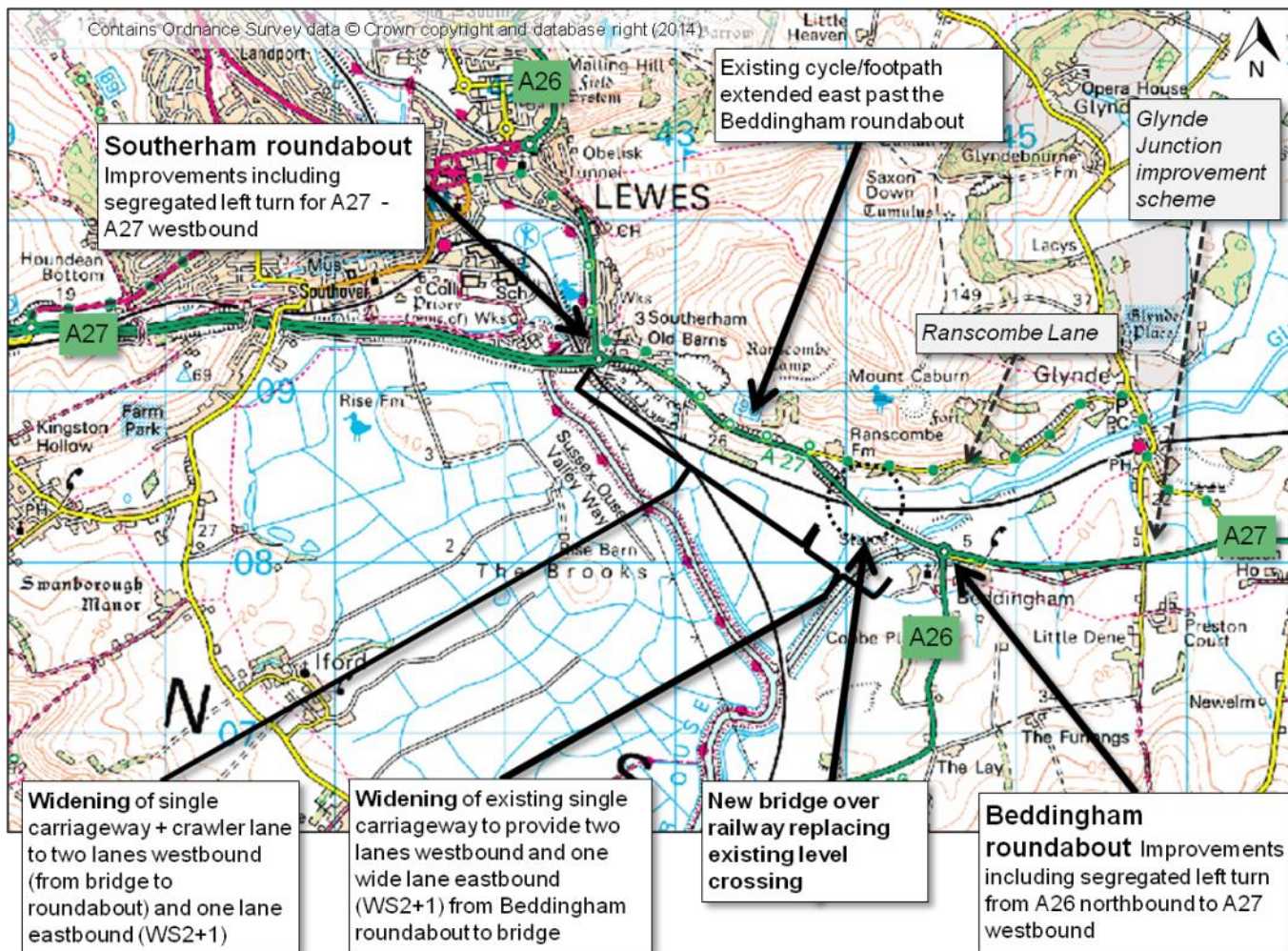
Features of scheme

1.8. Key features of the scheme are as follows, as shown in Figure 1.2:

- Replacement of the level crossing at Beddingham by a bridge over the Lewes to Eastbourne railway line.
- Upgrade of Southerham and Beddingham roundabouts, including dedicated left turn lanes, to improve safety and reduce traffic delays.
- Widening of the carriageway to improve safety and traffic flow, including extension of the existing westbound climbing lane, to run the full length of the scheme. This provides for two lanes of traffic travelling in a westerly direction, and a wide single lane for traffic travelling east (WS+1).
- Extension of the existing cycleway and footway from Ranscombe Lane junction to Beddingham.

¹ In 2002, the HM Railway Inspectorate (HMRI) gave the Beddingham level crossing site a high-risk classification, and advised if a scheme to grade-separate the crossing was not progressed, that the crossing would require upgrading to full barriers with CCTV control. Full barriers at the level crossing would result in the trunk road being closed to road traffic for up to 24 minutes in every hour, causing significant additional delays to road users and having adverse effects on the surrounding area.

Figure 1.2 – Details of scheme



1.9. Further features of the scheme include:

- Raised traffic islands installed to prevent right turns to and from access at Southerham Lane, Ranscombe Lane and a private access.
- A new underpass beneath the A27 and a new bridge over the River Ouse (Glynde Reach) maintaining farm access in the vicinity of the railway bridge.
- Replacement tree and shrub planting together with enhanced landscaping.
- Improved highway drainage treatment facilities.
- Low noise surfacing on new carriageway.

History of the Scheme

1.10. The history of the A27 Southerham to Beddingham improvement scheme can be summarised as follows:

Table 1-1 – History of Key Dates

Date	Summary
2002	South Coast Multi-Modal Study (SoCoMMS) recommended that a dual carriageway scheme be built as soon as possible
July 2003	Secretary of State (SoS) decision not to accept a dual carriageway option

Date	Summary
2003/4	Interim safety measures installed around level crossing including : improved signage, anti-skid surfacing and 40 mph speed limit
Mar 2004	Scheme with wide single carriageway added to Targeted Programme of Improvements (TPI)
Sept .2005	Public Inquiry
Aug. 2006	Scheme approved
Oct. 2006	Start of Works
15th Dec. 2007	Level crossing closed and A27 traffic switched to the new bridge
Mar. 2008	Southerham roundabout rebuild completed
22nd Aug. 2008	Scheme fully opened to traffic

Other Road Network Improvements not part of scheme

- 1.11. Within the area being considered in this report, there were two significant road schemes completed by the time of the one year after (OYA) study, namely:
- **A27 Glynde Junction Improvements**
 - Improvements to the crossroads in the A27 east of Beddingham roundabout
 - **A259 Bus Corridor (Phase 1)**
 - On the A259 between Hove and Peacehaven south of the A27, this scheme provided bus lanes, signalling improvements to signalling and crossings, and a shared use path.
- 1.12. Following the completion of the Southerham - Beddingham scheme, and since the OYA report was produced, the following separate HA scheme² was constructed and opened in 2012:
- **A27 Beddingham to Firle Cycleway.** This scheme extended the cycleway on the northern side of the A27 from the eastern end near Beddingham roundabout which had been built as part of the Southerham-Beddingham scheme, to connect with the existing path network one mile to the east near the village of Firle and provide a more direct and less hilly route than the Ranscombe Lane alternative for cyclists travelling east-west. Together, the two schemes complete the gap in the Regional Cycle Route 90 (RCR90).

Post Opening Project Evaluation (POPE)

Highways Agency's Appraisal Process

- 1.13. The HA is responsible for improving the strategic highway network (motorways and trunk roads) through the Major Schemes programme. At each key decision stage through the planning process, schemes are subject to a rigorous appraisal process to provide a justification for the project's continued development.
- 1.14. 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

² funded by NDD (Network Development Directorate)

which the DfT's objectives will be achieved³. 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 Appendix A of this report.

Post Opening Project Evaluation

- 1.15. POPE studies are carried out for all Major Schemes to evaluate the strengths and weaknesses in the techniques used for appraising schemes. This is so that improvements can be made in the future. This is achieved by comparing information collected before and after the opening of the scheme, against predictions made during the planning process. The outturn impacts of a scheme are summarised in an Evaluation Summary Table (EST) that summarises the extent to which the objectives of a scheme have been achieved. The EST for this scheme can be found in Table A.2 of this report.

Sources

- 1.16. This study has been based on observations made before and after construction, various documentary sources and consultations, summarised as follows:
- A27 Southerham to Beddingham Improvements Forecasting Report, July 2005
 - A27 Southerham to Beddingham Improvements Traffic and Data Survey Report, Jan 2004
 - A27 Southerham to Beddingham Improvements Local Model Validation Report July 2005
 - A27 Southerham to Beddingham Improvements Economic Assessment Report July 2005
 - A27 Southerham to Beddingham Improvements Departures Report June 2005
 - Public Inquiry Statement Of Case June 2005
 - Explanation of the Scheme and Non – Technical Summary of the Environmental Statement February 2005
 - Inspectors Report from the Public Inquiry
 - A27 Southerham to Beddingham Improvements Government Policy Overview and an Assessment of the Scheme.
 - Scheme Brief (including forecast costs)
 - Appraisal Summary Table (2005)
 - Environmental Statement (2005)
 - Traffic data obtained from ESCC, HA and specially commissioned surveys
 - Collision data from the police
 - Consultations
 - Site visit

Contents of this Report

- 1.25 Following on from this introduction, this report includes:
- Section 2 – Traffic Analysis.
 - Section 3 – Safety

³ In recent years these have changed, but the evaluation of this scheme in this study will use those defined at the time of its appraisal, namely Environment, Safety, Economy, Accessibility and Integration.

- Section 4 – Economy
- Section 5 – Environment
- Section 6 – Accessibility and Integration
- Section 7 – Conclusions
- Appendices
 - Glossary
 - AST and EST
 - Journey Time comparison
 - Environment
 - Tables and figures in this report

2. Traffic Analysis

Introduction

- 2.1. In order to assess the traffic impact of the scheme, the following section reports on changes in traffic flows and journey times and how these changes compare with those forecast.
- 2.2. Traffic flow analysis covers:
- Long term traffic volume trends on the A27 and A26 in this area;
 - Comparisons of before and after opening for the following traffic data:
 - Traffic flow volumes on the A27 and A26 and the surrounding road network over a wide area; and
 - Comparison of the traffic data forecasts with the observed traffic volumes.
- 2.3. Journey time analysis covers:
- Comparisons of journey times before and after opening on the A27; and
 - Comparison of changes in journey times on the A27 with that forecast.

Sources

- 2.4. This section uses data from the following sources as detailed below.

Traffic count data

- 2.5. Traffic flows have been measured by Automatic Traffic Counters (ATC). This data was obtained from the following sources:
- HA permanent ATC sites taken from TRADS;
 - East Sussex County Council ATC sites ; and
 - Temporary ATCs and a manual classified count, commissioned for this study to complete the gaps and provide data for all the sites identified in the Traffic Forecasting Report.

Journey times

- 2.6. Journey times have been obtained from the following sources:
- Moving observer surveys before start of construction and OYA;
 - Highways Agency Journey Time Database (JTDB); and
 - Sat-nav data from vehicles using the route.

Modelling

- 2.7. Forecasts of the changes in traffic flows and journey times and the background to the traffic modelling of this scheme has been taken from the following reports:
- Forecasting Report, July 2005;
 - Local Model Validation Report (LMVR), July 2005 and
 - Traffic and Data Survey Report, January 2004.

Background Changes in Traffic

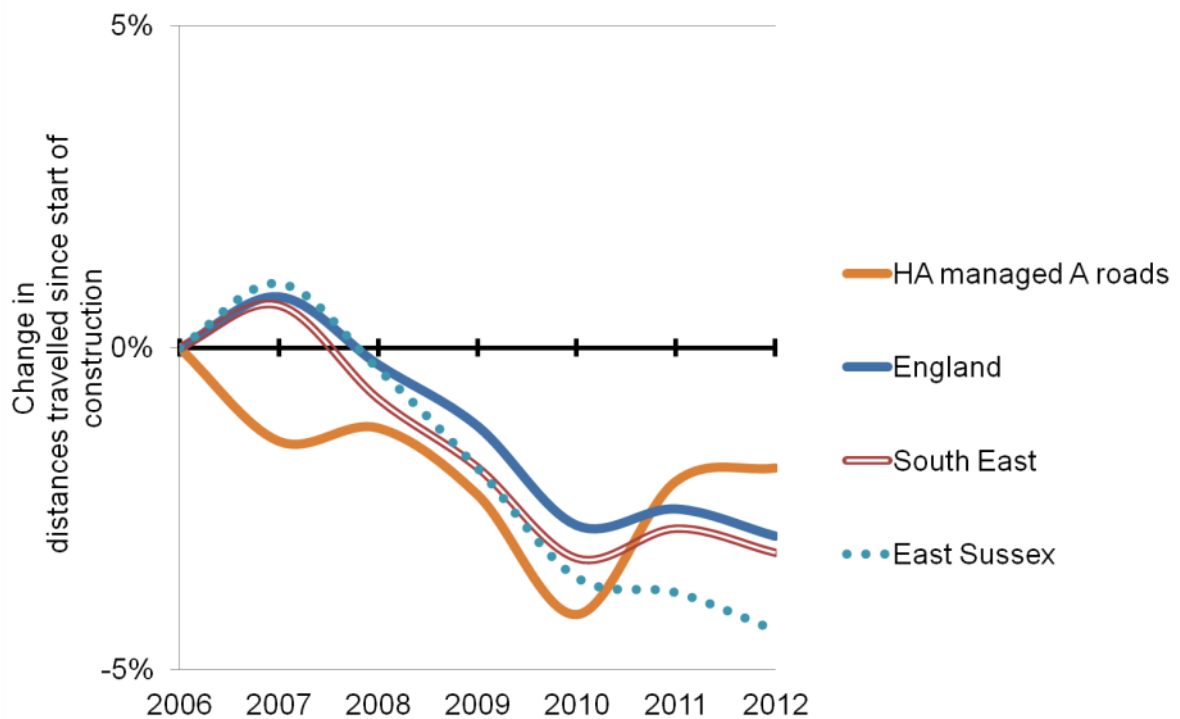
- 2.8. Historically in POPE scheme evaluations, the 'before' counts have often been factored to take account of background traffic growth so that they are directly comparable with the 'after' counts. This usually involves the use of National Road Traffic Forecasts (NRTF), with local adjustments made using National Transport Model (NTM) Local Growth Factors.
- 2.9. However, in light of the recent economic climate, which has seen widespread reductions in motor vehicle travel in the 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.

National, Regional and Local Trends

- 2.10. The best measure of the wider trends in overall traffic levels both regionally and nationally is shown in DfT annual statistics for total distance travelled (million vehicle kilometres). Figure 2.1 shows the changes by year in the period from 2006 (at start of construction) and 2012 (the latest available) for the county of East Sussex, the South East region, 'A' roads managed by the HA, and for England as a whole.

Figure 2.1 – Local, Regional and National Traffic Flow Trends since start of construction



*Sources: DfT statistical tables TRA8904, TRA4112

- 2.11. It can be seen from Figure 2.1 that since the start of scheme construction in 2006, traffic has fallen by a couple of percentage points. This is strongly linked to the economic downturn starting in 2008.

Long term traffic trends on A27 and A26

- 2.12. As was noted in the OYA study of this scheme, traffic on roads immediately adjacent to this scheme showed increases on completion of the scheme. The long term trends for the annual average daily traffic (AADT) on the A26 and A27 are shown in Figure 2.2 and Figure 2.3 together with the proportional change since 2006. Traffic trends at these two sites gives us a good indication of the pattern for traffic levels on the section of the A27 improved by the scheme, where there is no long term data due to the impact of construction on the road.

Figure 2.2 – Long Term trend on A27, east of scheme

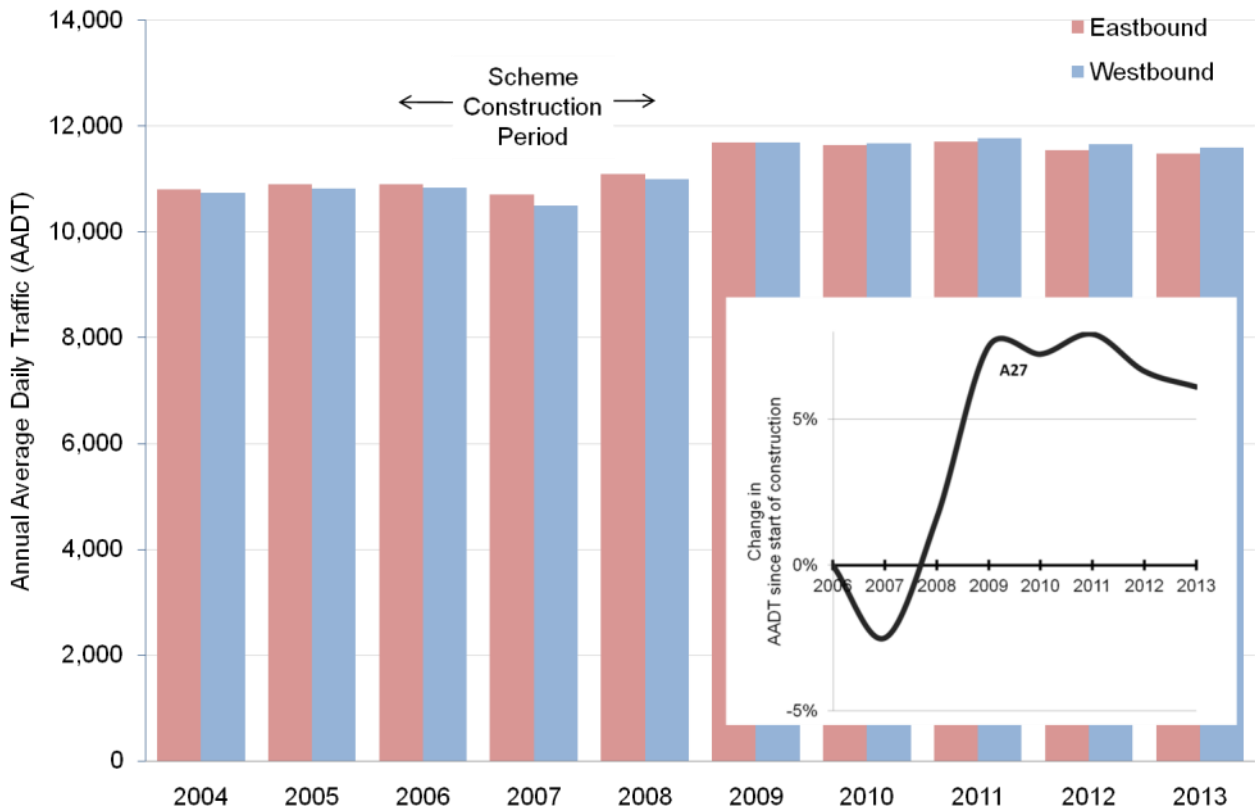
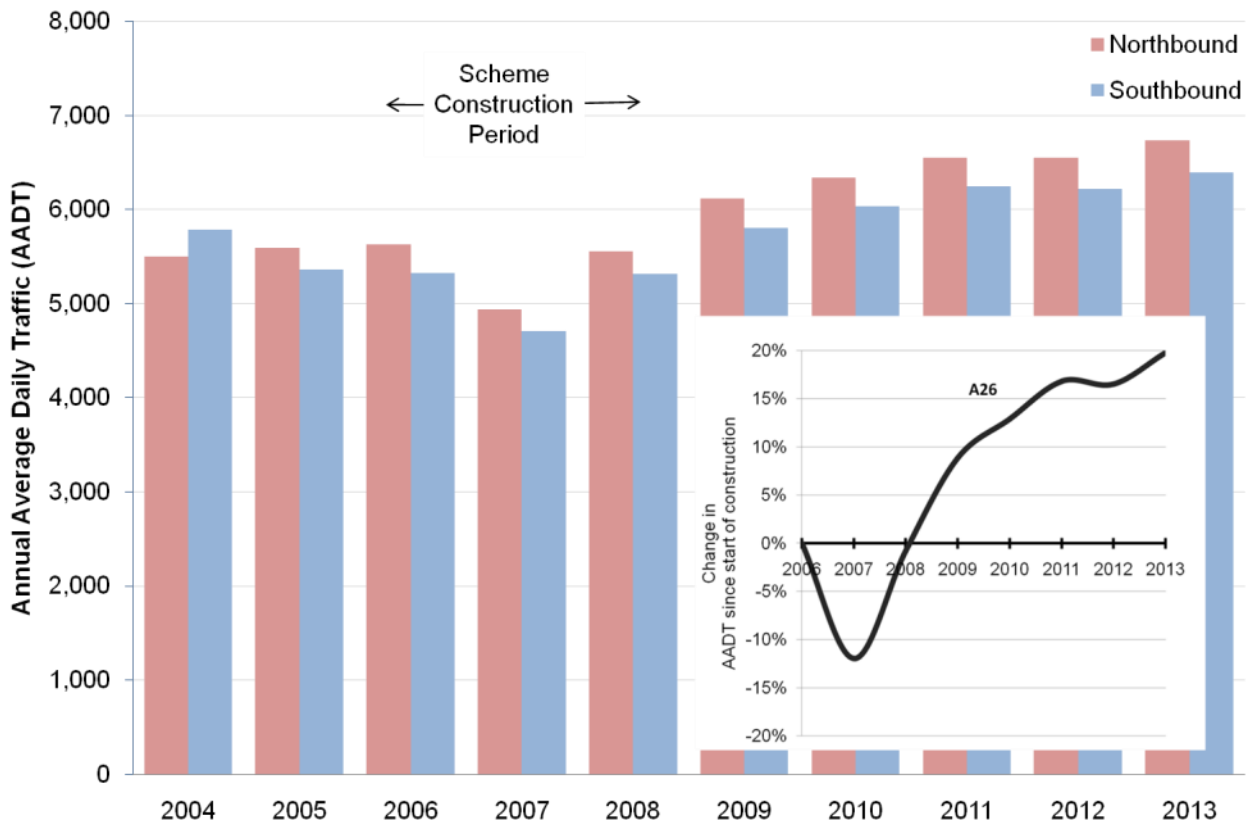


Figure 2.3 – Long Term trend on A26, south of scheme



- 2.13. The key points shown by the long term trends for the traffic flows are:
- Traffic on the A27 east of the scheme increased on scheme completion and at FYA was 6% higher than before the scheme was built.
 - A26 flows have increased by 20% at FYA compared with those before the scheme was built.
 - Unlike the wider trends seen locally, regionally, and nationally as shown in Figure 2.1, traffic volumes have not declined since 2008.

Observed Flows before construction, One Year After (OYA) and Five Years After (FYA)

- 2.14. This section of the report uses data from a variety of sources to inform the before and after analysis of changes in traffic volumes for the scheme. To complete this evaluation, traffic flow data from before the start of construction and one and five years post opening is compared.
- 2.15. Comparisons of 24-hour average weekday traffic (AWT) flows for the pre-scheme and post-opening periods are presented on maps in Figure 2.4 for the area immediately close to the scheme improvement section and Figure 2.5 for the wide area.

Figure 2.4 – Average Weekday Traffic (AWT) on road network around scheme

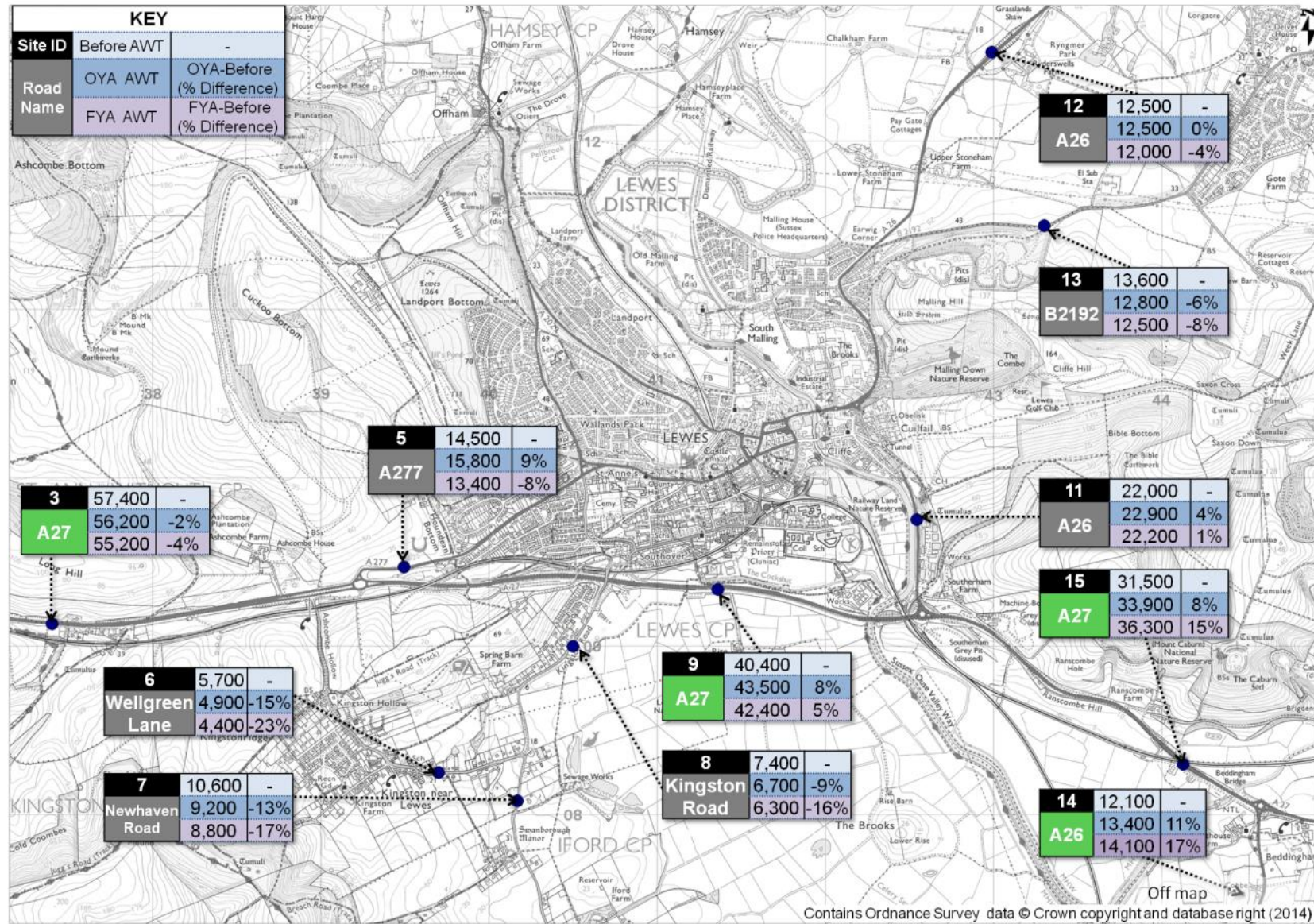
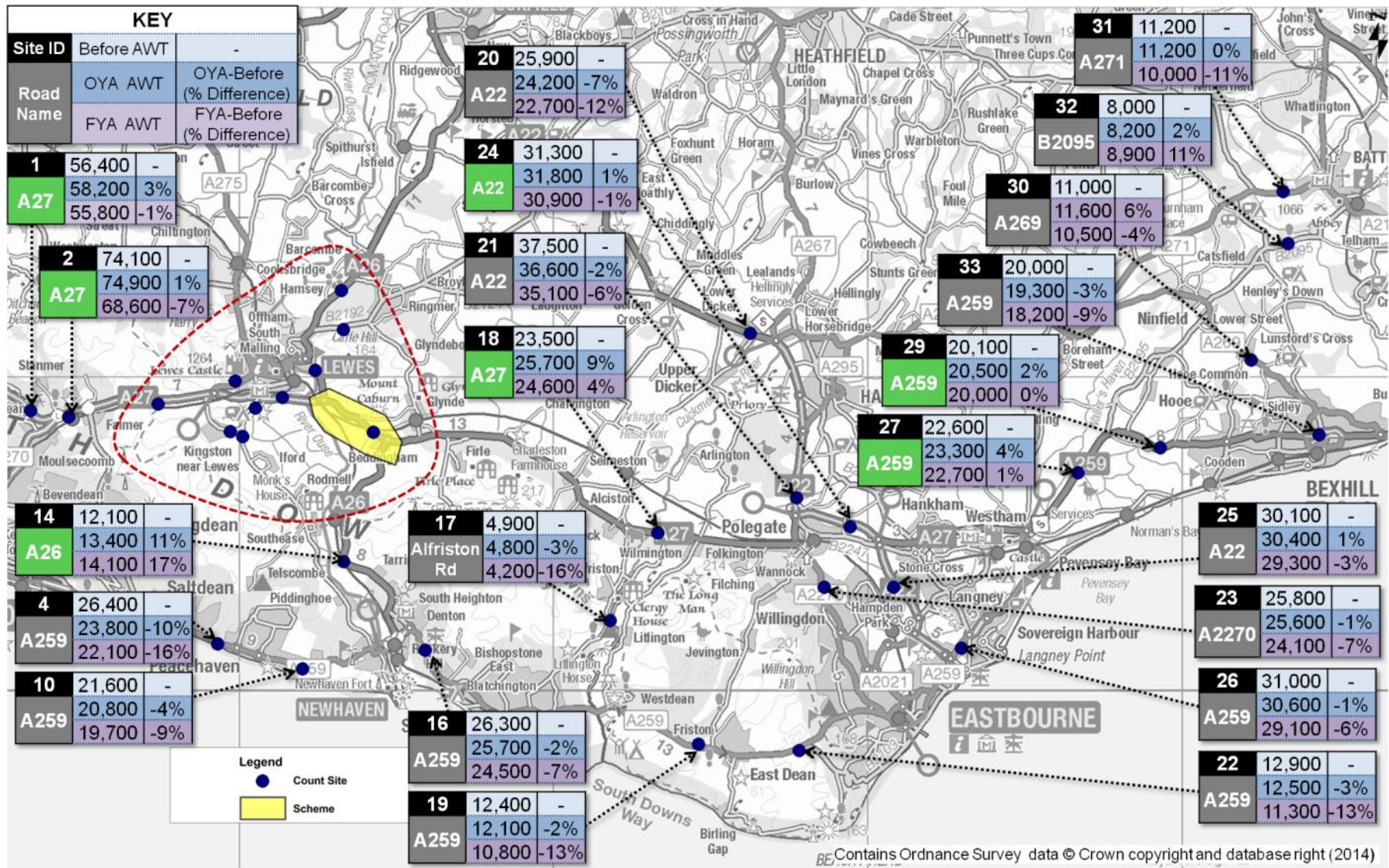


Figure 2.5 – Average Weekday Traffic (AWT) in Wide area around scheme



2.16. The key points regarding the changes in weekday traffic flows shown in Figure 2.4 and Figure 2.5 are:

Around the scheme:

- On the A27 through the scheme (site 15), weekday traffic has increased by 4,800 vehicles per day (vpd) since before scheme construction, an increase of 15%.
- South of the scheme, we see some traffic has rerouted away from the minor roads on the west side of the Ouse valley south of Lewes (Wellgreen lane and Newhaven road, sites 6 and 7) to the A26 (site 14). This was an expected benefit of the scheme as these roads were previously being used as rat-runs by traffic to avoid the section of the A27 which suffered from reliability issues due to the level crossing.
- Although less traffic approaches Lewes from the north-east on the A26 and B2192 (sites 12 & 13), there is more traffic on the A26 approaching the Southerham roundabout (site 11) which suggests that more traffic from Lewes is using this route to access the A27.

Wider area:

- The A259 which runs east-west along the coast, parallel to the A27 shows reductions in traffic of between 1,500 and 4,000 vpd at FYA. The greatest drop was on the section south of the scheme (site 4) which shows that traffic has rerouted away from the A259 to the improved A27.
- Routeing changes between the A27 and the A26 south of the scheme at Beddingham (site 14) have also had an impact on the traffic on the connecting A26 (more traffic) and Alfriston Road (site 17) which saw reduced traffic on this rat-run route.

Screenlines

2.17. Following completion of this scheme, there has been additional traffic on the A27 corridor between the A277 and Wilmington (sites 9, 15 and 18).

2.18. In order to further investigate reassignment as a result of the scheme over a wide area, a screenline analysis has been undertaken using the count sites presented earlier. Screenline analysis allows for a better understanding of vehicle movements across a wider corridor area by totalling the flows on a set of sites. The intention is to count vehicles at only one of a set of sites for each journey they make.

2.19. Six strategic screenlines have been identified for this study:

East - West movements:

- Screenline 1 – west of Lewes
- Screenline 2 – through the scheme
- Screenline 3 – east of the scheme
- Screenline 4 – west of A22 Polegate

North – South movements

- Screenline 5 – south of A27 corridor (Lewes to south of Polegate)
- Screenline 6 – north of A27 corridor (Lewes to north of Polegate)

2.20. The locations of the sites that comprise these screenlines are shown in Figure 2.6 and flows across these screenlines are shown in Table 2-1 and Table 2-2.

2.21. It should be noted that in general, traffic has fallen on many roads in line with wider trends, as shown in Figure 2.1).

Figure 2.6 – Location of screenlines

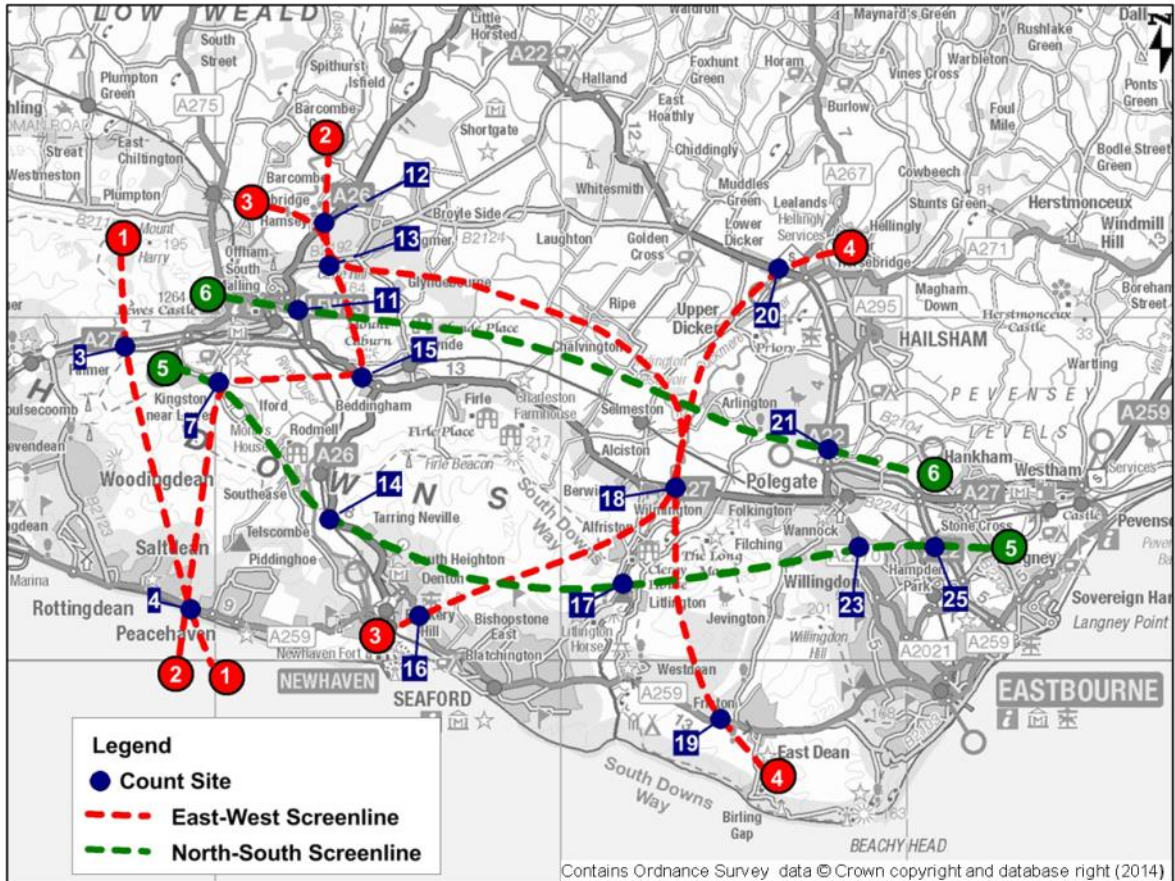


Table 2-1 – East - West Screenlines Average Daily Traffic (ADT)

East-West Screenlines			ADT			Change*	
Screen line	Ref	Description	Before	OYA	FYA	OYA	FYA
West of Lewes (1)	3	A27 west of Lewes services	54,100	53,600	51,300	-5,00 -1%	-2,-800 -5%
	4	A259 Telscombe Cliffs	25,500	22,900	21,300	-2,600 -10%	-4,200 -17%
	Screenline total		79,600	76,500	72,600	-3,100 -4%	-7,000 -9%
Through the scheme (2)	12	A26 Uckfield Road	11,700	11,700	11,100	0 0%	-600 -5%
	13	B2192 Ringmer Road	12,900	12,200	11,600	-700 -6%	-1,300 -10%
	15	A27 (scheme section)	30,200	32,500	33,400	2,300 7%	3,200 10%
	7	Newhaven Road (Swanborough Hollow)	9,600	8,400	7,800	-1,200 -12%	-1,800 -19%
	4	A259 Telscombe Cliffs	25,500	22,900	21,300	-2,600 -10%	-4,200 -17%
	Screenline total		90,000	87,600	85,100	-2,200 -3%	-4,700 -5%

*Data is round and percentage changes are based on raw data.

East-West Screenlines			ADT			Change	
Screen line	Ref	Description	Before	OYA	FYA	OYA	FYA
East of scheme (3)	12	A26 Uckfield Road	11,700	11,700	11,100	0 0%	-600 -5%
	13	B2192 Ringmer Road	12,900	12,200	11,600	-700 -6%	-1,300 -10%
	18	A27 between A22 and A26 Wilmington	22,500	24,500	23,000	2,000 9%	500 2%
	16	A259 Seaford Rd, west of Bishopstone	25,300	24,600	22,900	-700 -3%	-2,400 -10%
	Screenline total			72,400	72,900	68,500	600 1%
East of scheme west of Eastbourne(4)	20	A22 The Dicker	24,700	23,200	21,000	-1,500 -6%	-3,700 -15%
	18	A27 between A22 and A26 Wilmington	22,500	24,500	23,000	2,000 9%	500 2%
	19	A259 Seaford Road (Friston)	12,100	11,800	10,100	-300 -3%	-2,000 -16%
	Screenline total			59,300	59,400	54,100	200 0%

2.22. The key points regarding traffic flows as highlighted by the east-west screenlines are:

- The screenline through the scheme (screenline 2) showed at OYA and at FYA that the additional traffic on the A27 (site 15) is from traffic which has rerouted from other roads which are used by east-west journeys, namely the A259 and the unclassified road Newhaven Road on the west of the Ouse valley (sites 7 and 4).
- East of the scheme (screenline 3) there is a small increase observed on the A27 which, against a wider trend to traffic decreases, is due to rerouting from the wider area, especially the A259 both west of Bishopstone and Friston (sites 16 and 19).

Table 2-2 – North-South Screenlines Average Daily Traffic (ADT)

North - South Screenlines			ADT			Saving	
Screen line	Ref	Description	Before	OYA	FYA	OYA	FYA
south of A27, Lewes and Polegate (5)	7	Newhaven Road (Swanborough Hollow)	9,600	8,400	7,800	-1,200 -12%	-1,800 -19%
	14	A26 (between A259 & A27)	11,500	12,600	13,000	1,100 10%	1,500 14%
	17	Alfriston Rd	4,600	4,600	3,900	0 1%	-700 -15%
	23	A2270 Eastbourne Rd	25,000	25,000	22,700	0 0%	-2,300 -9%
	25	A22 Golden Jubilee Way	28,300	28,500	26,900	200 1%	-1,400 -5%
	Screenline total			78,900	79,200	74,300	100 0%
North of A27, Lewes and Polegate (6)	11	A26 Southerham Rd	21,000	21,500	20,600	500 3%	-400 -1%
	21	A22 Hailsham Road	36,000	35,100	32,900	-900 -3%	-3,100 -8%
	Screenline total			56,900	56,600	53,600	-400 -1%

2.23. The key point regarding changes in traffic flows as highlighted by the north-south screenlines is:

- The A26 north of Southerham roundabout and south of Beddingham roundabout (sites 11 and 14) show increased traffic in contrast with the other routes north and south of the A27 corridor which show reductions in line with wider trends. Thus the improvements to these roundabouts and the intermediate A27 is shown to have attracted traffic to that part of the network.

HGV data

2.24. Table 2-3 shows a comparison for the proportion of vehicles greater than 5.2m in length. This is used as a proxy for HGV measurements as data is available on a like-for-like basis for 2006 and 2012.

Table 2-3 – Large vehicle numbers (over 5.2m in length) on Trunk road network

Ref	Description	Number of larger vehicles per weekday				Proportion of all Traffic (AWT)		
		Before	OYA	FYA	% diff before	Before	OYA	FYA
2	A27 between A270 and B2123 (west of Falmer)	8,300	9,700	8,700	5%	12%	13%	13%
9	A27 between A26 and A277 (west of river Ouse)	5,500	6,100	6,000	9%	15%	14%	14%
14	A26 (Between A259 and A27) west of Tarring Neville	2,400	2,500	2,500	4%	21%	18%	18%
18	A27 Between A22 and A26 (Wilmington)	2,900	3,300	3,200	10%	13%	13%	13%

2.25. The main points regarding large vehicles shown here are:

- The absolute numbers of larger vehicles has increased on the trunk road network large vehicles.
- The change is in line with the increase in all traffic seen on these roads, except the A26 south of Beddingham (site 14). This route has a much higher proportion of HGVs as it provides access to the port at Newhaven, but the percentage increase in these vehicles has decreased due to light vehicles routing away from the coastal road following the removal of the level crossing as part of this scheme.

Forecast vs. Outturn Traffic Flows

2.26. This section compares the observed traffic impacts of the scheme to the traffic changes forecast in the scheme appraisal. Before undertaking an evaluation of the forecast traffic impacts compared with 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 potential differences between the traffic forecasts and the observed impacts.

Forecasts

2.27. Forecasts of the changes in traffic flows and journey times have been taken from the A27 Southerham to Beddingham Improvements Forecasting Report (July 2005)

Time periods

2.28. The base year was 2002 and the forecasted years were :

- Opening year : 2008
- Design year : 2023

Modelled Area

- 2.29. The network used for the Southerham to Beddingham Traffic Model covered a study area from Brighton in the west to Eastbourne in the east and from Seaford in the south to Haywards Heath, Uckfield and Heathfield in the north. It included all 'A' roads, 'B' roads and relevant unclassified roads within this wide area. This area was deemed suitable to represent all the routes currently being used or that are likely to be used in the future by traffic affected by the scheme and hence it covered all feasible reassignment of traffic.
- 2.30. Future flows were modelled, and compared with base year flows at several locations on along six routes in the network which were identified as alternatives to the A27 and hence could be impacted by traffic being attracted to the A27.

Basis of Modelling

- 2.31. The scheme appraisal used modelled the traffic for this scheme using software known as CUBE Voyager⁴. This included junction modelling and capacity restraint modelling. The model was developed here only for the highway elements and did not address the effect of Public Transport. It was deemed early in the development process that modelling Public Transport would not contribute significantly to the overall results of the model and development of a more complex multimodal model was not warranted.
- 2.32. Traffic inputs were based on surveys from 2003 and the base year flows were validated as described in the LMVR then factored up to 2008 using TEMPRO and modelled HGV growth. TEMPRO factoring was based on the South East Policy Dataset and adjustments made for planned changes in land use and developments. HGV growth was estimated using NRTF.
- 2.33. The Induced Traffic Appraisal showed an intermediate risk, however elasticity tests showed that the scheme would be relatively insensitive to application of elasticity techniques to estimate induced and suppressed traffic, and that this applied particularly to the differences between Do Nothing and Do Something scenarios therefore elasticity techniques were not used in the scheme forecasting.
- 2.34. The Do Minimum scenario for this scheme was Do Nothing as the only confirmed network improvements were all outside the network area.

Forecast vs Observed Traffic

- 2.35. In order assess whether the outturn flows in the vicinity of the scheme are in the region of those predicted at the time of the scheme's appraisal, forecast flows have been taken from the A27 Southerham – Beddingham Improvements Forecasting Report (July 2005) and compared to observed flows. The Forecasting Report provides forecast flows for the peak hours and inter-peak hour for the forecast opening year 2008 and design year of 2023⁵. Proxy forecast for the FYA stage has been calculated using interpolation been these.

⁴ Cube Voyager is a US software package used for modelling personal travel.

⁵ In order to convert these to AADTs, annualisation factors were applied to ensure a like-for-like comparison. The modelled time periods were the same as those used in the wider area traffic model forecasts, and the annualisation factors used were the same as those used in the Economic Assessment using the economic modelling software TUBA. AADT were then derived from the yearly total.

Forecast vs Observed at FYA

- 2.36. The OYA report noted that the observed flows before the start of construction on the scheme and immediately neighbouring roads were largely in line with those forecast for the Do Nothing scenario. Without the scheme improvements, the traffic on the A27 through the level crossing was observed as 30,200 AADT, less than 2% below the Do Nothing forecast.
- 2.37. The main differences from the forecasts were seen on the A259 south of the scheme (site16) and A22 (sites 20 and 21) to the east which have between 50% and 100% more traffic than modelled even in the Do Nothing scenario, which suggests that the model was weak here.

Forecast vs Observed at FYA

Table 2-4 – Forecast AADTs and Observed ADTs (Five Years After opening, 2013)

Ref	Description	Forecast	Observed	Difference	% differ.
5	A277 Brighton Road	12,300	12,100	-200	-2%
6	Wellgreen Lane, Kingston-near-Lewes	5,100	4,000	-1,100	-22%
8	Kingston Rd south of A27	5,000	5,600	600	12%
9	A27 between A26 and A277 (west of river Ouse)	42,200	34,400	-7,800	-18%
11	A26 Southerham Rd	24,800	20,600	-4,200	-17%
13	B2192 Ringmer Road	7,300	11,600	4,300	59%
14	A26 (between A259 & A27) west of Tarring Neville	16,000	13,000	-3,000	-19%
15	A27 at former railway crossing between Southerham and Beddingham	35,400	33,400	-2,000	-6%
16	A259 Seaford Rd (west of Bishopstone)	12,300 ⁶	22,900	10,600	86%
18	A27 between A22 & A26 (Wilmington)	20,700	23,000	2,300	11%
19	A259 Seaford Road	12,600	10,100	-2,500	-20%
20	A22 The Dicker	14,400	21,000	6,600	46%
21	A22 Hailsham Road	24,300	32,900	8,600	35%
22	A259 East Dean Road	15,000	10,400	-4,600	-31%
23	A2270 Eastbourne Rd	20,000	22,700	2,700	14%

- 2.38. Key points regarding the accuracy of the forecast traffic are:
- A27 through the scheme (site 15) has 2,000 vpd less than expected but this is only 6% and is largely in line with the national and regional trends on recent years.
 - East of the scheme, there is more traffic than predicted on the A27 (site 18), but fewer on the parallel east-west route A259 (sites 19, 22).

⁶ A259 east of Newhaven (Site 16) has double the forecast traffic. This discrepancy was also noted at the OYA stage. This is due to an error in the modelling at this location. As shown in Figure 2.5, the change from before the scheme was built is -7% AWT, which is similar to the finding at OYA. Investigation into the modelling shows that this site was not part of those surveyed for the modelling; therefore the model must have produced flows here based on erroneous routing assumptions. Site 20, A22 The Dicker shows a similar level problem and again the flows in the before period were nearly double the Do Nothing modelled flows.

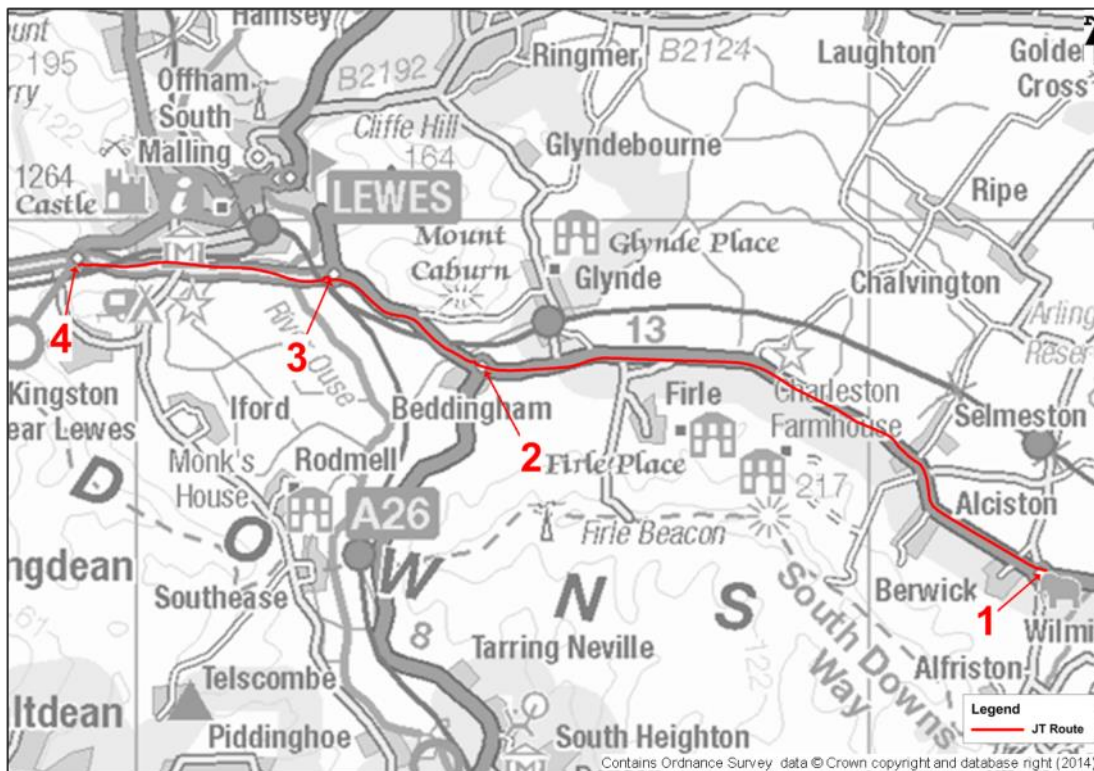
- South of the scheme, the A26 south of Beddingham roundabout (site 14) has additional traffic (see Figure 2.5), but this is 3,000vpd less than expected.
 - The reduction in traffic on the rat-run routes south of Lewes (sites 6 and 8) has been 1,100 vpd better than expected for Wellgreen Lane but 600 worse on Kingston Rd.
- 2.39. Overall, there are wide variations in the accuracy of the traffic forecasts.
- 2.40. It is worth noting that the OYA report included a more detailed assessment of forecasting inaccuracy. This looked at how closely the observed data from the before scheme period (2006) aligned with the forecast flows for the Do Nothing scenario in the opening year of 2008 and how well the baseline data used for the model (dated from 2002) matched observed data. This concluded:
- There was poor correlation between the base year data and observed 2002 AADTs at almost all locations apart from the scheme section of the A27 (Site 15), the A26 south of the A27 (Site 14), and A26 north of the A27 (Site 11);
 - Base year flows on the A259 (Site 16) and on the A22 at the Dicker (Site 20) were particularly inaccurate; and
 - The inaccuracy in the base year counts has clearly been the primary cause of the inaccurate traffic flow forecasts.

Journey Time Analysis

- 2.41. The appraisal of the scheme noted that the closures of the road due to the operation of the level crossing were a serious problem, making journey times on the A27 variable and unpredictable. Thus, one of the scheme's objectives was to reduce delays for road users. Therefore this sub-section examines the impact of the scheme on journey times. The journey time analysis is split into two components:
- Analysis of pre and post-scheme journey time differences along the scheme.
 - A comparison of forecast and outturn journey times along the scheme.
- 2.42. The calendar periods used in this study are:
- Before: 11th – 14th Sep 2006.
 - OYA: 21st – 24th Sep & 28th Sep – 1st Oct 2009.
 - FYA: 29th Oct 2012 to 28th Oct 2013.
- 2.43. Time periods surveyed were as follows:
- AM peak weekdays (Mon-Thu) (07:00 to 09:00).
 - Interpeak weekdays (Mon-Thu) (10:00 to 15:00).
 - PM peak weekdays (Mon-Thu) (16:00 to 18:00).
- 2.44. Journey time surveys were conducted by the following methods:
- Before: moving observer method with GPS (Global Positioning System) with 12 runs undertaken in each direction and time period. Delays due to level crossing closure included in these timings.
 - OYA: moving observer method with GPS with 12 runs undertaken in each direction and time period.
 - FYA: survey data on journey times sourced from sat-nav devices⁷.
- 2.45. The journey time survey routes with intermediate timing points are illustrated in Figure 2.7.

⁷ Drivers 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 2.7 – Journey Time Route with Timing Points



2.46. Table 2-5 below presents a summary of the average journey times on the route between Drusilla Park Roundabout (point 1) and Ashcombe Roundabout (point 4), using the A27 including the scheme section, recorded before start of construction, one year after opening of the scheme and five years after opening of the scheme.

Table 2-5 – Observed Journey Times (mm:ss): A27 between Drusilla Park Roundabout and Ashcombe Roundabout

Direction	Time Period	Before	OYA	FYA	OYA Savings	FYA Savings
Eastbound	AM	13:33	15:00	13:13	-01:27	00:20
	IP	11:48	12:25	12:47	-00:36	-00:59
	PM	14:08	16:17	17:22	-02:09	-03:14
Westbound	AM	16:33	14:08	13:43	02:25	02:50
	IP	12:34	13:07	12:30	-00:34	00:04
	PM	13:01	15:09	13:16	-02:08	-00:15

2.47. The key points from Table 2-5 are:

- The largest time saving of 2 minutes and 50 seconds is observed in the westbound direction during the AM peak and this is marginally higher than seen at OYA.
- In the eastbound direction, the AM peak has seen an improvement in journey times by about 20 seconds. During PM peak, journey times have increased by about 3 minutes compared with pre-scheme.
- In the eastbound direction inter-peak period, journey times have increased compared with pre-scheme and this is consistent with OYA. In the westbound direction, there is a marginal improvement in journey time of 4 seconds.
- In the westbound direction PM peak, the average journey time along the route is higher than the pre-scheme showing congestion along this route during this time period and

the net increase compared with pre-scheme is 15 seconds. However this is less than the increase seen at OYA.

- 2.48. The before construction, OYA and FYA timing point journey time comparison is presented in Appendix C. The analysis of results between timing points has shown that along the scheme section i.e. between timing points 2 (Beddingham Roundabout) and 3 (Southerham Roundabout), there are significant journey time savings in both directions across all time periods with the only exception being eastbound in the PM peak where an increase of 25 seconds is observed.
- 2.49. Congestion has increased in the FYA period compared with before construction (2006) between the timing points 1 (Drusilla Park Roundabout) and 2 (Beddingham Roundabout) and the net increase in journey time observed between this section is in the range of 1 to 3 minutes.

Analysis of data from Journey Time Database

- 2.50. The analysis of moving observer results with sat-nav data as shown above gives some ambiguous results which may be due to the moving observer method in the before period. Thus, as at the OYA stage, we have additionally investigated an alternative source of journey time data for the before period as sat-nav data is not available for that period.
- 2.51. The Highways Agency Journey Time Database (JTDB) contains average journey times and average speeds for each 15 minute period throughout the year for each junction to junction link on the Highways Agency core network. It uses data from a variety of automatic data collection sources. This has provided an alternative source of journey time data from which an assessment of journey time savings on the scheme section of the A27 can be made.
- 2.52. A summary of the before and one year after journey times in minutes for the scheme section of the A27 between Southerham roundabout and Beddingham roundabout is shown in Table 2-6. This uses only data indicated as high quality from the JDDB for before and OYA, whilst the FYA data is from sat-nav. It is noted that the JTDB data for the FYA period was of lower quality, therefore has not been used for calculations of the benefits used later in the report.

Table 2-6 – Average Journey times on A27 scheme section (minutes)¹

Direction	Time Period	Before	OYA	FYA	OYA Savings	FYA Savings
		(JTDB)	(JTDB)	(Sat-nav)		
Eastbound	AM	2:54	2:12	2:24	0:42	0:30
	IP	2:30	2:00	2:22	0:30	0:08
	PM	5:54	5:48	3:23	0:06	2:31
Westbound	AM	3:00	1:54	1:50	1:06	1:10
	IP	2:24	1:48	1:53	0:36	0:31
	PM	2:36	1:54	1:49	0:42	0:47

¹ Journey time links AL3124 E/B, and AL3123 W/B, Mondays – Thursdays only, excluding school holidays

- 2.53. The following conclusions can be drawn from Table 2-6 regarding changes in average journey times along the scheme section of the A27:
- All time periods show savings although these range from large in the PM peak EB to negligible.
 - Savings observed at FYA are largely consistent with those seen at OYA; except for the greater saving seen in the PM peak for eastbound traffic.

Reliability

- 2.54. WebTAG states that reliability is a sub-objective of the economic assessment of a scheme and refers to the impact of the scheme on improving journey time variability. It also states that assessment of reliability is a rapidly developing area.

Forecast

- 2.55. The reliability forecast given in the AST is :

The addition of the westbound lane, combined with the construction of the bridge and improvements to the junctions at Southerham and Beddingham will improve reliability

- 2.56. The quantitative assessment of the reliability impact was given as a reduction in route stress.

Evaluation

- 2.57. Route stress is a metric defined in Design and Management of Roads and Bridges (DMRB) Volume 5 Section 1 Annex D. This does not set out how the type of road included in this scheme (one carriageway WS1, other dual) should be measured and it is not known how the assessments in the original AST were calculated.
- 2.58. Improvements in reliability as measured by standard deviation in journey times cannot be calculated here as the comparable data is not available. Thus we have not evaluated the observed change in as measured by the route stress metric.

Figure 2.8 – Automatic Half Barrier Level Crossing on A27 before scheme construction



Photo from Environmental Statement

- 2.59. The major impact on reliability is simply the removal of the level crossing and hence the inevitable delays. The Public Inquiry Inspector's report stated that with the Automatic Half Barrier crossing which was in place at the time (2005) the following occurred:
- Barriers closed the road up to 8 times an hour; and
 - Total delay per hour was up to 6 minutes.
- 2.60. Without the replacement of the level crossing with the bridge (as provided by the scheme), rail safety concerns meant that Network Rail guided by the HMRI would install a full barrier crossing causing road closures of up to 24 minutes per hour.
- 2.61. The provision of the bridge over the railway line has therefore had a large beneficial impact on reliability through removal of avoided delays due to level crossing closure which with full barriers in place would have become 24 minutes per hour plus delays on the release of congestion from queuing at the level crossing.

Key Points on Traffic at FYA

Traffic flows

- Traffic flows on the A27 within the scheme have increased on weekdays by 4,800 to 36,300 vehicles per day (vpd) (15%) five years after opening compared with the before period. Likewise, the sections of A27 road east and west of the scheme (Wilmington and south of Lewes) have increased in contrast to the general reductions seen regionally during this time period.
- Analysis of traffic flows across screenlines has shown that additional traffic on the A27 corridor has reassigned from the wider road network.
- Minor roads to the west of the Ouse valley have seen reductions of between 16% and 23% as traffic has rerouted from these rat-runs onto the trunk road network following the completion of this scheme, especially the removal of the level crossing.
- Traffic on the A259 coast road which runs parallel to the A27 has seen reduced traffic from west to Eastbourne to Peacehaven.
- Traffic growth of 2,000 vpd on the A26 between the Beddingham roundabout and the port of Newhaven indicates that some strategic traffic has rerouted to use the A26 instead of the A259.

Traffic forecasts

- Compared with the forecast, A27 through the scheme (site 15) has 2,000 vpd less than expected but this is only a 6% difference and is largely in line with the national and regional trends of the reduction of traffic in recent years.
- Overall, there are wide variations in the accuracy of the traffic forecasts largely due to significant rerouting of traffic but there is no trend of under- or over-estimation.

Journey times

- On the section of the A27 improved by the scheme, there are journey time savings in the peak and inter-peak periods in both directions.
- The greatest savings on the scheme section are 2.5 minutes for PM eastbound traffic and 1.2 minutes in the AM westbound traffic.
- Journey times along a longer section of the A27 show savings of nearly 3 minutes were seen in the AM peak for westbound traffic (which benefits from the widened carriageway though the scheme and free-flow lane at Southerham roundabout) and this is similar to that seen at OYA.

Reliability

- Provision of the bridge over the railway line has improved reliability for road users through removal of the level crossing. This is an improvement on the situation with the crossing that existed before, with half-barriers and up to 8 closures per hour.
- Had the bridge over the railway not been built, then reliability in future years would have become substantially worse due to the full barrier closures at the level crossing which were due to be enforced by the Health and Safety Executive (HSE) on Network Rail as

the alternative to the bridge. In that case, the road closures would have been up to 24 minutes per hour.

3. Safety

Introduction

- 3.1. This section of the report examines how successful the scheme has been in addressing the objective of improving safety. The focus of this objective is to reduce the loss of life, injuries and damage to property resulting from transport collisions and crime. This is assessed by analysing the changes in Personal Injury Collisions (PICs) occurring in the five years before start of construction and five years after completion.

Scheme objectives:

- Improved safety for vehicle travellers, pedestrians and cyclists (non-technical summary); and
- Substantially reduced risk of road/rail collisions occurring through replacement of level crossing (stated at public inquiry).

- 3.2. It should be noted that there was no history of injury collisions involving trains at the level crossing but the potential for such incidents was an important part of the justification for the scheme. The Proof of Evidence Appendix on the level crossing stated that the HMRI had verbally indicated that the level crossing was probably the highest risk level crossing in the whole country. It surmised that there were no clear recommendations to fully address the risk other than building a road bridge.

Sources

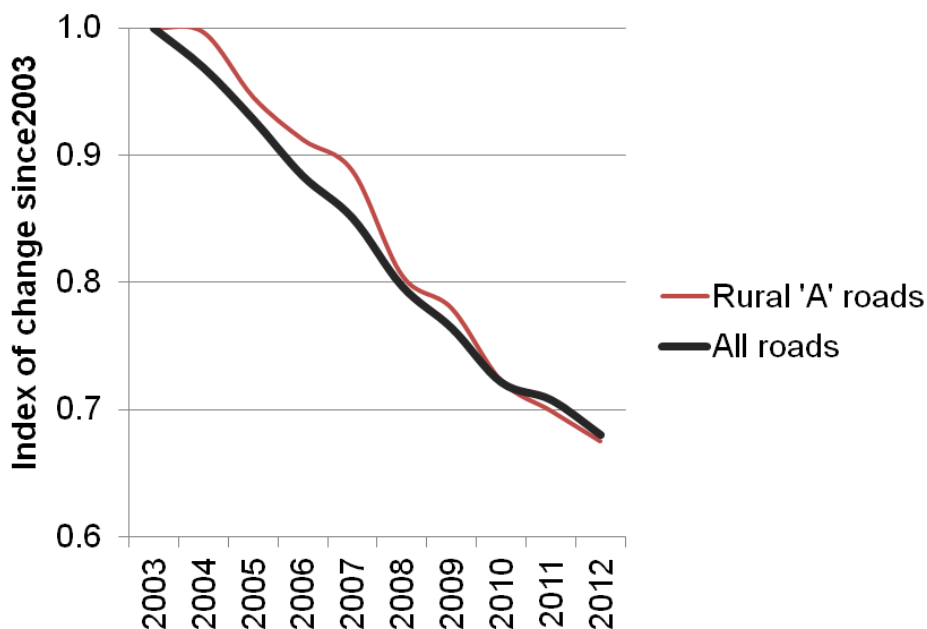
- 3.3. For the purposes of this study, collision data has been obtained from Sussex Police for the periods:
- Before construction : October 2001 – Sept 2006
 - After completion: Sept 2008 – Aug 2013.
- 3.4. The collision data is based on the records of personal injury collisions recorded in the STATS19 data collected by the police when attending collisions. Damage only collisions are not included.
- 3.5. The collision data referred to in this report has not necessarily been derived from the national validated collision statistics produced by the DfT. As such, the data may subsequently be found to be incomplete or contain inaccuracies. The requirement for up-to-date information and site specific data was a consideration in the decision to use unvalidated data, it is sufficiently robust for use in this context.
- 3.6. Analysis of the scheme's impact on Personal Security has been undertaken through use of the observations made during a site visit undertaken in May 2014.
- 3.7. Additionally, the final safety audit report was obtained:
- Stage 4 Road Safety Audit 12 month Monitoring Report.

Background Changes in Collision Reduction

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

- 3.9. The comparison needed for adjustment of the annual average collision data is between the middle of the five years post opening and the five years of the pre-construction period.
- 3.10. The approach is to use national data for the changes in the numbers of collisions in this period occurring on 'A' roads for the key links and on all roads for the wider area⁸. Figure 3.1 illustrates the changes in collision numbers by road type between 2003 and 2012.

Figure 3.1 – Trends in Injury Collision Numbers since 2003



- 3.11. These reductions in national collision numbers presented here are used in calculations of the collisions savings in this section.

Evaluation of Changes in Collision Numbers and Rates

Study Area Used: Wide area

- 3.12. Normally in major schemes appraisal, the forecast safety benefits of the scheme are derived from a COBA (Cost Benefit Analysis) model, which gives predicted collision savings for the opening year and over the appraisal period. Wherever possible, in order to evaluate the safety benefits after scheme opening, the same geographical area is studied in order to make like-for-like comparisons between the forecast and observed impacts.
- 3.13. In this instance however, the COBA input deck for this particular scheme was no longer available, and the geographical study area which was used to forecast the scheme's safety benefits is uncertain. The Local Model Validation Report (LMVR) for the A27 Southerham to Beddingham improvements scheme however gives the following description of the model area used in the appraisal of the scheme:

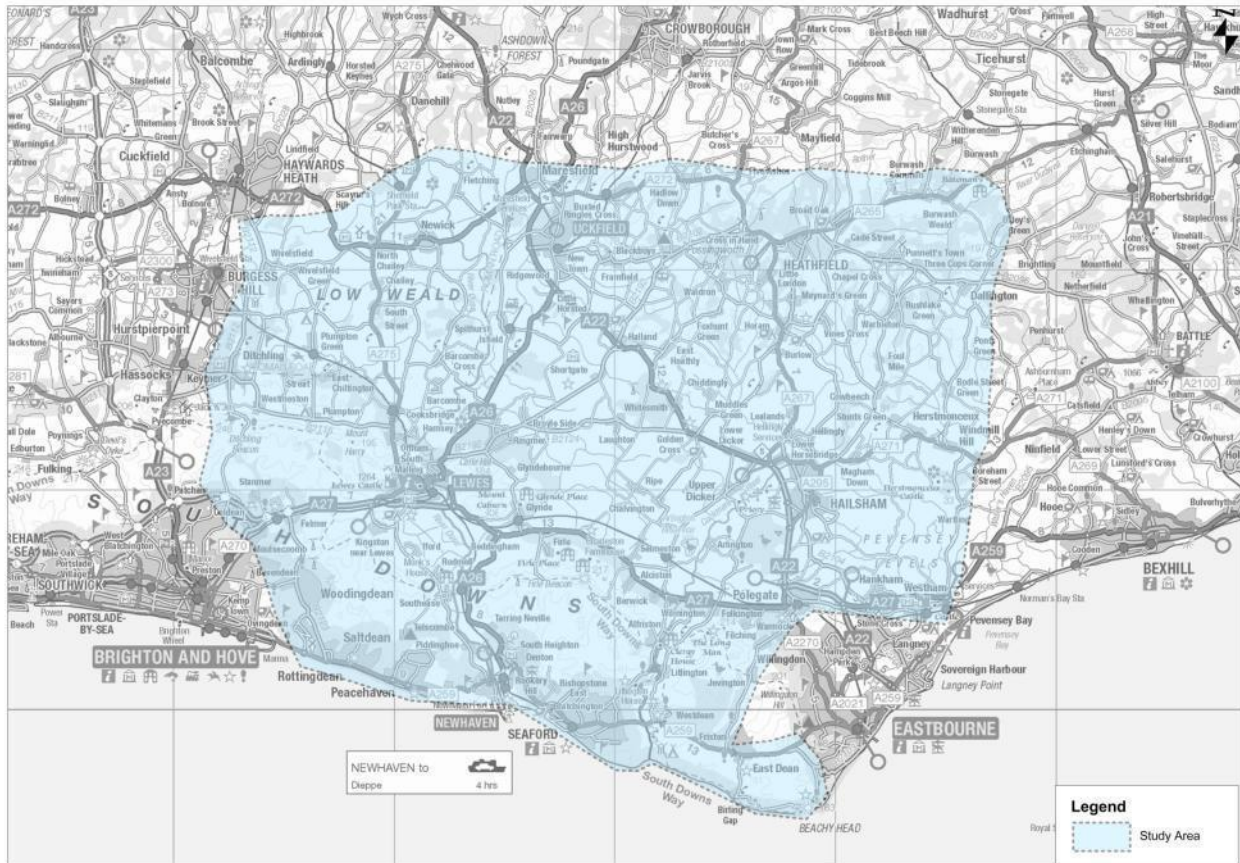
'The network used for the Southerham to Beddingham Traffic Model covers a study area from Brighton in the west to Eastbourne in the east, and from Seaford in the south to Haywards Heath, Uckfield and Heathfield in the north. It will include all 'A' roads, 'B' roads and relevant unclassified roads. This area was deemed suitable to represent all the routes currently being used or that are likely to be used in the future by traffic affected by the scheme. This network

⁸ Data sourced from DfT table RAS10002 which includes reported collisions and collision rates by road class and severity, Great Britain.

contains all major routes within the study area, but does not attempt to model intra-urban routes in detail.'

- 3.14. In the absence of more detailed information, this description has been used to determine the area for which collisions have been analysed in this POPE five years after evaluation.
- 3.15. As described above, collisions occurring within the urban areas of Brighton and Eastbourne have been excluded. Also, only 'A' roads and 'B' roads have been included within Lewes. The geographical spread of the collisions before and after opening of the scheme, indicating the extent of the study area used in this safety analysis is shown in Figure 3.2.

Figure 3.2 – Collision study area



Number of Personal Injury Collisions

- 3.16. The analysis of the PIC records for the study area and of a narrow area focused on the section of the A27 improved by the scheme has been undertaken to investigate the impact of the scheme on collisions.

Collisions in Study Area (Wide area)

- 3.17. This is the area used in the original appraisal of the scheme's impact on safety as undertaken in the COBA⁹ modelling as shown in Figure 3.2. An analysis of the collision numbers five years before the start of construction, and the five years after opening is shown in Figure 3.3 and annual averages in Table 3-1.

⁹ COBA is Cost Benefit Analysis software, used in the case of this scheme solely for the safety impact.

3.18. We also present the annual savings including an adjusted saving based on the counterfactual scenario in which it is assumed that without the scheme in place, the collision numbers in this area would have reduced in line with the national trend during the time period.

Figure 3.3 – Number of Collisions by year: study area

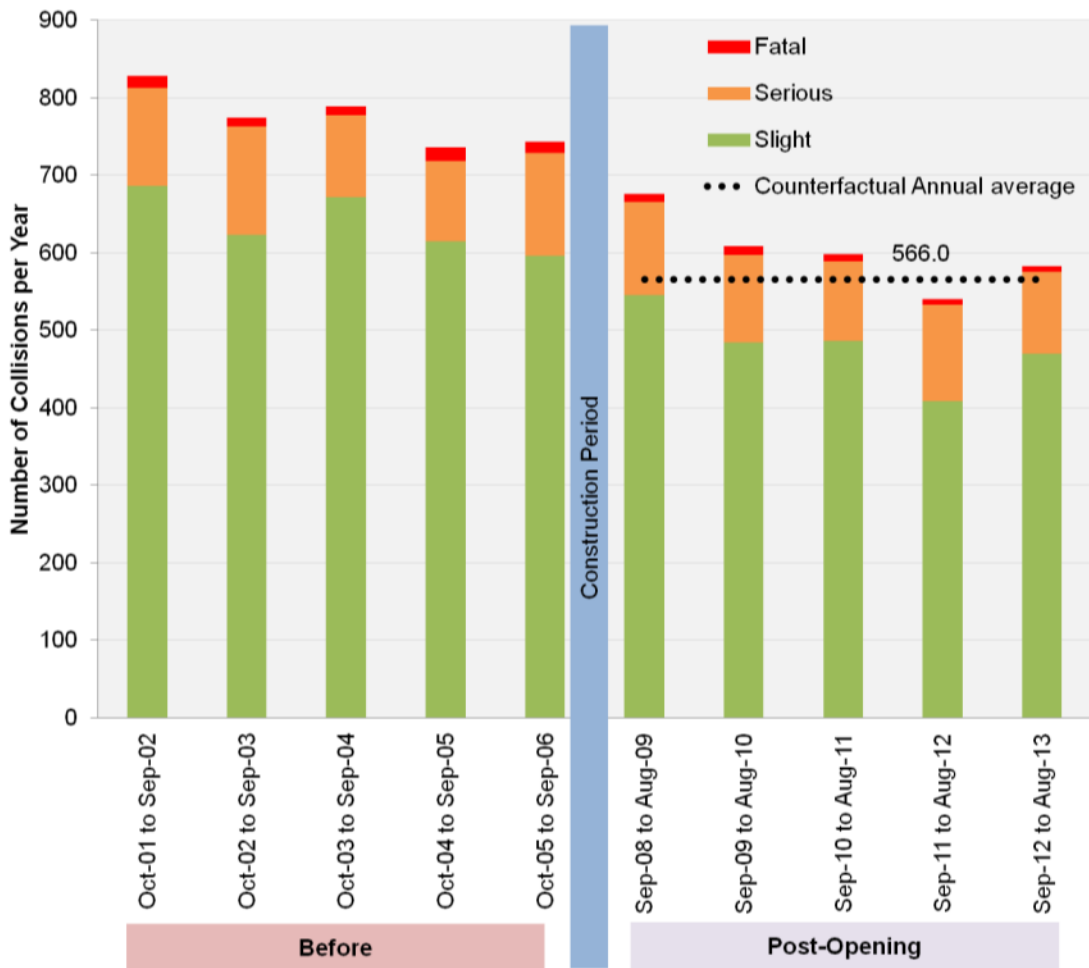


Table 3-1 – Annual Average Number of Collisions in Study Area

	Before	After	Difference	% diff
Fatal	14.2	9.0	5.2	37%
Serious	121.9	113.0	8.9	7%
Slight	639.0	479.2	159.8	25%
Total	775.0	601.2	173.8	22%
Total Adjusted counterfactual*	566.0		-35.2	-6%

*Adjusted figure is the counterfactual annual average i.e. the estimated annual average if collisions risk due to the road layout was the same as observed before construction, reduced by the background trend observed nationally.

3.19. The key points regarding collision numbers in the study area shown in Figure 3.3 and Table 3-1. are:

- The post opening period shows a reduction in collisions in this area compared with the before period of 25%.

- However, during this period there was a national trend in the reduction of injury collisions at a slightly greater rate of reduction. Thus when the counterfactual is calculated to take this safety improvement trend into account, there is a net change of 6% additional collisions in this area. Statistical tests on these results show this increase is significant.
- The size of the area and hence large number of collisions within this time period examined mean that the impact of this improvement on a small part of the network (forecast to be a 1% reduction), is difficult to isolate from the other influences during this time period.

3.20. Due to the size of this area, we have not presented the locations of these collisions on a map, but do so in the following sub-section where we examine the impacts in a much narrower area, that most directly impacted by this scheme.

Collisions in Local area close to the scheme

3.21. In addition to the analysis of collision in the wider study area, we also examine the collision data in the immediate proximity of the scheme. The numbers are shown by year in Figure 3.4, annual average in Table 3-2 and the spatial distribution is mapped in Figure 3.5. The counterfactual annual average is based on the national reduction in collisions on rural 'A' roads in this period.

Figure 3.4 – Number of Collisions by year: scheme area

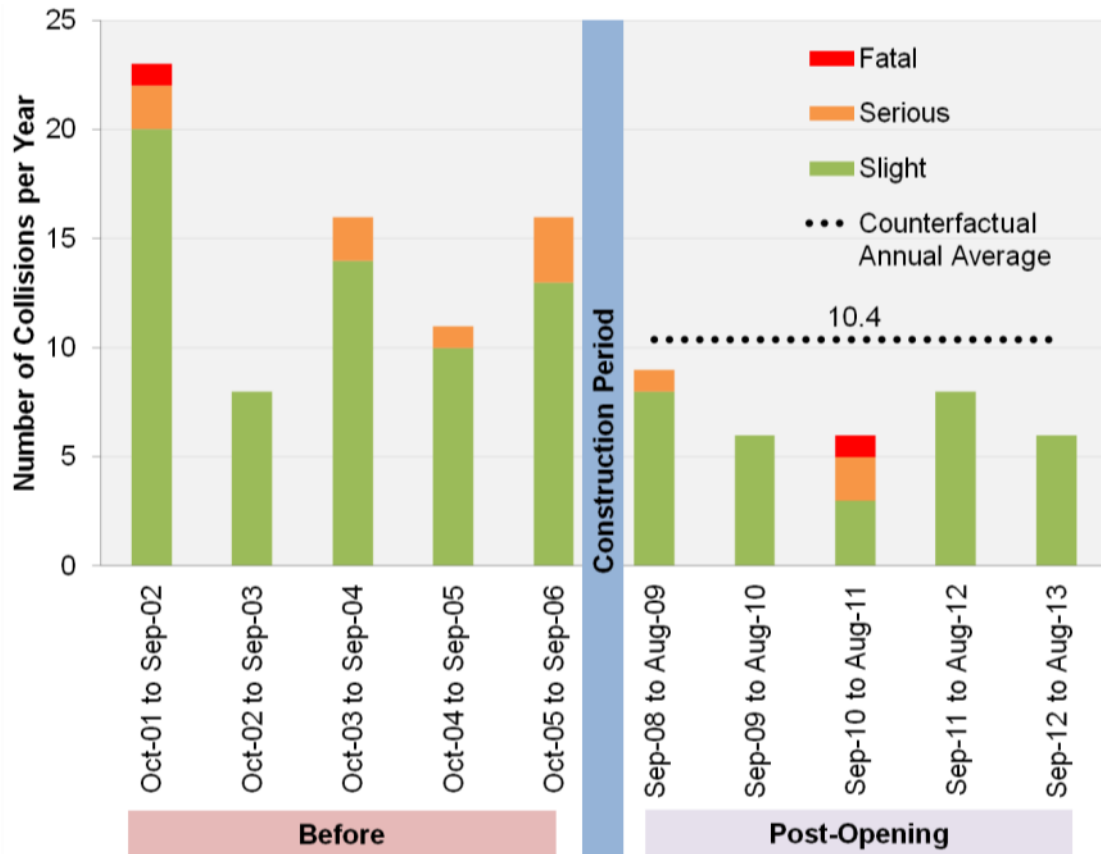


Table 3-2 – Annual Average Number of Collisions in Scheme Area

	Before	After	Difference	% diff
Fatal & Serious	1.8	0.8	1.0	56%
Slight	13.0	6.2	6.8	52%
Total	14.8	7.0	7.8	53%
Total Adjusted counterfactual*	10.4		3.4	33%

*Adjusted figure is the counterfactual annual average i.e. the estimated annual average if collisions risk due to the road layout was the same as observed before construction, reduced by the background trend in rural 'A' roads observed nationally .

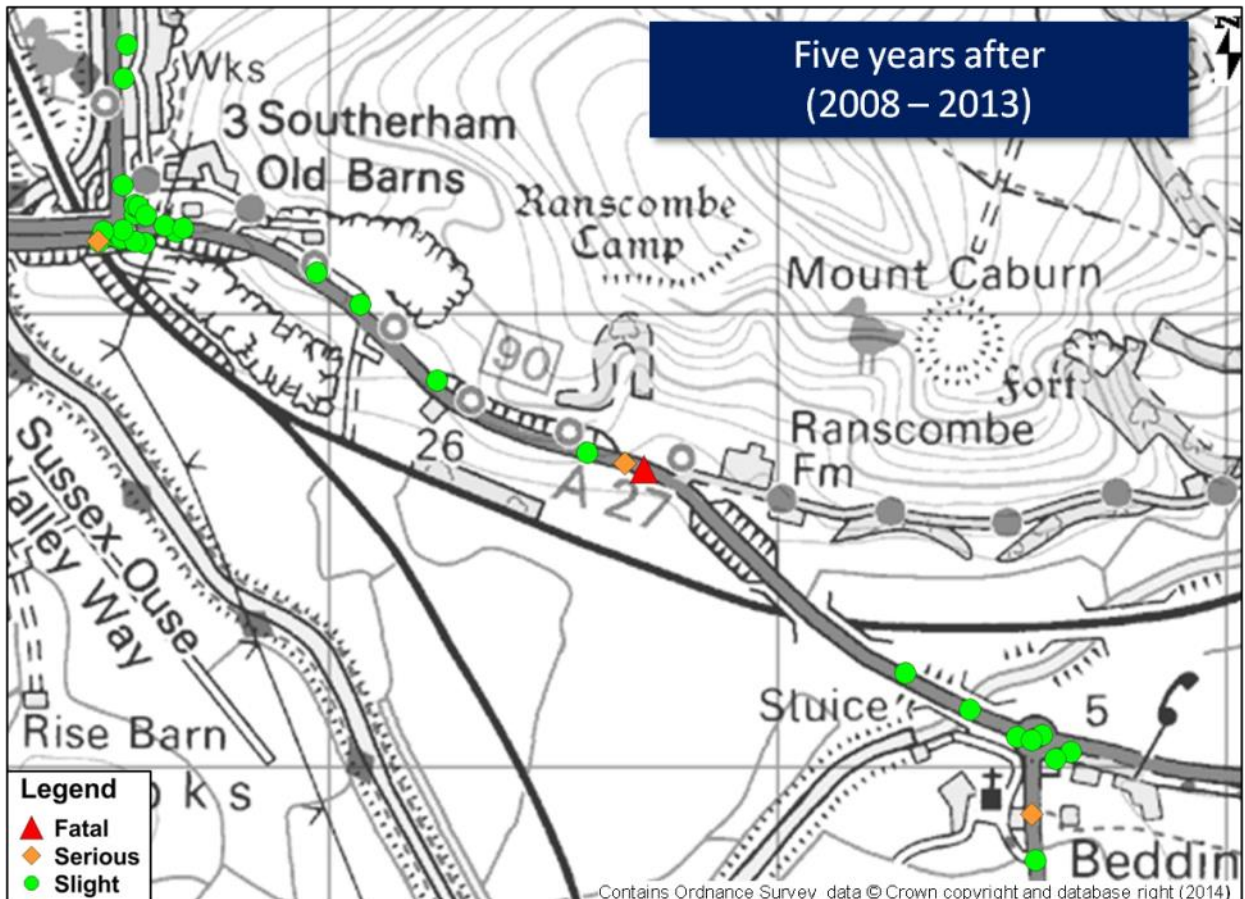
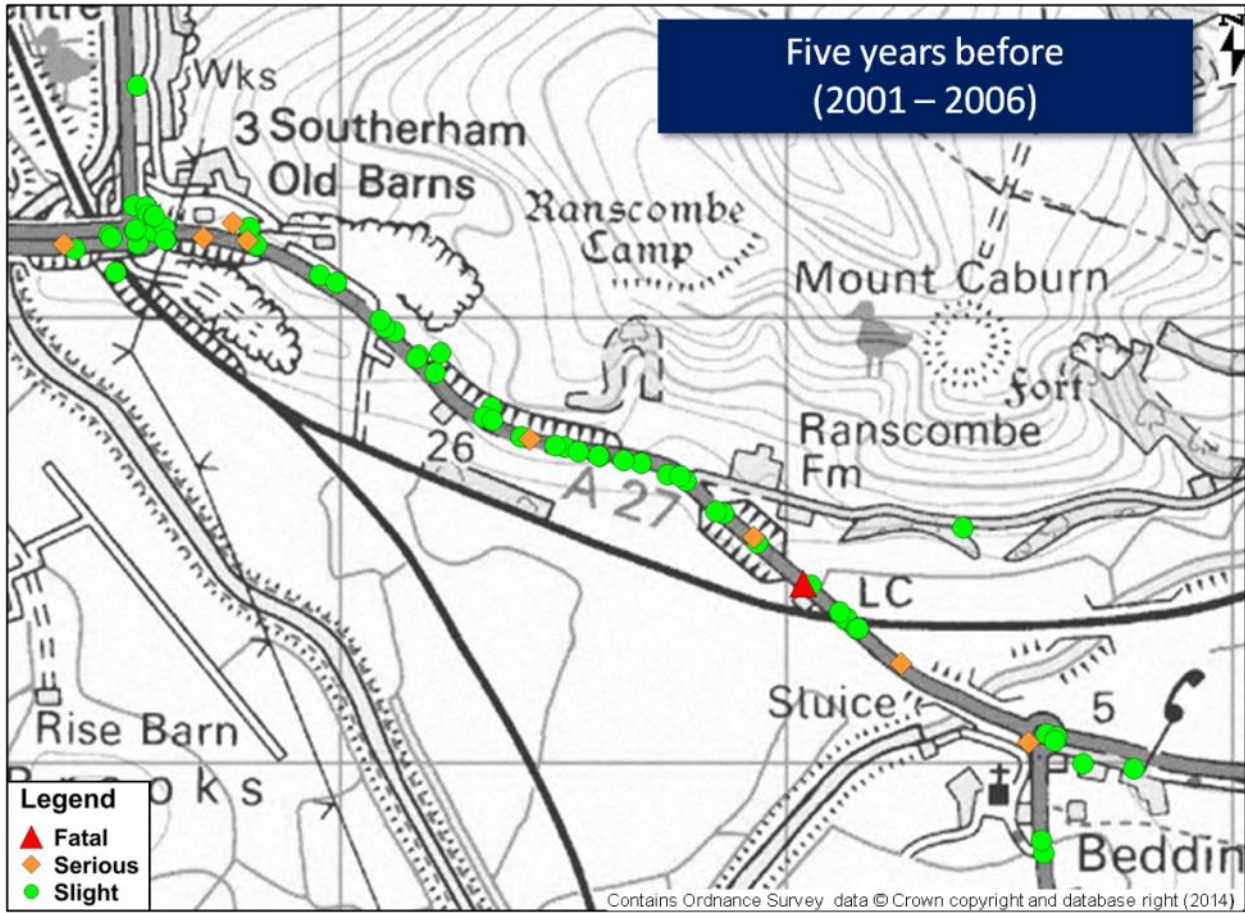
3.22. The key points regarding collision numbers in the study area shown in Figure 3.4, annual average in Table 3-2 are:

- Post opening, there is a clear drop in the collision numbers within the scheme area.
- The annual number of collisions dropped by 53%.
- Fatal and serious collisions, although the numbers are small, do follow a similar trend to overall collision numbers which is better than the wider area.
- When the background trend reduction is taken into account, there is still a saving of 3.4 collisions annually (33%), however this is not a statistically significant finding.
- This saving is despite extra traffic in the corridor. Hence we can infer that that the apparent increases in collisions in the wider area shown by comparisons with the counterfactual rate is not due to the scheme and is more likely to be due to trends in this area differing from the national trend.

Location of Collisions in Scheme area

3.23. Figure 3.5 maps the locations of collisions in the scheme area in the five years before and after the scheme was built.

Figure 3.5 – Collision Locations: five years before and after



- 3.24. Key points on the changes to the locations of collisions around the scheme are:
- Before the scheme was built, the presence of the level crossing on the truck road and associated queues is clearly linked with the cluster of collisions close to the crossing.
 - The section of the A27 west of the former level crossing shows much fewer collisions which is probably due to the widening of the westbound carriageway of this section which provides a crawler lane for slower-moving traffic uphill to the roundabout here.
 - Southerham roundabout shows no clear change in collisions.

Collision Rate on Scheme section

- 3.25. Since the scheme opened, there has been more traffic attracted onto the A27 therefore it is useful to examine the accident rate within the scheme to take this into account.
- 3.26. The measure used is referred to as PIC/mvkm which is the number of Personal Injury Collisions per million vehicle kilometres travelled. A counterfactual has also been calculated based on the national change in collision rate per billion vehicle kilometres in the period 2004-2011 on 'A' roads. These are shown in Table 3-3.

Table 3-3 – Collision Rates (PIC/mvkm) on the key links including adjustment for national reduction trend

Observed Annual average	Collision Rate PIC/mvkm
Observed before	0.501
Counterfactual before	0.352
Observed after	0.218
Net Saving	0.134 (38%)

- 3.27. The key points from the change in collision rates on the roads within the scheme as shown in Table 3-3 are :
- Despite the increased traffic travelling through the scheme (as shown earlier) the collision rate has fallen.
 - The collision rate has dropped by 38%.
 - This is a statistically significant result reduction.

Casualties

Number of casualties and KSI

- 3.28. The numbers of people injured in the collisions shown in Table 3-2 for the narrow area around the scheme has been analysed and the annual average number of casualties is shown in Table 3-4. This also shows the proportion of casualties who were Killed or Seriously Injured (%KSI).

Table 3-4 – Casualties: annual average number and severity

	Before	After	Difference	% diff
Fatal & Serious	2.6	0.8	1.8	69%
Slight	22.6	9.2	13.4	59%
Total	25.2	10.0	15.2	60%
Total *(adjusted)	18.3		8.1	45%
Killed or Seriously Injured index	10%	8%	2%	

3.29. The key points regarding casualty numbers are:

- The number of casualties injured in collisions in the scheme area has reduced by 60%.
- The proportion of KSI casualties has fallen at a greater rate than for casualties overall.
- Taking into account the national trend there is a reduction of 8.1 casualties (45%) per year.
- Statistical tests on this result show that this reduction is significant even when the national trend is considered.

Fatalities & Weighted Injuries (FWI)

3.30. The collision rate discussed above and shown in Table 3-3 does not take into account the severity of collisions. To analyse this we now present the Fatalities and Weighted Injuries (FWI) metric which is a combined measure of casualties based on the numbers of fatal, serious and slight casualties. The FWI for the five years before and after periods are shown in Table 3-5. To take into account the increased traffic on the A27 and for comparison with other schemes, we also present the FWI rate per billion vehicle kilometres (bvkm).

Table 3-5 – FWI on the improved section of the A27

Period	FWI/collision	FWI/year	FWI/bvkm
Five years before construction	0.045	0.67	22.6
Five years after opening	0.050	0.35	11.0
% saving	12%	-47%	-51%

3.31. The key points here are:

- The FWI per year has reduced by 47%
- When the additional traffic is taken into account, the ratio of FWI/bvkm has reduced by 51%.

Non-Motorised User Casualties

3.32. One of the scheme’s objectives was to improve facilities for these users. Thus we have looked at the safety record in the immediate area.

3.33. There was only one recorded collision involving a pedal cycle rider casualty in the before period and this occurred on the A27, 0.7 km east of Southerham Roundabout and there have been none afterwards.

Issues from RSA4 (Stage 4 - 12-month monitoring report)

3.34. The 12 month report issued in December 2009 noted recurring instances of safety barrier damage at the dedicated through lane for westbound A27 traffic at Southerham roundabout. This was believed to be due to excess speed.

3.35. This issue had been identified earlier and the signage changed to highlight the tight bends: the advance direction sign on the westbound approach was replaced with one more clearly showing the Splitter island and addition slow signs added. No change was made to the splitter island. RSA4 auditors recommend the removal of the splitter island but the designers did not agree as the evidence was insufficient.

Forecast vs Outturn Collision numbers

3.36. The Economic Assessment Report states that safety benefits were calculated using a combination of the COBA11 R6 software and manual calculations as follows:

- Scheme area and the connecting links were modelled in COBA using traffic flows from wider area traffic model.
- Manual calculations were then used for the remaining sections of the network. Total vehicle kilometres were extracted from the Wider Area Traffic Model for the peak periods then factored up using standard factors for the average accident rate by year for 2008 and 2023 for Other S2 Road. Accident number was then calculated by multiplying the benefit in total vehicle kilometres by the accident rate.

3.37. This approach to looking at the wide area took into account the extra traffic on the A27 in the scheme and rerouting over wide area. However, it is clear that the decrease in vehicle kilometres from vehicles now using the shorter route via the A27 will lead to a reduced accident rate.

COBA forecast for immediate area

3.38. The forecast 60 year collisions saving for links and junctions in the COBA network of links in the area around the scheme were 382.1 accidents in 60 years. The opening year figure was not given, so we estimated it using the PAR methodology which specifies a factor to estimate 60 year benefits from one year estimate. Used in reverse, this shows that the predicted opening year collision saving in this area is approximated to be 6.

Wide area

3.39. Manual calculations were used for the remaining sections of the network. This used the total vehicle kilometres extracted from the Wider Area Traffic Model for the peak periods which were then factored up using the DMRB guidance. The equivalent vehicle kilometre values from the COBA assessment were then subtracted from the traffic model, to avoid duplication and the difference between the Do Nothing and Do Something total vehicle kilometres was then calculated to give the benefit.

3.40. This gave a prediction of a saving of 10 collisions in the opening year.

3.41. Much of the benefit over 60 years was the wider area and this was due to the reduction in vehicle kilometres due to traffic rerouting back onto the A27.

3.42. The comparison between the forecast and observed data is set out in Table 3-6.

Table 3-6 – Forecast vs Outturn Collision Numbers

Annual collision saving	Forecast		Observed annual average saving in first 5 years post opening			
	Saving in opening year	% saving	Actual ¹	% saving	Adjusted ²	% saving
Scheme area	6.8	44%	7.8	53%	3.4	33%
Study Area (wide area)	10	1%	173.8	22%	-35.2	-6%

¹ Observed data not adjusted for additional traffic

² Observed change adjusted for background reduction occurring nationally

- 3.43. The key points regarding the difference between the observed data and the forecasts are:
- The forecasting of the safety impact of the scheme was that there was expected to be a reduction in the network improved by the scheme (6.8) and a reduction spread over a wide area due to traffic rerouting to the A27 and away from less suitable roads.
 - In the scheme area, the reduction in collisions with the scheme has been 33% with the scheme compared with the expected numbers without the scheme (based on the observed number of collision before construction, reduced by the background trends). This is lower than the forecast of 44% reduction.
 - In the wide area used in the appraisal it was forecast that the scheme would reduce collisions by 1%. The observed data of the reduction in this area shows a large

reduction of 22% but this is attributed to a wide range of factors which have impacted road safety nationally during this period. It is not feasible to identify the proportionally small impact due to the scheme from the other safety impacts in this area. When the national trend is applied to the numbers for this area, there is a net increase in collisions but we do not conclude that this is due to the scheme.

Rail safety

- 3.44. A key objective of the scheme was to remove the risk of collisions between road vehicles on the A27 and trains at the level crossing. There is no recent history of such collisions occurring at this location so there is no analysis presented here but it is worth noting the importance of the benefit of the scheme for rail safety.
- 3.45. The scheme removed a level crossing which was one of the last remaining on the trunk road network and was crossed by over 30,000 vpd. According to discussion with HMRI at the time of the planning of this scheme, the crossing was considered to be one of the highest risks in the country of road/rail collision.
- 3.46. The construction of the A27 overbridge to modern standards by this scheme has reduced the risk of road/rail collisions at this location from the high level before, to the normal very low level of modern road bridge with safety parapets over a railway line.

Security

Forecast impacts on Security

- 3.47. The Security sub-objective was included in the scheme's AST which states 'Improved traffic flow on the A27 and at junctions improves security' with an assessment given of 'slight beneficial'.

Evaluation

- 3.48. Reference to WebTAG Unit 3.4.2, 'The Security Sub-Objective', suggests the only security indicators for a highway scheme which is relevant to this scheme is the impact on the risk of smash and grab type of crime for traffic queuing at the level crossing and roundabouts.
- 3.49. There has been no change to the features of the scheme which affect this sub-objective since it was completed and evaluated at OYA stage. The evaluation thus remains as slight beneficial based on improved flow of traffic at the roundabouts and on the A27 where the level crossing has been replaced by the bridge.

Key Points on Safety evaluation

Collisions

- Collision numbers have reduced by 3.4 annually within the scheme network, once national trends are taken account of, but this is not statistically significant.
- The greatest change has occurred with the prevention of collisions at the level crossing and improvement to the road standard north of the new railway bridge.
- Saving in collisions on the scheme is only half that forecast.
- It has not been possible to identify a safety benefit in the wider area.
- Removal of the level crossing has a large benefit for rail safety including the significant reduction in the risk of a road/rail collision.

Collision rates

- On the key links, the collision rate has dropped by 38%.
- Reduction in collision rate is measured by the usage i.e. distances travelled PIC/mvkm so the extra traffic is taken into account. This reduction is statistically significant.

Casualties

- Number of casualties injured in the collisions on the scheme has reduced by 8.1 annually, adjusted for national trends, and this saving is statistically significant.
- FWI index has dropped by 25%.

Security

- Reduction of traffic queues, especially the level crossing reduces the risk of crime for stationary traffic hence the scheme has had a slight beneficial impact on personal security for road users.

4. Economy

Introduction

- 4.1. This section presents an evaluation of how the scheme is performing against the DfT's economy objective, which is defined in WebTAG as:
- 4.2. To support sustainable economic activity and get good value for money
- 4.3. The five sub-objectives for economy are to:
- Get good value for money in relation to impacts on public accounts;
 - Improve transport economic efficiency for business users and transport providers;
 - Improve transport economic efficiency for consumer users;
 - Improve reliability; and
 - Provide beneficial wider economic impacts.
- 4.4. When a scheme is appraised, an economic assessment is used to determine the scheme's value for money. This assessment is based on an estimation of costs and benefits from different sources:
- Transport Economic Efficiency (TEE) benefits (savings related to travel times, vehicle operating costs and user charges);
 - Collision costs (savings related to numbers and severity level of collisions);
 - Costs to users due to construction and maintenance; and
 - Costs to public accounts of construction and impact on indirect taxation.
- 4.5. This section provides a comparison between the outturn costs and benefits and the forecast economic impact, as well as evaluating reliability and the scheme's wider economic impacts.

Scheme costs

Introduction

- 4.6. This section compares the forecast costs of the scheme as of the start of the construction period with the actual spend at the time of this study.
- 4.7. Costs of the scheme are also considered for the full appraisal period of 60 years such that they can be compared with the benefits over the same period. The full costs examined were made up of the following:
- Investment costs : before and during construction;
 - Operating costs during the 60 years after opening; and
 - Impact on Indirect Tax revenues: during the 60 years after opening.
- 4.8. Investment costs are considered in terms of a common price base of 2002 for comparison with forecast. For comparison with the benefits, overall costs are expressed in terms of present value, termed Present Value Cost (PVC).

Investment Costs

- 4.9. The investment cost is the cost to the HA of the following:
- costs of construction;
 - land and property costs;
 - preparation and supervision costs; and
 - Allowance for risk and optimism bias.

- 4.10. The outturn investment costs as of September 2009 for building the scheme have been obtained from the Regional Finance Manager at the Highways Agency (HA) and approved by the HA scheme Project Manager for the purposes of this study.
- 4.11. The forecast scheme costs are based on the latest figures approved by the Minister in summer 2006, shortly before scheme construction.
- 4.12. The outturn spend profile for this scheme has been obtained for the purpose of this study and covers the period 2001 – 2013. For the purpose of comparison between forecast and actual, and with other major schemes, prices have been converted to 2002 prices. This figure can then be compared with the forecast cost on a comparable basis. These figures are shown below in Table 4-1, alongside the latest outturn scheme costs.

Table 4-1 – Scheme Costs (£m)

Forecast Cost		Outturn Cost (as of March 2014)		% difference
Cost in £million 2002 prices, undiscounted	29.1	As spent costs in 2004 - 2014 years and prices	33.7	
		Cost in £million 2002 prices, undiscounted	29.1	0%

- 4.13. The key point regarding scheme cost as shown in the table is that the outturn cost was as forecast.
- 4.14. It should be noted that whilst the £1.88m Glynde junction improvements scheme referred to earlier in this report was implemented at the same time as the A27 Southerham to Beddingham improvements and was recommended for provision by the Public Inquiry Inspector, it is not included in the costs presented in this section of the report, as it was funded separately by the MAC from its local scheme budget.

Operating Costs

- 4.15. The Operating Cost was forecast as £0m and has therefore been omitted from this evaluation.

Present Value Costs (PVC)

- 4.16. Cost benefit analysis of a major scheme requires all the costs to be considered for the whole of the appraisal period and they need to be expressed on a like-for-like basis with the benefits. This basis is termed Present Value. Present Value is the value today of an amount of money in the future. In cost-benefit analysis, values in differing years are converted to a standard base year by the process of discounting giving a present value.
- 4.17. Following current Treasury Green Book guidance, calculation of the present value entails the conversion to market prices, then discounting by year. This using a rate of 3.5% for the first 30 years and 3% thereafter.
- 4.18. The full PVC for this scheme is made up of the following costs converted to present value:
- Investment costs, as above.
 - Impact on Indirect Tax revenues during the lifetime of the scheme.

Indirect tax - present value cost

- 4.19. Indirect tax revenue impact in the context of scheme appraisal means the changes to the revenue raised by central Government. For highways schemes this primarily means the revenue from fuel duty for all users and, for consumers, from VAT which will change if the

scheme impacts the amount of fuel used by road users. Fuel usage changes are from the following :

- Changes in speeds which mean that vehicle are travelling at a greater or worse fuel efficiency;
- Changes to the amount of traffic; and
- Change to the journey lengths.

4.20. In the case of this scheme, the last of these three was expected to cause the greatest change. The removal of the level crossing was forecast to attract traffic onto the A27 corridor which had previously travelled much longer routes to avoid the reliability problems on this section of the A27. Thus indirect tax impact was forecast to be a large reduction in the amount of tax raised due to vehicles travelling shorter distance and therefore using less fuel.

4.21. The forecast amount of Indirect Tax for the A27 Southerham to Beddingham improvement is provided in the TEE table of the TUBA output set out in the EAR, under Public Accounts. The figure given is £22m over the 60 year appraisal period. As there is currently no way of remodelling this element of scheme costs over the area modelled in TUBA, in the OYA study a proxy was estimated, whereby an assumption is made that the observed impact of the rerouting from other routes to the A27 corridor was be taken to be indicative of the long term trend over the whole 60 year appraisal period.

4.22. By combining the estimates of reassigned traffic, with the lengths of the main routes from which reassignment has taken place a vehicle kilometre saving was calculated, which has then been compared with the forecast. This is shown in Table 4-2.

Table 4-2 – Estimated Vehicle Kilometre Saving due to Reassignment and Indirect Tax impact

Route	Forecast			Observed		
	Reassigned traffic	Distance Saved (km)	Vehicle km Saved	Reassigned traffic	Distance Saved (km)	Vehicle km Saved
Eastbourne to Brighton (compared with A27 route)						
A259	200	4.5	900	1,600	4.5	7,300
B2192	1,300	7.4	9,620	1,100	7.4	8,200
Newhaven to Lewes (compared with A26/A27 route)						
Wellgreen Lane	700	-3.5	-2,450	1,300	-3.5	-4,600
Kingston Road	2,100	-2.1	-4,410	1,200	-2.1	-2,400
Total vehicle km saving			3,660			
Indirect Tax impact (£m 2002 market prices, discounted)			£22.0m			
				£51.2m		

4.23. Albeit only an estimate, and one which does not take account of vehicle speeds over this wide area, Table 4-2 shows the following:

- The observed vehicle kilometre saving is approximately double that forecast.
- Using this as a benchmark by which to calculate a proxy for the 60 year Indirect Tax impacts for the scheme, the same proportion of observed against forecast was applied to the £22m forecast to derive an estimate of the outturn impact as a £51.2m reduction in indirect tax revenue.

Summary of Present Value Cost

4.24. Table 4-3 shows the total of the present value costs, both with and without the indirect tax element.

Table 4-3 – Summary of Present Value Costs (£m)

Costs in £m 2002 market prices, discounted	Forecast	Outturn
Investment	29.9	30.2
Indirect Tax impact as cost	22.0	51.2
Total PVC (including indirect tax)	51.9	81.4

4.25. These values for the costs are used in the calculation of the Benefit Cost Ratio in Table 4-7.

Economic Benefits

4.26. The appraisal of this scheme considered the economic benefits of this scheme expressed in terms of present value (present value benefits, PVB) of the following impacts:

- Transport Economic Efficiency (TEE) comprising Journey Time and vehicle operating cost benefits; and
- Safety benefits.

4.27. The economic benefits of this scheme were first assessed using COBA and QUADRO for the area around the scheme. When a Wider Area Traffic Model was developed subsequently, TUBA (Transport Users Benefit Appraisal) 1.6 software was used to appraise the benefits. Safety benefits which are not modelled in TUBA were appraised based on the COBA model and manual calculations which extrapolate over the wider area.

Transport Economic Efficiency (TEE)

Forecast of TEE Benefits

4.28. The TEE benefits for this scheme were forecast using TUBA over the wide area traffic model.

4.29. TUBA does not provide information specific to junctions and links so it is not possible to identify the specific level of benefits on the links improved by the scheme. The EAR did note that benefits were expected to be delivered due to:

- Reduction in journey times along the A27; and
- Decrease in total distances travelled in the modelled area due to the reassignment of traffic in the wide area which in the Do Nothing used longer routes to avoid the congestion on the A27.

4.30. The forecasts of the TEE benefits for consumers and businesses combined are shown in Table 4-4.

Table 4-4 – Forecast TEE Benefits (£m)

Costs in £m 2002 market prices, discounted	Forecast
Journey Time	298.2
Vehicle Operating Costs (VOC)	60.8
Total	359.1

Evaluation of TEE Journey Time Benefits

- 4.31. Journey time benefits have been evaluated based on the vehicle hours saving for the traffic using the A27. Although this does not cover the same wide network as used in the TUBA model, this is where the majority of the benefits are expected to occur. Vehicle hours savings have been valued based on the observed data as described in the traffic chapter for flows and for journey times based on JTDB for before data and sat-nav data for the after period
- 4.32. Vehicle hour savings were calculated in the OYA study and this has been repeated at FYA. Total saving for the first five years is based on the interpolation of these figures.
- 4.33. As it is not possible to rerun TUBA, the journey time benefits have been monetised using the PAR method as was undertaken in the OYA study. The Value of Time VOT (c) was taken from the PAR 5.0 Guidance Table C.6 which specifies a value of time for the average vehicle in the opening year which in 2008 was 1266 pence per hour.
- 4.34. Extending the benefits over 60 years is based on predictions of traffic growth from the national forecast (NTEM).

Table 4-5 – FYA Outturn Economic Evaluation of TEE Journey Time Benefit

Journey Time Benefits in 2002 market prices, discounted, based on PAR guidance		
Vehicle Hours saved for first 5 years	(a)	2,713,183
Vehicle Hours saved at fifth year	(b)	541,955
Value Of Time (VOT) per average vehicle in Opening Year 2008 (£/hour in market prices)	(c)	£12.66
VOT Savings in first 5 years	(d) = (a) x (c)	£34.3m
VOT Savings in 2013	(e) = (b) * (c)	£6.9m
Year 5 benefits capitalised over 55 years	(f) = (e) * capitalisation	£317.0m
60 year VOT benefits	(g) = (d) + (f)	£351.4m
60 year VOT benefits discounted to 2002	(g) * discount factor	£286.0m

Evaluation of TEE Vehicle Operating Costs Benefit

- 4.35. For most highway schemes including this one, the VOC and indirect tax impacts are both very closely linked to changes in fuel consumption (e.g. changes in speeds) which has similar magnitude of impacts, but from opposite sides of the benefits balance. That is, if there is decreased fuel consumption, VOC will decrease due to users paying less for fuel (i.e. a benefit to road users) but as indirect tax will be collected by the Treasury this is considered to be a negative benefit to public accounts according to current guidance. For this evaluation, the ratio

used for the reforecast indirect tax impact calculation (as shown in Table 4-2) has been applied to the calculation of the monetary value for VOC.

- 4.36. The forecast and the outturn vehicle operating costs comparison is shown in Table 4 5.

Table 4-6 – FYA TEE VOC Benefits

Present Value Benefits (£m 2002 prices, discounted)	Forecast	Outturn
Vehicle Operating Costs (VOC)	60.8	141.3

- 4.37. This evaluation shows that the outturn benefit is higher than forecast due to greater than expected saving in vehicle kilometre savings.

Safety

Forecast of Safety Benefits

- 4.38. In scheme appraisal, the economic impact of changes in safety, are calculated by assigning monetary benefits to the predicted reduction in the number and severity of personal injury accidents over the appraisal period.
- 4.39. COBA was used to model the safety benefit over a small area (£14m), and then manual calculations based on changes to the million vehicles travelled over the wide traffic model area.
- 4.40. As discussed in the safety section of this report and shown in Figure 3.2, the study area used in the safety appraisal covered a very wide area. This covers the reassignment routes as considered for the TEE benefits. The size of this area meant that the Do Nothing and Do Something scenarios both include a large number of collisions and the forecast net saving with the scheme in place is 10 which represents only 1% difference. This was monetised as £66m.

Evaluation of Safety Benefits

- 4.41. Monetisation of the outturn safety benefits of this scheme is not straightforward due to forecast impact being only 1% in the wide study area. The analysis of the collision numbers shows a net increase in the wide area which is statistically significant and a net saving on the key links which is not significant. As there is clearly additional traffic having been attracted to the A27, as predicted, the methodology for the evaluation of the safety impact is that no monetary benefits are attributed to the scheme.

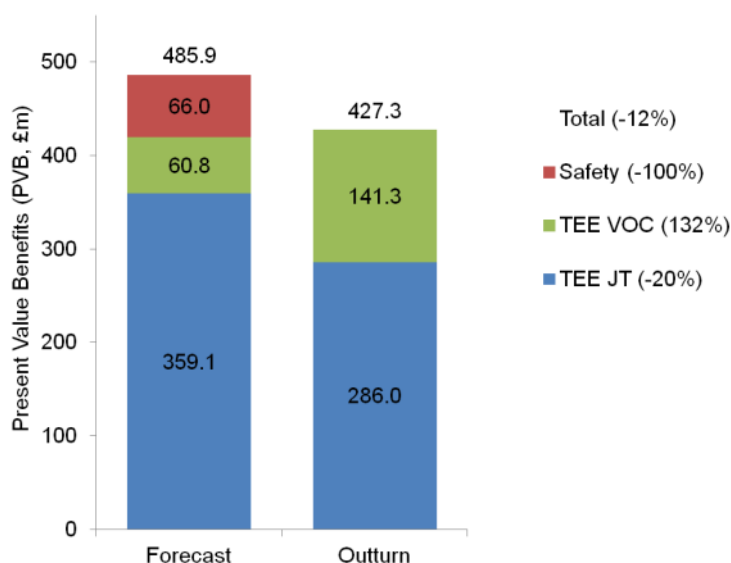
Maintenance and delay benefits

- 4.42. Maintenance and delay benefits were forecast by the QUADRO modelled to be £8m. This represents less than 2% of the total benefits and as this is primarily based on future maintenance, these are not considered in this POPE analysis.

Summary of total Present Value Benefits

- 4.43. Figure 4.1 shows the total benefits as described earlier, including the assessment of PVB with VOC but not indirect tax (as was the approach for the original appraisal).

Figure 4.1 – Present Value Benefits: Forecast and Outturn (% difference)



4.44. This shows that the total outturn PVB is £427.3m, only 12% than forecast. If the benefits are assessed and according to the more recent guidance which includes the impact of changes to indirect taxation which in the case of this scheme is reduced by the scheme, the PVB is £376.3m, 19% below prediction.

Benefit Cost Ratio

4.45. The benefit-cost ratio (BCR) is an indicator used in the cost-benefit analysis of a road scheme that attempts to summarize the overall value for money of a project or proposal. The BCR is the ratio of the benefits of a project or proposal, expressed in monetary terms, relative to its costs, also expressed in monetary terms. All benefits and costs are expressed in present values as detailed in the above sub-sections.

4.46. Table 4-7 shows the calculation of the BCR using the costs and benefits presented earlier in Table 4-3 and Figure 4.1 and the assessment of the BCR when the Indirect tax impact has been considered within the benefits, in line with current guidance.

Table 4-7 – Benefit Cost Ratio (BCR)

BCR		Forecast (includes TEE benefits from wide area)	Outturn evaluation
Indirect tax as impact on costs (as appraisal approach)	Present Value Benefits	£485.9m	£427.3m
	Present Value Costs	£51.9m	£81.3m
	Benefit Cost Ratio	9.4	5.3
Indirect tax as impact on benefits	Present Value Benefits	£463.9m	£376.2m
	Present Value Costs	£29.9m	£30.2m
	Benefit Cost Ratio	15.5	12.5

4.47. The key points regarding the evaluation of BCR are:

- Calculated as in the original appraisal approach, the outturn BCR is lower than forecast mainly because the indirect tax impact is much greater than expected.
- When the indirect tax impact is treated as part of the benefits, in accordance with current guidance, the BCR is 12.5. This represents a return of over £12 for every £1 spent.
- The outturn BCR represents very high value for money.

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

Wider Economic Impacts

4.49. As noted in the OYA assessment, the scheme does not serve any regeneration areas. However the improvements to the Beddingham Roundabout will improve access to the port of Newhaven 9km (5½ miles) to the south, which is accessed via the A26 and is used by freight traffic.

Key points from Economy Evaluation

Costs

- The actual scheme investment cost was £29.1m in 2002 prices, almost identical to that forecast.
- The impact on indirect tax is greater than forecast and is a reduction in revenue due to rerouting traffic now using a shorter route on the improved A27 and hence using less fuel.

Benefits

- The outturn assessment of the scheme's benefits show that it will provide £427.3m in present value benefits in 2002 values over 60 years, only 12% below that expected.
- Benefits from the saving in journey times, provide the majority of the benefits but less than forecast due to lower traffic volumes on the A27.
- The monetised benefit from the safety improvements is less than expected, due to higher than forecast level of collision reduction observed nationally; which would have reduced collisions in the area if the scheme had not been built.
- Rail safety benefits are not included in these monetised benefits.

Benefit Cost Ratio

- The outturn BCR is 12.5. This represents a return of over £12 for every £1 spent.
- When the scheme was appraised, reduction in indirect tax raised was treated as part of the costs; when calculated this was the BCR is 5.3, much lower than the forecast 9.4.

Wider Economic Benefits

- Freight accessing Newhaven Port from the strategic road network benefits from the scheme.

Summary of OYA Evaluation

The OYA appraisal identified a number of areas where further analysis was required at the FYA stage to confirm the longer term impacts of the scheme on the environment, which have been summarised as follows:

Landscape

The OYA report recorded a concern regarding narrow planting plots, with wide centre spacing (2m) that might not have the potential to provide effective screening, or significantly add to landscape character. It was considered too early to judge growth progress and the subsequent impact on local character areas (density and maturity of trees, establishment of seed mixes), which should be reviewed at FYA. The creation of the South Downs National Park may have increased the sensitivity of the landscape since the ES. It was expected that a Handover Environment Management Plan would be available at FYA.

Biodiversity

Mitigation appeared to be in line with the ES. However it was too early to establish the effectiveness of mitigation measures, which should be considered further at FYA if monitoring information was available. It was advised that consultation at FYA should be extended to include a wider range of wildlife groups, including those monitoring Barn Owls. Animal mortality data should be obtained for the FYA report as it had not been provided at OYA.

Water

The OYA report concluded that the longer term effectiveness of water issues should be revisited at FYA. The EA considered it too early to establish flood and drainage issues.

Heritage

The OYA report noted that it was too early to assess screen planting designed to reduce the visual impacts of the westbound scheme on listed buildings.

Noise

Traffic flows, new low noise surface and a noise study undertaken in 2009; all indicated noise was as expected, however, it was noted at OYA that residents had expressed concerns that increased speeds had resulted in an increase in traffic noise.

- 5.4. It is the intention of the FYA report to evaluate the effectiveness of the scheme at FYA according to its objectives, and a number of agreed sub-objectives, as identified in the ES.
- 5.5. The following environmental sub-objectives were appraised in the ES and in the AST according to the DfT's objectives for transport:
- Noise
 - Local Air Quality
 - Greenhouse Gases
 - Landscape
 - Biodiversity
 - Cultural Heritage
 - Water Environment
 - Physical fitness
 - Journey Ambience

- 5.6. For each of the environmental sub-objectives, the evaluation in this Section assesses the environmental impacts predicted in the scheme's AST (Appraisal Summary Table) and ES against those observed five years after opening. This section is based upon findings from the OYA evaluation and new evidence obtained at Five Years After opening including:
- An evaluation of the ongoing effectiveness of the mitigation measures implemented as part of the scheme improvements.
 - An updated summary of key impacts against all of the nine environment WebTAG sub-objectives, with particular focus on assessment of sub-objectives where it was too early to conclude at the OYA evaluation stage.
 - Additional analysis relevant to close out issues or areas for further study as identified at the OYA stage for consideration at FYA.

Methodology

- 5.7. The environmental assessment focuses on those aspects that were unable to be fully appraised at OYA, or where at OYA, suggestions were made for further study. Any issues that have arisen since the OYA evaluation stage have been incorporated into this report. The detail of the OYA study is not repeated, and reference should be made to the OYA report where required, although key points are incorporated into the FYA report where appropriate to provide contextual understanding.
- 5.8. The environmental evaluation takes into account traffic impacts of adjacent, or nearby schemes that were implemented within a similar time frame, particularly in relation to traffic flows and journey times.

Data Collection

- 5.9. The following documents have been used in the compilation of the FYA report:
- Appraisal Summary Table (AST) for the scheme (September 2005);
 - A27 Southerham to Beddingham Improvements Environmental Statement Volume 1A Main Text and Non-Technical Summary, Volume 1B Figures, Volume 2 Detailed Assessments (2003);
 - Non-Technical Summary of the Environmental Statement (February 2005);
 - Post Construction Ecological Monitoring, GCN Survey (June 2009);
 - Post Construction Ecological Monitoring, Bat Survey (August 2009);
 - Nest Box Monitoring and Maintenance Statement (February 2010);
 - Ranscombe Cottage Noise Study (February 2009);
 - Cultural Heritage Final Report (January 2009);
 - A27 Aftercare: Landscape Walk-over (November 2010);
 - Key Accident Data: Animals/Objects in carriageway (October 2013);
 - Press Release: New A27 cycle lane fills missing link in national cycle network (2012); and
 - As Built Drawings.
- 5.10. A full list of the background information requested and received to help with the compilation of this report is included in Table C.1 in Appendix D.

Site Inspection

- 5.11. As part of the FYA evaluation, a site visit was undertaken in May 2014. This included the taking photographs to provide comparison with material produced at the appraisal stage and at OYA (see Appendix D).

Figure 5.2 – View to south from Mount Caburn, Five Years After Opening



Figure 5.3 – Shared use footpath/cycleway, Five Years After Opening



Consultation

- 5.12. Three statutory environmental organisations (Natural England, English Heritage and the Environment Agency), together with the County, District and Parish councils were consulted as part of the FYA evaluation. Non-designated environmental bodies were also contacted for the evaluation, regarding their views on the impacts they perceive the scheme has had on the environment, and whether they feel the mitigation implemented has been effective, as shown in Table 5-1.

Table 5-1 – Summary of Environmental Consultation Responses

Organisation	Field of Interest	Comments at OYA	Comments at FYA
Natural England	Biodiversity & Landscape	No comments	Natural England stated that they do not hold such records, therefore they had no comments.
English Heritage	Heritage	No comments received.	No comments received.
Environment Agency	Water	No available data for water quality. Too soon to determine flood and drainage issues.	No reports of increased flooding. Unclear whether reed beds are established. Recommended water quality sampling from the

Organisation	Field of Interest	Comments at OYA	Comments at FYA
			outlet of the drainage system and an investigation into the need for inspections and maintenance.
East Sussex County Council	General	Landscape effects better than expected. Insufficient heritage review pre-construction.	No comments received.
Lewes District Council	General	Noise complaints received and air quality issues in Lewes.	No comments received.
Glynde & Beddingham Parish Council	General	Not contacted at OYA.	No comments received.
Rodmell Parish Council	General	Informal consultation only.	No comments received.
South Downs National Park Authority	Landscape, biodiversity & NMU	The South Downs Joint Committee (SDJC) commented 'Landscape worse than expected'.	Commented on Landscape, Biodiversity, Noise and Physical Fitness.
National Trust	Heritage	No comments received.	Not contacted at FYA.
Sussex Wildlife Trust	Biodiversity	No comments received.	No comments received.
Sussex Ornithological Society	Biodiversity	Not contacted at OYA.	A Barn Owl box that fell down was replaced.
Sussex Bat Group	Biodiversity	Not contacted at OYA.	No access to surveys for works. Bat boxes mounted on poles in exposed, open areas are unlikely to be used.
Wildlife Conservation Partnership	Biodiversity	Owl nest box locations received after site visit.	No comments received.
Sustrans & Ramblers Association	NMU	Concerns over the width and extent of the shared use footpath/cycleway.	No comments received.

5.13. No information regarding animal mortality data, requested from the Area 4 Managing Agent Contractor (MAC), has been made available at the time of writing.

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 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 ES assumed a scheme opening year of 2007. However, construction was delayed and the scheme opened in 2008. In order to compare the 2007 predicted traffic flows with the 2009 observed flows at one year after opening; the 2007 predicted figures were adjusted by a factor of 0.99¹⁰. This methodology was arrived at by using nationally observed trends in traffic, taking into account background changes in traffic, within the context of the current economic climate.
- 5.16. For the FYA evaluation, predicted traffic flows were obtained by interpolating between 2010 (published year) and 2022 (design year) flows from the ES. Table 5-2 compares the ES predicted traffic flows with observed flows at FYA.

Table 5-2 – Forecast and Observed Vehicles Flows (AADT)

Map Reference	Location	ES Baseline AADT 2003	Predicted OYA Flow Factored (2009)	Observed OYA Flow(2009)	% Diff. (OYA)	Predicted FYA Flow(2013)	Observed FYA Flow (2013)	No. Diff. (FYA)	% Diff. (FYA)
15	A27 Southerham to Beddingham	29,900	35,046	32,500	-7%	37,900	33,400	4,500	-12%
14	A26 South of Beddingham	11,600	14,949	12,600	-15%	16,200	13,000	3,200	-19%
18	A27 East of Beddingham	21,300	23,661	24,500	4%	25,600	23,000	2,600	-10%
9	A27 West of Southerham Roundabout	39,200	38,800	41,400	7%	47,600	39,700	7,900	-17%
11	A26 North of Southerham Roundabout	20,550	21,354	21,500	1%	23,200	20,600	2,600	-11%

- 5.17. Observed traffic flows at FYA are lower than predicted across all of the monitored sites.
- 5.18. Table 5-2 shows that flows observed in 2013, were lower than flows observed in 2009 at three monitored sites:
- A27 East of Beddingham
 - A27 West of Southerham Roundabout; and
 - A26 North of Southerham Roundabout.

¹⁰ Data from the DfT Transport Statistics Bulletin: Road Traffic and Congestion in Great Britain Quarter 3 (published November 2009), i.e. the 2007 billion vehicle kilometres factor was 124.4, the 2009 (3rd quarter) bvkkm was 123.3, giving a factor of 0.99.

Five Years After Assessment

- 5.19. Included in this section is a brief summary of statements from the AST, ES and OYA evaluations (including close out of 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

- 5.20. The AST stated that noise impacts would be minimal from the improved scheme compared to the existing carriageway, because the scheme was largely an online improvement.
- 5.21. The AST further stated that noise predictions for the preferred route were likely to be lower than the existing situation as a result of resurfacing the carriageway with new low noise surfacing and as a result of improvements to the highway network. A small number of properties were likely to be eligible for noise insulation.
- 5.22. Overall, the percentage of people annoyed by noise would be approximately 13.1 in the Do-something scenario and approximately 15.1 in the Do-minimum scenario. Approximately 2% less of the population would be annoyed by noise. The overall score was beneficial.

Environmental Statement

- 5.23. The ES stated that specific noise control measures such as barriers had not been considered necessary, due to the small scale of the predicted noise impacts and the inappropriate landscape impact within the AONB. However, the ES noted that proposed planting (particularly near the embankment of the railway bridge) would be useful by removing the noise source from view and reducing perceived human annoyance due to noise.
- 5.24. The ES also stated that on opening in 2008, the scheme was predicted to result in 5 properties eligible for noise insulation. All 5 properties were situated in the vicinity of the A27 to the east of Beddingham roundabout. Although not directly affected by the improvements between Southerham and Beddingham, they were considered likely to be impacted on by the forecast change in traffic conditions caused by carriageway widening, roundabout improvements and traffic re-assignment. In the long term it was predicted that there would be a decrease of 2% in the number of people bothered by traffic noise in 2022 compared to the baseline.

OYA conclusions

- 5.25. The OYA report stated that traffic had increased generally in line with expectations and that this was supported by the 2009 noise study undertaken at Ranscombe Cottages. Traffic was slightly lower than predicted (in the ES) on the A27 and slightly higher than predicted east and west of the scheme. It was also noted that there had been some issues raised locally about noise by residents who complained directly to the HA.
- 5.26. The OYA report further stated that the noise study undertaken on behalf of the HA in February 2009 (Ranscombe Cottages Noise Study) indicated that noise levels did not exceed the thresholds required for residents to be eligible for improvement grants. Although residents felt that increased traffic speeds were having an adverse noise impact.
- 5.27. The OYA report continued that the new low noise surfacing had been implemented and screen planting had been carried out along the A27 road corridor, particularly in the vicinity of listed buildings at Ranscombe Lane and Beddingham, although it was too early to establish effectiveness.

- 5.28. Based on implemented mitigation measures and traffic flows, noise impacts were likely to be **as expected** at OYA, but the report highlighted that noise should be re-evaluated at FYA.

FYA Consultation

- 5.29. The South Downs National Park became fully operational on 1 April 2011 (three years after this scheme was completed). The South Downs National Park Authority (SDNPA) stated residents had complained that noise was 'worse than expected' and had increased dramatically. The SDNPA commented that while undoubtedly the scheme would benefit from planted vegetation maturing to screen vehicle lights and baffle noise, planting mature trees earlier may have reduced the adverse impacts earlier. There had been an increased negative impact on Mount Caburn from the scheme, in terms of visual impact and noise.

FYA Evaluation

- 5.30. Based on data on observed traffic flows, flows at FYA are slightly lower than predicted along the A27 and adjoining roads. Although these reductions are not sufficient to allow for a 'better than expected' result due to the assumption made by POPE methodology that noise levels will be **as expected** if observed traffic flows are within 25% more, or 20% less than predicted flows.
- 5.31. The creation of the South Downs National Park may have created heightened sensitivity to noise impacts at FYA. The removal of existing vegetation may also have created an increased perception of noise until planting matures. Consultation with the SDNPA suggests increased impacts on Mount Caburn (part of the Lewes Downs Candidate Special Area of Conservation Importance, National Nature Reserve and Site of Special Scientific Importance) and the authority stated that residents continue to have concerns regarding noise impacts.
- 5.32. It is accepted that an increase in speed and traffic flow is usually offset by the use of a quiet road surface, however, based on the 2009 noise study referenced in the OYA report, it was concluded that ES predicted noise levels at Ranscombe Cottages was lower than measured within this 2009 study, although noise was below the threshold for qualification for noise insulation compensation. As no new environmental surveys are undertaken for POPE, further evaluation based on the noise study findings is not possible. As such, based on traffic flows reflected in table 5.2 alone, the effect of the scheme on noise is **as expected**.

Table 5-3 – Evaluation Summary: Noise

Sub-Objective	AST	FYA
Noise	Beneficial	As expected Based on traffic flows alone

Local Air Quality

Forecast

AST

- 5.33. The AST stated that the scheme would have a positive impact on local air quality. The final net total assessment for the effect of the proposed scheme over the do-minimum was reported, as follows:
- 2008: Particulate Matter (PM₁₀) = -54.60 Nitrogen Dioxide (NO₂) = -43.05
 - 2010: Particulate Matter (PM₁₀) = -52.97 Nitrogen Dioxide (NO₂) = -40.32
- 5.34. Overall, air quality impacts on the scheme would be **slight beneficial** in the Do-something scenario, compared to the Do-minimum.

Environmental Statement

- 5.35. The ES stated that the overall residual impact of the proposed scheme would be a positive impact within 200m of the centreline of the widened road. This represents a slight deterioration in air quality due to a slight increase in volume of traffic, but this impact would be offset by the benefit derived from the demolition of the Railway Cottages (removal of receptors). The nearest property was estimated to be 13m from the road centre line (1 Beddingham Close).
- 5.36. The ES further stated that Carbon monoxide, Benzene, 1-3 butadiene, Nitrogen oxides and particulate matter emissions would reduce in the future due to a fall in background levels. Comparing the Do-Minimum and the Do-Something indicated that the scheme would cause a slight increase in the concentration of pollutants at a regional level but increases would be the result of increased traffic flows on roads adjacent to the A27 Southerham to Beddingham.
- 5.37. The scheme was expected to achieve the strategic air quality objectives and no specific measures were expected to mitigate against the effect of the scheme on air quality.

OYA conclusions

- 5.38. The OYA report stated that based on traffic flows, which were generally in line with expectations and reduced congestion as a result of the scheme, it was likely that local air quality had improved.

FYA Consultation

- 5.39. No consultation responses were received as part of the Air Quality assessment.

FYA Evaluation

- 5.40. Based on the information in Table 5-2, traffic flows are generally lower than expected across all sites (greater than -10% variance in AADT values), when compared to the predicted flows. As a result, it is expected that pollutant concentrations are likely to be lower than estimated. Overall, local air quality can therefore be considered to be **as expected**.

Table 5-4 – Evaluation Summary: Local Air Quality

Sub-Objective	AST	FYA
Local Air Quality	Slight Beneficial	As expected

Greenhouse Gases

- 5.41. The assessment of the impacts of transport schemes on emissions of greenhouse gases is one of the environment sub-objectives. According to the DfT's WebTAG guidance, carbon dioxide (CO₂) is considered to be the most important greenhouse gas and, therefore, has been used as the key indicator for the purposes of assessing the impacts of transport options on climate change. Although the focus is on CO₂ emissions, the current guidelines are to express the change in terms of the change in the equivalent tonnes of carbon released as a result of implementing a transport scheme. Therefore the original forecasts figures have been converted to tonnes carbon for the purpose of this evaluation.

Forecast

AST

- 5.42. The AST stated that the 'Do-Something scenario would increase levels of Carbon Dioxide, over the future Do-Minimum levels'. A quantitative measure was given for 2007 (assumed opening year) as 4,314 tonnes of Carbon Dioxide (CO₂) in the Do-Minimum scenario and 5,024 tonnes in the Do-Something (with scheme). This equates to 1,177 and 1,370 tonnes of Carbon, respectively.

Environmental Statement

- 5.43. The ES uses the same figures as in the AST. It stated that the forecast relates to the improved section of the A27 only, and therefore does not include benefits/disbenefits due to changes in traffic flows on other roads in the area as a result of the scheme.

OYA conclusions

- 5.44. The OYA stated that 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 DMRB Volume 11 Section 3 Part 1.
- 5.45. The OYA report further stated that the net gain in tonnes of Carbon as a result of the scheme has been less than forecast, and this is likely to be due to the increase in traffic flows on the section being less than forecast, as shown in Section 2 Table 2.5. However, the overall calculated tonnes of Carbon in both scenarios (with and without scheme) based on observed before and one year after data is however considerably more than forecast, and this is likely to be due to the underestimate of HGVs. Based on these figures, the overall impact of the scheme on Greenhouse Gases was better than expected.

FYA Consultation

- 5.46. No consultation responses were received as part of the evaluation of Greenhouse Gases.

FYA Evaluation

- 5.47. The assessment of carbon emissions at the FYA stage was based on the Design Manual for Roads and Bridges (DMRB) guidance to re-forecast carbon emissions for the DM and DS scenarios, using data contained in the TFR. Observed carbon emissions for FYA were calculated using the same methodology for the DM and DS scenarios, using flow and speed data collected for this study to analyse emissions from vehicles using the A27 scheme section. Since the ES did not assess adjoining roads, the FYA study will follow the same logic in order to provide a like comparison, as shown in Table 5-5 below.

Table 5-5 – Re-forecast and Outturn Change in Carbon Emissions (scheme section only)

	Carbon Emissions (carbon tonnes/year)		
	Forecast		Outturn at FYA
	AST Opening year	Re-Forecast for FYA	
Do Nothing/without scheme	1,177	1,606	1,491
Do Something/with scheme	1,370	1,871	1,720
Net Increase	193	265	230
	16%	16%	15%

- 5.48. Table 5-5 shows that outturn carbon emissions on the scheme section based on observed data increased by 15%, equivalent to 230 additional tonnes of carbon. However, the re-forecast data for the same year shows a 16% increase in carbon emissions between the DM and DS scenarios, equivalent to 265 carbon tonnes. Therefore, whilst the carbon emissions released by vehicles using the A27 scheme section have increased with the scheme in place as a result of increased traffic volumes and higher speeds, the increase is proportionally similar to that estimated in the re-forecast.

- 5.49. Therefore it can be concluded that whilst the scheme has led to an increase in carbon emissions from vehicles travelling on the A27 scheme section, this net increase is approximately as expected.

Table 5-6 – Evaluation Summary: Greenhouse Gases

Sub-Objective	AST	FYA
Greenhouse Gases	Net increase in carbon emissions of 193 tonnes (16%)	Net increase in emissions of 230 tonnes (15%) Roughly as expected Savings elsewhere in network not quantifiable

Landscape and Townscape

Landscape

Forecast

AST

- 5.50. The AST stated that the scheme would impact upon the landscape of the existing Sussex Downs Area of Outstanding Natural Beauty (AONB). Changes to landscape pattern and views would occur, but adverse impacts would be reduced through appropriate design of ameliorative and enhancement planting.
- 5.51. The AST further appraised that visual impact at residential property, taking landscape measures into account, in winter 15YA opening would be as follows:
- 4 properties Moderate Adverse
 - 14 properties Slight Adverse
 - 3 houses demolished at Beddingham Level Crossing.

- 5.52. The overall assessment taking into account mitigation measures, would be **Moderate Adverse** at both scheme opening (winter) and 15YA opening (summer).

Environmental Statement

- 5.53. The ES suggested the proposed planting was intended to blend with the existing native vegetation types existing on the downs, on the lower slopes and at the edge of the floodplain. Plants would generally be planted at 1.5m spacing as 2 year transplants.
- 5.54. The ES further stated that screen planting would consist of taller growing species as well as lower growing trees and shrubs. Twenty percent of the plants in the mix/mixes would be trees planted at larger size, feathered form (1.5-2.5m high); and larger specimen trees would be planted offsite, including at Beddingham roundabout to screen the enlarged junction from St Andrew's Church and Courthouse Farm. New areas of verges would be sown with a general purpose seed mix of low maintenance grasses with some additional herbaceous species typical of chalk grassland to blend in with the existing landscape. There would be certain areas sown with a species-rich mix for dry chalk grassland, with a third grassland mix of shade loving wildflowers.
- 5.55. The ES concluded that residual impacts on landscape character would remain in three key Landscape Character Areas at the design year, 15YA Opening:

- Open Chalk Escarpment: Slopes of Mt Caburn and Ranscombe Hill would have an overview of the Railway Bridge and embankment (**Slight Adverse**).
 - Scarp Foot slopes: Impacted by the enlarged junction at Beddingham roundabout, which would be out of scale with the landscape of Beddingham village (**Slight Adverse**).
 - Principal Rivers Floodplain; Embankment and bridge would be at odds with the local landscape pattern and landform, impacting the character of the floodplains (**Moderate Adverse**).
- 5.56. Overall, the impact of the whole scheme on landscape character was assessed as **Moderate Adverse** both at scheme opening and 15YA scheme opening.
- 5.57. The ES further stated that the residual visual effects upon sensitive residential receptors and listed buildings would be slight adverse for the following properties at design year:
- Corriecollies
 - Ranscombe House
 - Ranscombe Farm
 - Ranscombe Lane
 - Ranscombe Holiday Cottages
- 5.58. The ES identified that the embankment and raised traffic profile, along with a new accommodation bridge would also adversely affect oblique views south-east from Ranscombe Cottages. Mitigation planting on embankment slopes and abutments would seek to reduce residual impacts to moderate adverse by 15YA.

OYA conclusions

- 5.59. The OYA report stated that landscape measures and mitigation planting had generally been implemented in line with proposals. The report further concluded that new planting and seeding in general should be assessed for growth targets at FYA as it was too early to establish effectiveness of screening value or establishment. It was also noted that there might be an issue with clover dominance in roadside verges.
- 5.60. The OYA appraisal further suggested that narrow planting beds, with widely spread spacing (2m centre spacing may not have the potential to create effective screening, or add to landscape character. It was suggested that 1m spacing may have been more appropriate to provide the required planting densities. The overall score for landscape at OYA was considered to be generally **as expected**.

FYA Consultation

- 5.61. Natural England confirmed that it has no comments to make regarding the correspondence sent. It was stated that NE does not hold such records.
- 5.62. The South Downs National Park Authority (SDNPA) stated that the scheme would undoubtedly benefit from planted vegetation maturing and acting to screen vehicles/traffic lights from residences and baffle noise. However, it was noted that all of the planting is still at the establishment phase and hasn't matured yet. Planting of more mature trees and vegetation would have helped to reduce the negative impacts on the landscape quicker and improved diversity. It was stated that there had been an increased negative impact on Mount Caburn in terms of views and noise impacts, which were worse than expected.

FYA Evaluation

- 5.63. Photomontages and photographic views were taken during the site visit to compare views from the ES and OYA views, to those captured FYA opening (see Appendix D). As explained at OYA, some of the views in the ES had been taken from private property and other photographs were views of receptors, rather than views experienced by those receptors. These viewpoints have not been included.

- 5.64. The OYA report suggested that the Handover Environmental Management Plan (HEMP) would be produced prior to completion of the 5 year aftercare period for handover to the MAC and made available to the FYA POPE. The HEMP has not been made available at the time of writing.
- 5.65. The A27 Aftercare: Landscape Walk-over document (November 2010) stated that maintenance appeared to have been carried out. The failure rate of the planting was low and planted vegetation appeared to be growing well, although some trees had died and needed replacing. Weed control in the plantations and grass verges appeared to be generally good but it was highlighted that there was a need to control invasive species such as Thistle and Dock.
- 5.66. During the FYA site visit, it is confirmed that maintenance measures have broadly been implemented in line with the ES proposals and the recommendations from the landscape walkover report. No dead trees have been identified at FYA and the number of weeds in roadside verges appears to be generally under control across the scheme.
- 5.67. However, noxious and invasive weeds classified under the Weeds Act 1959 (Ragwort, Thistle) were observed in small numbers in pockets alongside roadside verges, particularly in patchy areas of chalk, where species-rich chalk seed mixes were showing little sign of growth. There is some evidence of the species-rich seed mixes westbound towards Beddingham roundabout, but these had not yet significantly established (see Figure 5.4).

Figure 5.4 – Species-rich seed mixes on verges (presence of weeds)



- 5.68. Planting maturity across the whole site and within individual planting plots is variable and there appears to be limited consistency in planting succession across the site. Sporadic pockets of trees are beginning to mature, however, in some locations planting appears to be of a limited height and spread compared to that expected for FYA. Trees also appear to show inconsistent growth within the same plots. Examples of this poor growth can be seen at the Railway Bridge (see Figure 5.6) and Ranscombe Lane (see Figure 5.5) where trees were planted to provide fairly narrow strips of screening.

Figure 5.5 – Mitigation Planting at Ranscombe Cottages (poor growth)



Figure 5.6 – Mitigation Planting at the Railway Bridge (poor growth)



- 5.69. Planting on the abutment slopes of the railway bridge, identified in the ES as an intrusive feature in views from Mount Caburn and Ranscombe Lane is not progressing as well as expected at FYA. This improved stretch of the A27 consists of chalk soils and the limited topsoil observed is likely to have been a factor in the restricted or slow growth. As the slope gradient either side of the railway bridge is about 1:1, it is expected that compaction of soils would be greater for slope stability and limited topsoil would have been applied during construction. Based on this assumption, it is expected that the screening requirements of this intrusive feature will not be adequately met by the scheme design year.
- 5.70. Although plant spacing appears greater than normally encountered within a highway's scheme, plants are growing well in most locations and given time and ongoing maintenance / management should eventually provide the desired screening/integration required (see Figure 5.7).

Figure 5.7 – Planting near Beddingham (eastbound embankment)



- 5.71. Small trees (feathers) planted at Ranscombe Lane to screen the listed Ranscombe House, Ranscombe Farm, Ranscombe Holiday Cottages and Ranscombe Lane from the scheme has not established to the height or maturity expected at FYA. Approximately half of the trees have not grown above their protective shelters. During the FYA site visit, livestock (sheep) were observed grazing the tree branches of the screen planting adjacent to the scheme boundary near Ranscombe Lane. It is noted that the asbuilt drawings indicate that land on which the tree were planted was subject to a compulsory purchase order. Grazing is likely to be a key contributor to the inhibited growth observed at this location (Figure 5.8). The erection of a fence to protect planting from livestock would allow vegetation establishment.

Figure 5.8 – Livestock grazing scheme planting, Five Year After Opening



- 5.72. The A27 upgrade involved an enlargement of Beddingham roundabout, including the addition of an extra lane constructed from the A26 to the A27. Mitigation planting was designed to reduce adverse impacts from the scheme on listed buildings (St. Andrews Church and Courthouse Farm) located to the south-west of the roundabout, including specimen tree planting of deciduous trees. The FYA site visit confirmed that the trees planted in this location appeared to be better established and more mature (see Appendix D), although there was some variability in the crown spread of these trees, with two of the four trees faring better than the other two at FYA
- 5.73. The extended cycle path (from Beddingham to Firle) appeared to be well maintained across the scheme and was being used at the time of the visit. According to the Maintenance and Repair Strategy Statement (September 2008), verge grass cutting and trimming of branches is undertaken at two yearly intervals. Grasses along the path were well established to the east of Ranscombe Lane but had not yet started to encroach on the path edges.
- 5.74. There is little evidence of the clover domination observed during the OYA site visit, although small patches of clover were evident in the verges along the scheme.
- 5.75. The SDNPA suggested that visual and acoustic impacts from the scheme on the landscape character of Mount Caburn were worse than expected. However, chalky soils can give rise to slow growth and it is assumed that while planting is largely still in the establishment phase; with careful ongoing maintenance, it should improve over time. It was noted at OYA that the spacing of trees and shrubs exceeded the plant spacing usually encountered in highway schemes which is unfortunate for this scheme due to the chalky soils in which plants do take longer to establish. Overall, based on current information it is assumed that planting is generally as expected at FYA. However, no prediction is included for Design Year, as establishment will be reliant on future maintenance needs of the planting plots.

Table 5-7 – Evaluation Summary: Landscape

Sub-Objective	AST	FYA
Landscape	Moderate Adverse	As expected

Townscape

Forecast

AST and Environmental Statement

- 5.76. The AST stated that the sub-objective of townscape was non-applicable. There was no specific mention of townscape in the ES. The scheme is largely an online improvement, in a rural

location and any landscape impacts to Beddingham village are discussed within the landscape section.

Evaluation

- 5.77. No evaluation of the Townscape objective has been undertaken within this chapter.

Biodiversity

Forecast

AST

- 5.78. The AST stated that the main impacts on designated sites would be from noise, dust and vibration during construction. Aquatic species in the River Ouse Policy Area might experience temporary disturbance from encroachment and loss of habitat, but new highway drainage systems and replacement water features would improve water quality and aquatic biodiversity. The scheme would result in the loss of roadside planting; and some important hedgerows; however, replanting would aim to enhance conservation value in the long-term. New under-bridges would provide safe corridors for mammals. Overall, scheme impacts were assessed as **slight adverse**.

Environmental Statement

- 5.79. The ES surmised that the scheme widening would not cause a significant ecological barrier to wildlife, over and above the existing stretch of road, but would result in some increased landtake and associated habitat loss. There would be loss of roadside planting, a small amount of semi-mature planting, a portion of semi-improved grassland, c.50m of species rich ditches; and a section of important hedgerow.
- 5.80. The ES further stated that the main impacts associated with the scheme would be temporary or short term, lasting for the duration of the construction period, with particular respect to impacts on sensitive bird species such as Sky Lark and Yellow Hammer and the Beddingham Level Grazing Marshes Site of Nature Conservation Interest (SNCI).
- 5.81. The ES highlighted a number of designated and non-designated sites existed within the area, which were notable for their conservation value, as follows:
- Southerham Machine Bottom Pit Site of Special Conservation Interest (SSSI);
 - Southerham Grey Pit SSSI, Mount Caburn (part of the Lewes Down Candidate Special Area of Conservation Importance), SSSI and NNR);
 - Lewes Brook SSSI, Beddingham Grazing Marsh & Glynde Reach SNCI;
 - Lewes Railway Land SNCI, River Ouse Policy Area (and remaining levels); and
 - A variety of non-designated sites with local value for conservation.
- 5.82. The ES documented the presence of a large number of species within the site area of the proposed scheme. Notably, this included Great Crested Newts, Common Lizard, Slow Worms, Grass Snake, Water Vole, Bats, Badger and Barn Owl. There were several red data book species of aquatic invertebrates recorded in nearby ditches and ponds.
- 5.83. The ES further stated that construction activities had the potential to disturb glow worms, a nationally declining species, with a high probability of occurrence in highway verges scheme-wide, and recommended continued monitoring of a range of other species post-construction, to assess long term conservation impacts.
- 5.84. It was suggested that monitoring should include badgers, birds, amphibians, reptiles, water voles, otters, dragonflies, damselflies, aquatic plants, beetles and molluscs. The ES also stated that protected species under license were likely to be disturbed by the scheme and therefore recommended continued monitoring of Great Crested Newts and Bats.

- 5.85. The ES indicated that verge enhancements and replacement vegetation to be implemented as part of the scheme mitigation could potentially provide benefit to species in the long term, in addition to construction of an ecological pond.

Changes since ES

- 5.86. One proposed balancing pond located north of Southerham Grey Pit SSSI was not constructed, which is discussed in the Water Quality and Drainage chapter of this section.

OYA conclusions

- 5.87. The OYA report confirmed that mitigation measures had been implemented in line with the proposals in the ES, although it was too soon to evaluate the effectiveness of these measures, which, it suggested, should be considered further at FYA. Bats, barn owls and great crested newts were monitored in 2009 as part of the scheme. Following this monitoring, no further assessment was expected, other than for Owls.

FYA Consultation

- 5.88. The SDNPA stated that while it welcomed the measures taken to reduce the impact on biodiversity it did not have specific data to give a view on mitigation measures. The authority commented that planting was still at the establishment phase and hadn't matured yet. Planting of more mature trees and shrubs would have helped with biodiversity. While it was recognised that a settlement pond to the westward of the A27 would become less stark with time, it was suggested that the provision of irregular edges, building islands and planting around margins would have improved conditions for wildlife.
- 5.89. A wider range of local wildlife groups were consulted on Biodiversity at FYA but none were able to provide feedback as they had no information on which to base a response, including Natural England who stated that it does not hold such records.

FYA Evaluation

- 5.90. The key Biodiversity mitigation measures from the ES and reported at OYA report included:
- Permanent Badger and Rabbit fencing
 - Installation of Barn Owl and Bat Boxes
 - Mammal crossings
 - Construction of an ecological pond and associated ditch
 - Construction of vegetated balancing ponds
 - Sowing of species-rich seed mixes
 - Planting of native trees, shrubs and hedges
 - Translocation of protected species
 - Species monitoring
 - Amphibian ladders
 - Provision of Hibernacula and Refugia for invertebrates and reptiles and wire mesh or fauna ladders.
- 5.91. It is understood by POPE that no further scheme monitoring was undertaken, following the 2009 Post Construction Ecological Monitoring. Based on the consultation response received from the Sussex Ornithological Society, it is likely that the Wildlife Conservation Partnership continues to undertake Barn Owl monitoring in the area. No updated LEAP/HEMP has been received by POPE for this evaluation, and as such this evaluation of the scheme impact on Biodiversity is therefore based on observations during the FYA site visit.

Species Fencing & Mammal Crossings

- 5.92. During the FYA site visit, it was evident that mitigation measures have been implemented as expected.

- 5.93. Badger and Rabbit fencing appears to be well maintained scheme-wide and the wire mesh fencing is intact and securely attached to wooden posts. The mammal crossings at the Glynde Reach Bridge and the Farm Accommodation Underpass have been implemented and appear to be in good condition (Figure 5.9).

Figure 5.9 – Mammal crossing at Glynde Reach Bridge, Five Years After



Great Crested Newts (GCNs)

- 5.94. There was no evidence of GCNs during the Post Construction Ecological Monitoring carried out on 1 June 2009, which included monitoring of ponds identified in the 2003 and 2006 single survey visits. At FYA, Newt trapping equipment was noted in proximity to the ecological pond and appeared to be recent – no information has been received by POPE to ascertain its purpose.

Figure 5.10 – GCN trapping bottles located near the Ecological Pond



- 5.95. It is not possible to evaluate the effectiveness of amphibian/fauna ladders installed beneath road drains, or to assess the presence of hibernacula and refugia.

Barn Owls and Bats

- 5.96. Pole mounted Bat boxes were located adjacent to the ecological pond and were intact. The poles were constructed in relatively isolated positions, some distance from mature trees, but close to establishing scheme planting and marginalised pond vegetation. The Sussex Bat

group informally commented that bat boxes perched on poles in isolated positions are not generally effective mitigation. However, there was evidence of use of these boxes in the 2009 Post Construction Ecological Monitoring reports for Bats. Additionally, insects and aquatic species attracted to the pond and adjacent ditch are likely to attract Bats.

- 5.97. The Sussex Ornithological society commented that one owl box, which fell down in a storm has since been re-erected. The Nest Box Monitoring and Maintenance Statement (2010) identified breeding Barn Owls at one of the boxes and reported failed breeding at another. The Wildlife Conservation Partnership, who had been monitoring the boxes, was invited to comment at FYA but no comments were received.
- 5.98. A Red Kite was observed flying over the Railway Bridge during the FYA site visit.

Ecological pond and Species-rich ditches

- 5.99. South of the Railway Bridge, the ecological pond and associated species-rich ditch were designed to mitigate for the loss of c.50m of species rich-ditches removed during construction of the scheme and to provide suitable replacement habitat for GCNs. The pond site was enclosed with a timber post and barbed wire fence, and pond surrounds appeared to be seeded with a grass and wildflower mix, in line with ES proposals. Both the ecological pond and adjacent ditch appeared to be very well vegetated during the site visit and reeds were well established, while some of the smaller marginalised planting was still maturing (Figure 5.11).

Figure 5.11 – Bat Box mounted on pole with species-rich ditch, Five Years After



- 5.100. During the FYA site visit it was not possible to assess whether there was any water in the ecological ditch due to the amount of established vegetation maturing along the margins of the ecological pond (reeds, shrubs and trees) and wire fencing.

Balancing Ponds

- 5.101. Partially vegetated balancing ponds have been constructed as part of the scheme, although one pond was not constructed. The ponds could have been better landscaped and did not appear to integrate with the existing landform and vegetation. Balancing ponds are discussed further in the Water Resources and Drainage section.

Verge planting

- 5.102. Species-rich seed mixes show poor growth in the roadside verges along the scheme and there are a few invasive and perennial weeds, as discussed in the landscape section. Bees and other insects are not generally affected by these conditions and successive, natural growth can be beneficial for the conservation of species over the long term.
- 5.103. Animal mortality data was requested but not made available to POPE as the MAC stated that they did not record this information.

- 5.104. Based on information assessed at OYA and locations visited during the FYA site visit, scheme impacts on Biodiversity appear to be **as expected**.

Table 5-8 – Evaluation Summary: Biodiversity

Sub-Objective	AST	FYA
Biodiversity	Slight adverse	As expected

Water Quality and Drainage

Forecast

AST

- 5.105. The AST stated that installation of a new drainage system to treat water from the road would improve management of both water quality and quantity. The overall score for water quality and drainage was **slight beneficial**.

Environmental Statement

- 5.106. The ES stated that existing drainage ran directly into the Ouse Levels ditches but the proposed retention ponds and reed beds would gradually release clean water into local ditches or nearby rivers, which would also improve conditions for local species.
- 5.107. The ES further stated that the new drainage network would provide the capacity required carrying run-off from the 1 in 1 year return storm period for the road and would not surcharge onto the road during a 1 in 5 year return period event.
- 5.108. The risk of a major accidental spillage, expressed as a return period for the proposed scheme was assessed as 1 in 161 years for Glynde Reach and 1 in 255 years for the River Ouse. The calculations given in the DMRB indicated that acceptable risk of a pollution incident was normally 1 in 100 years for discharges to aquifers and sensitive watercourses. Based on these conclusions, the ES indicated that that no further pollution measures were required to reduce spillage risk.
- 5.109. The ES further states that there would be a net loss (c.50m) of ditch habitat within the River Ouse Policy Area. Mitigation in the form of an ecological pond would be located just outside the designated Policy Area to the south of the Railway Bridge.
- 5.110. The improved stretch of the A27 includes the tidal floodplain of the River Ouse and the fluvial floodplain of its tributary, the Glynde Reach. The ES suggests that there would be negligible loss to the River Ouse floodplain as a result of the scheme. The provision of balancing ponds and other discharge control measures would improve localised flood control.

Changes since ES

- 5.111. One proposed balancing pond located north of Southerham Grey Pit SSSI was not constructed. It is understood that the drainage requirement for this pond was considered marginal, and that drainage has been provided through interceptors direct to the River Ouse to the west.

OYA conclusions

- 5.112. The OYA report stated that the proposed drainage system would separate groundwater drainage from carriageway surface water runoff to allow road drainage to be treated before discharge into surrounding watercourses. The installation of pollution prevention and control measures, where none existed before construction of the new road, was considered to have a significant positive benefit for long term water quality and flood control within the study area. The road drainage and treatment system included the following measures to minimise pollution of watercourses:

- Interceptors/catchpits to remove the majority of the suspended solids in the road runoff;
- Vegetative treatment systems such as reed beds in appropriate locations to improve the overall quality of final discharges;
 - Balancing ponds where suspended solids can be removed before final discharge into receiving watercourses; and
- Storage tanks.

FYA Consultation

5.113. The following responses were received from the Environment Agency as part of the consultation process on Water Quality & Drainage.

- No reported instances of flooding, or problems caused by works.
- The nearest Groundwater Quality Monitoring Network point is at Mount Caburn 1km to the North of the A27 and monitors groundwater quality in the Chalk aquifer. The groundwater flow in the Chalk in the scheme area is generally to the south west towards the River Ouse. The positioning of the groundwater quality monitoring therefore will not pick up any impact of the transport route development on the Chalk aquifer. As such, no comment could be made on the status of water quality.
- No assessment has been provided to show whether any of the implemented road drainage and treatment systems have worked and are continuing to work effectively. Water quality sampling should be carried out from the outlet of the drainage system to assess its effectiveness and impact upon the water environment.
- Due to the decision not to monitor a larger range of terrestrial and aquatic ecology, it is unclear whether reed beds are established and working to filter any road run off, to mitigate for negative impacts on surrounding ecology and water quality.

5.114. The SDNPA commented that the settlement pond, which was created on the westward side of the A27 was stark and could have been enhanced for wildlife by creating more irregular edges, building islands, and planting around the margins.

FYA Evaluation

5.115. The drainage system appears to have been implemented in line with the recommendations of the ES, with the exception of the one balancing pond that was not constructed. Two balancing ponds have been constructed as a part of the scheme and were partially vegetated at the time of the site visit. No information has been received on the maintenance of the ponds (balancing and ecological) with respect to water quality.

5.116. Reeds and vegetation have colonised and are well established at the ecological pond and adjacent species-rich ditch, as discussed in the Biodiversity chapter of this section and in Appendix D.

5.117. The addition of the drainage system for the widening is considered to be a positive addition; providing benefits, where none existed before. Without access to any water quality sampling data at the outlet of the drainage system, or a program of inspections and maintenance, the overall assessment, based on the site visit alone, is assumed to be generally **as expected**.

Table 5-9 – Evaluation Summary: Water Environment

Sub-Objective	AST	FYA
Water Environment	Slight Beneficial	As expected

Cultural Heritage

Forecast

AST

- 5.118. The AST stated that proposals were unlikely to impact upon any archaeological remains and impacts from the A27 scheme upgrade were likely to be **neutral**.

Environmental Statement

- 5.119. The original scope of archaeological works was laid out in the Environmental Statement in 2005, to be undertaken in advance of construction works.
- 5.120. The ES stated that the proposals for the widening of the A27 would be unlikely to impact upon any archaeological remains. The results of the geophysical survey and trial trenching indicated that if any archaeological remains survived, they were likely to be deeply buried under colluvium from the hills above. As over 90% of the proposed route would be at-grade or on embankment, it was likely that any archaeological remains present would continue to be undisturbed.
- 5.121. The ES further stated that a watching brief would be undertaken by an appropriately qualified and experienced archaeologist with appropriate back up. Where topsoil removal was undertaken using a 360-degree machine, a toothless ditching bucket would be used. If any archaeological remains were uncovered, provision would be made for appropriate excavation and recording.
- 5.122. The ES and watching brief noted that much of the footprint area was destroyed in the 1970s from the existing A27.
- 5.123. The ES recorded a number of listed properties (10 Grade II and 1 Grade I property) with distances from the centreline, as follows:
- Southerham House Grade II, 100m
 - Southerham Cottage Grade II, 35m
 - Ranscombe House Grade II, 77m
 - Courthouse Farm Grade II, 24m
 - St Andrews Church Grade I, 100m
 - No.1 Barbers Cottages Grade II, 26m
 - No.2 Barbers Cottages Grade II, 26m
 - Thatch Cottage Grade II, 23m
 - Dairy Cottages Grade II, 20m
 - Cobbe Cottage Grade II, 730m
 - 17-22 Trevor Gardens, Grade II

- 5.124. The ES concluded that although no Listed Buildings would be directly affected by the proposed scheme, enlargement of the junction at Beddingham roundabout would impact upon views from both Courthouse Farm and St Andrews Church. The impact would be to slightly increase their exposure and proximity to the traffic, affecting their setting as listed buildings. Ranscombe House would also be slightly affected by the proposed scheme with westward views of the trunk road becoming more intrusive at this location. The view southwards from Ranscombe House would not change significantly, with existing hedges and scrub continuing to provide screening against the traffic on the new road.
- 5.125. A programme of tree and shrub planting was planned to restore and improve the existing screening.

One Year After Opening

- 5.126. With regard to archaeology the OYA report confirmed that the Cultural Heritage Final Report concluded that the archaeological evaluation was undertaken as agreed, and that for an

archaeological investigation of this size and outcome, the Cultural Heritage Final Report (January 2009), should be considered to be the final published data available. It was stated that archaeology would not be considered further in the FYA evaluation.

- 5.127. For built heritage the OYA site visit confirmed that the mitigation planting proposed in the ES had been undertaken, including tree/shrub planting near Beddingham Roundabout, and off site planting in the area of Courthouse Farm and St Andrews Church Listed Buildings. It was considered too soon to evaluate the effectiveness of mitigation planting in reducing the impacts of the scheme on the setting of listed buildings at Beddingham roundabout and Ranscombe Lane and it was suggested that this should be considered further at FYA.

FYA Consultation

- 5.128. English Heritage did not provide any comments on Cultural Heritage.
- 5.129. The SDNPA stated that there had been an increased negative impact on Mount Caburn from the visual and acoustic impacts of the scheme, while it was recognised that residences would benefit from the planted vegetation maturing and acting to screen vehicles/traffic lights, which was also likely to reduce the perception of noise.

FYA Evaluation

- 5.130. The widening of the carriageway has brought listed buildings slightly closer to the scheme, particularly in the vicinity of sensitive receptors at Beddingham roundabout and Ranscombe Lane.
- 5.131. During the site visit it was observed that the planned programme of tree, hedgerow and shrub planting had been implemented in the vicinity of listed buildings in order to provide landscape integration and enhance screening potential.
- 5.132. Landscape planting undertaken online at Ranscombe Lane, in an easterly direction along the A27, has been implemented in order to reduce westward views of the trunk road from Grade II Ranscombe House and to enhance the character setting. However, the planting in this location was stunted and sparse and therefore had low screening potential. Westerly views from Ranscombe House, out to the scheme, were fairly open. Planting was likely to be inhibited by the livestock observed grazing the trees, refer to the landscape section for more information.
- 5.133. Offsite tree planting of deciduous specimen trees had been undertaken near Beddingham Roundabout, in the vicinity of Grade I Listed St. Andrew's Church and Grade II Listed Courthouse Farm. New planting was designed to screen views of the trunk road and the enlarged junction at Beddingham roundabout, which were more visible following removal of a portion of hedgerow and other vegetation, as part of the scheme construction.
- 5.134. At least two of the four trees in proximity to Courthouse Farm appeared to be maturing in line with expectations but it was too early in the season to determine whether the neighbouring two trees would develop full crowns as they appeared to be less well developed (see Appendix D).
- 5.135. Further offsite planting has been undertaken at the accommodation overbridge, on the embankment near the Railway Bridge and in the vicinity of Glynde Reach Bridge to mitigate the intrusion of hard-engineering on the heritage setting of listed buildings and on views from Mount Caburn and the wider landscape. New planting and hedgerow enhancements at Glynde Reach Bridge appeared to be growing well, whereas planting along the Railway Bridge was very inconsistent, as discussed in the landscape section.
- 5.136. The SDNPA stated that impacts on Mount Caburn were worse than expected. The creation of the SDNP, since the ES, may have heightened the sensitivity of the national park to the scheme. It is likely, that over time and with careful maintenance and protection, planting will mature and in the long term natural succession may better enhance the wider landscape character.

- 5.137. Overall, taking into account the score for archaeology, impacts on cultural heritage are Neutral (as expected).

Table 5-10 – Evaluation Summary: Heritage

Sub-Objective	AST	FYA
Heritage	Neutral	As expected

Physical Fitness

Forecast

AST

- 5.138. The AST stated that the physical fitness assessment would be **moderate beneficial** as the works would not sever people from their local services or existing access routes. Furthermore, extension of the pedestrian and cycle facilities from Ranscombe Lane to Beddingham would improve local access and decrease journey times for non-vehicular travellers.

Environmental Statement

- 5.139. The ES stated that the proposed scheme would not cause any additional severance in terms of preventing local residents at Beddingham from accessing community facilities such as St. Andrew's Church.
- 5.140. It was noted that, since the A27 upgrade was largely an online improvement, there was already difficulty experienced by pedestrians, equestrians and cyclists crossing the road, due to the high volume of traffic and lack of non-motorised user (NMU) access. This existing severance also affected residents of Coriecollies, Ranscombe Farm, Ranscombe Cottages and walkers/ramblers using the wider area.
- 5.141. The ES suggested that there would be a likely impact on the amenity value of several public rights of way (PROW), which would be affected by increased exposure to the scheme and the loss of screening vegetation. Impacts on the amenity value of PROW would be offset by replacement planting intended to reduce impacts by the design year (15YA opening).
- 5.142. The ES stated that extension of the combined foot and cycleway eastwards, from Ranscombe Lane to Beddingham roundabout; would not only improve local access, but would increase the length of the National Cycle Network (Route 90).

Changes since ES

- 5.143. A press release from the Highways Agency in June 2012, highlighted that a new A27 cycle lane had been constructed, which involved a £1 million upgrade to the national cycle network and a new mile-long cycleway from Beddingham to Firle.
- 5.144. The Sustrans operated seasonal 'Hiker Bus' mentioned in the ES was cancelled before the scheme was built.
- 5.145.

One Year After opening

- 5.146. The OYA report summarises the key mitigation measures implemented as part of the scheme to improve the Physical Fitness assessment, as follows:

- An extension of the existing Footpath/Cycleway, running adjacent to the north side of A27 between Southerham and Ranscombe Lane, by 200m east of Beddingham roundabout.
- A grade-separated crossing for pedestrians and cyclists (under the road, alongside the river).
- A new pedestrian refuge to allow a link from the eastern end of the extended footpath to an access road on the south side of the carriageway.
- Screen planting to reduce impacts to PROW with increased exposure.

5.147. The connection of the extended footpath and cycleway to the eastern bank access would provide a safer crossing to access the north and south of the A27.

5.148. The OYA report concluded that the extension of the existing footpath/cycleway had been advantageous for cyclists and walkers, although usage appeared to be low.

FYA Consultation

5.149. The Ramblers Association and Sustrans did not make any comments.

5.150. The SDNPA stated that the creation of the Beddingham to Firle section of the new cycleway was a welcome addition, completing routes onwards to Newhaven/Seaford and Eastbourne and providing a meaningful joined up network for leisure and business.

FYA Evaluation

5.151. It was noted in the OYA report that the footpath/cycleway used to stop just east of Beddingham, which was inconvenient and had elevated the risk of accidents for cyclists crossing the A27.

5.152. The extension to the footpath/cycleway completed in 2012 provides a connection between the end of the route built as part of this scheme, just east of Beddingham, to the Regional Cycle Route 90 (RCR90), linking towns and villages along the A27 corridor. The majority of the RCR90 cycle route is traffic free, cyclists are able to follow the A27 corridor along a safer route, reducing competition for the road and avoiding diversions through Glynde village. This is an improvement on the situation noted at OYA.

5.153. It is noted that a safety barrier could have been installed along the length of the shared use footpath/cycleway to protect NMUs in the event of vehicles veering off the road, particularly on the narrowest section of the path around Ranscombe Hill Chalk face.

5.154. The extension of the cycle path from Beddingham to Firle appears to address concerns mentioned at OYA, that little consideration seems to have been given to southbound NMUs, in relation to the refuge crossing at Beddingham roundabout, which is about 250m from the junction, and has previously made it difficult for cyclists travelling west and undertaking right hand turns.

5.155. No NMU surveys have been produced specifically for POPE which would provide any quantifiable measures of use of the PROWs. During the site visit the shared-use path was used by 4 different cyclists, within a short window of observation (Figure 5.12), which included use of the narrowest section by Ranscombe Hill.

Figure 5.12 – Cyclist observed using the extended footpath/cycleway, Five Years After



- 5.156. Mitigation planting to reduce the visual impact of the scheme on PROWs appears to have been implemented in line with proposals and seems to be well maintained.
- 5.157. The OYA report stated that an unrestricted access path had been created around the locked gate at Courthouse Farm to maintain access for pedestrians and cyclists at all times (see Appendix D). During the FYA site visit, cow parsley and grass were observed to be encroaching slightly on the path.

Table 5-11 – Evaluation Summary: Physical Fitness

Sub-Objective	AST	FYA
Physical Fitness	Moderate beneficial	As expected

Journey Ambience

Forecast

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

AST

- 5.159. The AST stated that driver stress would be reduced by improved traffic flows, particularly on the westbound carriageway. Road travellers would expect little long-term change to existing views. The overall score for journey ambience was **Large Beneficial**.

Environmental Statement

- 5.160. Traveller care was not specifically documented in the ES. It was noted that no lay-bys had been provided, which would have provided a useful resting stop for drivers.
- 5.161. The ES further stated that the likely indirect impacts of the scheme on drivers would be beneficial compared to the existing situation, with respect to fear of potential accidents and route uncertainty. The provision of clear lane markings, removal of the existing level crossing and an appropriate level of signage to provide travellers with directions would all reduce impacts.

- 5.162. The ES stated that the scheme would result in the removal of vegetation in several locations; including near Southerham and at Beddingham roundabouts, which would create open views of the River Ouse and its floodplain, the Ouse valley and Glynde Reach. Long key views from the new Railway Bridge and Glynde Reach Bridge would be maximised. Views of the Ouse valley and Glynde Reach, to the east of Coriecollies would remain unchanged.

One Year After Opening

- 5.163. The OYA report concluded that congestion had been reduced by the provision of two lanes westwards and construction of a new railway bridge, reducing driver stress as expected. Driver views and traveller care were also considered to be as expected. The OYA report noted that the route eastbound would remain as a single carriageway which would mean traffic flows would remain high in this direction, resulting in higher stress at peak times.

FYA Consultation

- 5.164. No comments were received for journey ambience.

FYA Evaluation

- 5.165. Table 5-12 summarises the evaluation of the scheme's impact on journey ambience. This evaluation has remained the same as the OYA assessment.

Traveller Factor	FYA Score	FYA evaluation
Stress	Beneficial	The improved section of the A27 contributes to reduction in driver stress by the removal of the level crossing, provision for non-motorised users off the carriageway and increased capacity of the road.
Views	Neutral	For the majority of the route there are open views of Glynde Reach and the River Ouse floodplain, Mount Caburn and the Sussex Downs. Landscape planting is not fully established or matured consistently across the scheme, thus open views have largely been retained at FYA, with some minor filtration. Views of the scheme from Mount Caburn remain moderate adverse, as predicted in the ES. This means views out from the scheme to Mount Caburn are likely to be retained.
Care	-	Traveller care was not specifically mentioned in the ES section on vehicle travellers. No facilities were proposed e.g. lay-bys.
Summary Score	Large Beneficial	The ES stated that the overall significance score for quality of journey had been established using the criteria in TAG Unit 3.3.13 and had been derived as large beneficial due to the number of travellers affected by the proposed scheme exceeded 10,000. This remains at FYA.

- 5.166. Overall, journey ambience is considered to be **as expected** based on the number of measures taken to provide easier navigation of the scheme, traffic flows and the provision of the extended shared-use footpath/cycleway between Ranscombe Lane and Firle, which separates traffic from NMU users.

Table 5-12 – Evaluation Summary: Journey Ambience

Sub-Objective	AST	FYA
Journey Ambience	Large Beneficial	As expected

Key Points

Noise

- The observed traffic flows within the scheme are lower than predicted throughout the scheme but do not exceed thresholds set by POPE Methodology for noise to be considered better than expected. Overall the scheme effect for noise is beneficial, **as expected**.

Air Quality

- Traffic flows are lower than expected across all sites when compared to the predicted figures. As a result, it is expected that pollutant concentrations are likely to be lower than estimated. Overall assessment is slight beneficial, **as expected**.

Greenhouse Gases

- Whilst the scheme has led to an increase in carbon emissions from increased traffic along the A27, this net increase is not as high as expected. The score is **better than expected**.

Landscape

- Mitigation measures have been implemented in line with the ES. However, plant growth in some locations is less advanced than expected for FYA. There are some growth inconsistencies between planting plots, where plant spacing appears less dense than usually encountered in a highway scheme. It is noted that the underlying chalk soils are likely to have contributed to slow growth. Planting is beginning to mature and may establish satisfactorily by design year given appropriate maintenance.
- Species rich grassland has not established in verges as expected and there is some presence of invasive weeds. However, verges aligning PROW and the extended shared-use cycle path appeared to be well maintained. The overall score is moderate adverse, **as expected**.

Biodiversity

- Mitigation for species generally appears to have been implemented in line with the ES. Reeds have colonised within the ecological pond and in the adjacent species-rich grassland ditch, although the perimeters of ponds were only partially vegetated and could have been better enhanced. The overall score is slight adverse, **as expected**.

Cultural Heritage

- Overall, planting to reduce visual impacts on listed buildings is establishing as expected. However, vegetation for screening of Ranscombe House has not established, but this appears to be through the uncontrolled access provided to livestock rather than other growth limitations. Based on the information available and taking into account the score for archaeology, it is considered that impacts are neutral, **as expected**.

Water

- Water quality is considered to be slight beneficial, **as expected**. The scheme's drainage system is considered to be a positive addition, providing benefits over and above the drainage provision of the existing road.

Physical Fitness

- Impacts are likely to be moderate beneficial, **as expected**. Following the completion of this scheme, the extension of the existing footpath/cycleway has been advantageous for cyclists and walkers and is well used.

Journey Ambience

- Congestion has been reduced and the route is generally well sign posted, with grade separated junctions restricting vehicle movements across the carriageway. There are a variety of open views available throughout the route. Traveller care remains the same as for the existing scheme. Overall, impacts are large beneficial, **as expected**.

6. Accessibility and Integration

6.1. This section evaluates the impact of the scheme in terms of the accessibility and integration objectives; comparing qualitative forecast assessments from the scheme AST (as shown in Table A.1) with post opening findings and analysis of policy objectives.

Sources

- Environmental Statement Vol 1A
- Proof of Evidence from Public Inquiry
- South Coast Multi Modal Study (SoCoMMS) 2002
- East Sussex and Brighton & Hove Structure Plan 1991-2011

Accessibility

Option values

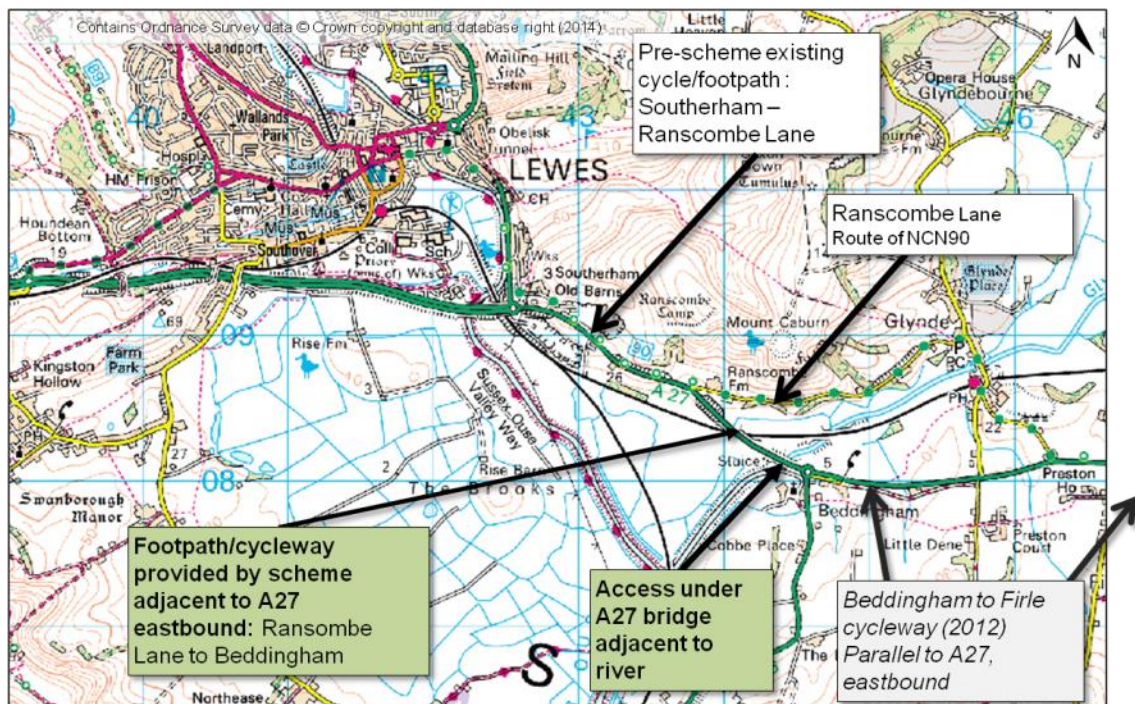
Forecast

6.2. The forecast impact on option values was due to the shared use path. The extension of the Pedestrian / Cycleway from Ranscombe Lane to Beddingham was forecast to increase opportunities for travel by bike and by foot for residents of Southerham and Beddingham.

Evaluation

6.3. The path was completed as part of the scheme, and as noted in the OYA report and shown in Figure 6.1.

Figure 6.1 – Footpath/cycleways adjacent or near A27



- 6.4. At OYA the following issue was raised by consultees with regard to the path:
- The usefulness of the path was limited by the fact that it terminated at Beddingham, leading unto the A27 which is busy, and unpleasant to ride on.
- 6.5. At FYA the status of this concerns is now as follows:
- In 2012, the usefulness of the shared use path built by the Southerham to Beddingham scheme was much improved when the cycleway was extended by the new scheme (A27 Beddingham to Firle Cycleway) to meet up with the existing shared use path network at Firle. The paths provided by these two schemes combined provide a more direct and less hilly route than the Ranscombe lane alternative for cyclists travelling east-west.
- 6.6. Overall, the evaluation of the impact of the scheme at FYA is slight beneficial as expected.

Severance and Access to the Transport System

- 6.7. The appraisal forecast a neutral impact on these sub-objectives. This was confirmed in the OYA evaluation, and since then there has been no significant change to severance to communities or public access routes or to the proximity to public transport services

Integration

- 6.8. The integration objective as set out in the appraisal summary table (Table A.1) 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; and
 - Integration with Land Use Policies and Other Government Policies: how the scheme integrates with local land use and wider government objectives.

Transport Interchange

- 6.9. This concerns the interchange between different modes of transport. The AST states that this is not applicable to this scheme.

Integration with Land Use Policies and Other Government and Local Polices

Forecast

- 6.10. The AST surmised the forecast impact as **beneficial**; for both Land Use policy and other Government Policies.
- 6.11. The Proof of Evidence presented at the public inquiry contains a summary of the compliance with planning policy, particularly transport policy, at the national, regional and local level.

Evaluation

- 6.12. Table 6-1 details the evaluation of the alignment of the scheme at FYA with the policy objectives of the relevant plans.
- 6.13. This shows that beneficial impacts are largely as expected and the impacts of the scheme which are contrary to policies are as adverse as expected
- 6.14. Therefore, in summary, the impact is **beneficial**.

Table 6-1 – Scheme alignment with National, Regional and Local Policies

Scope	Policy	Forecast Impact on Policy Objective	Evidence for how it aligns at FYA	Alignment
National Planning Policy	Transport Ten Year Plan (2000)	Improve safety on trunk road	Reduction in collisions on A27 within network improved by scheme.	Yes
		Reduce congestion on A27 through removal of the level crossing.	Congestion on A27 reduced	Yes
		Attract traffic back to the strategic road network from less suitable roads, reducing congestion and improving safety and the local environment along less suitable routes.	Traffic is shown to have has rerouted form less suitable roads onto the A27, however it has not been possible to isolate out the impact on congestion or number of collisions in wider area due to other confounding factors.	Not known
	Planning Policy Guidelines (PPGs)	Adverse impact expected on polices PPG7: Sustainable Development in Rural Areas, and PPG9: Nature Conservation, due to potential impacts on landscape and views within the Area of Outstanding Natural Beauty (AONB) in which the scheme is located. Mitigation outlined in the ES will significantly minimise the impact on these objectives.	Mitigation outlines in the ES was put in place and at FYA it is establishing satisfactorily.	Adverse but with mitigation, as expected
Regional Planning Policy	South Coast Multi Modal Study	Identified the level crossing as a location of increasing congestion and recommended that grade separation of the A27 from the railway. Improvement world also assist the expansion of the port of Newhaven.	Grade separation of level crossing completed hence reducing congestion and increasing reliability on A27.	Yes
		Recommended Cycleway provision on improved A27.	Cycleway provided along A27 from existing route at Southerham, now at FYA the cycleway which ended at Beddingham is extended by a further scheme: Beddingham to Firle Cycleway.	Yes
	Regional Planning Guidance 9 (RPG9), East of Lewes Strategy Development Plan (2002)	Support A27 corridor as a regional spoke supporting economic activity at the 'hubs', and improving accessibility to the strategic port of Newhaven.	Improved journey times on A27 and collision reduction	Yes
		Not perpetuating unacceptable transport conditions by removing the high safety risk at the level crossing.	Safety risk at level crossing removed through construction of scheme	yes

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		Limit damage to the Sussex Downs and the AONB would be limited by the on-line nature of the proposed route, which would achieve the objectives of maintaining the existing transport system whilst giving important consideration towards minimising the environmental impacts of transport movements. Thorough consideration of mitigation and enhancement in route design will also help to meet the objectives of limiting environmental impact.	Environmental damage to the Sussex Downs and the AONB limited through on-line nature of the route and environmental mitigation measures which are establishing as expected	yes
	East Sussex and Brighton and Hove Structure Plan (1991-2011)	Provides a safer transport route and increasing journey time reliability.	Improved reliability on A27 and collision reduction	Yes
		Adverse impact on the environmental objectives since the scheme is located within an AONB although appropriate mitigation will limit any non-compliance.	Mitigation measures establishing as expected	Yes
Local Planning Policy	Lewes District Local Plan (2003)	Adverse impact on the policy of preservation of areas of environmental importance. The impact of the proposals on these principles would be 'adverse', as the scheme is located within an AONB and will also encroach into the River Ouse Policy Area SNCI. Mitigation will significantly reduce the impacts.	Mitigation measures establishing as expected	Yes
		Beneficial impact on transport objectives through extension of facilities for cyclists and pedestrians.	Shared use path provided by scheme	yes

Key Points on Accessibility and Integration at FYA

Accessibility

- The shared use path alongside the A27 and underpass under the A27 linking the path with the A26 built by the scheme now does improve opportunity to cycle this route. Completion of the connection with the cycle network was completed in 2012 with the Beddingham to Firle Cycleway east of the scheme.

Integration

- Completion of the scheme is largely consistent with regional policies.
- Where the scheme has adverse impacts, mitigation measures are establishing as expected.

7. Conclusions

Introduction

7.1. To conclude this report this section summarises how the scheme is meeting its objectives.

Success against Objectives

7.2. The objectives can be categorised as follows:

- DfT's objectives: Impacts are assessed against the Government's objectives for transport at the time of the appraisal. Namely: environment, safety, economy, accessibility and integration; and
- Scheme specific objectives.

DfT objectives

7.3. The scheme's successes against the standard five objectives and sub-objectives are presented in full in the form of the Evaluation Summary Table presented below in Table A.2.

Scheme specific objectives

7.4. Drawing upon information presented in this report, a summary of the scheme's successes against the scheme specific objectives for each phase, as listed previously in Section 1 of this report is provided in Table 7-1.

Table 7-1 – Summary of success against scheme objectives

Objectives (as at entry into major schemes programme)	Has the scheme objective been achieved?	
To make the crossing of the A27 over the railway line safer	Risk or road/rail collisions have been virtually eradicated. Reduced collision rate on improved section of A27, taking into account extra traffic.	✓
To reduce delays for road users	Reduced journey times on A27 and there are no longer delays caused by level crossing closures.	✓
To cater more effectively for traffic using the route	Improved road condition, especially level crossing removed.	✓
To provide better facilities for cyclists and pedestrians	Shared use path provided alongside full length of this part of A27	✓

Appendices

Appendix A. Glossary

Term	Meaning
AADT, ADT	Annual Average Daily Traffic. Average of 24 hour flows, seven days a week, for all days within the year. ADT non annualised average daily traffic
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.
AONB	Area of Outstanding Natural Beauty
AST	Appraisal Summary Table. This records the impacts of the scheme according to the Government's five key objects for transport, as defined in DfT guidance contained on its Transport Analysis Guidance web pages, WebTAG
ATC	Automatic Traffic counter
AWT	Average Weekday Traffic. Average of Monday to Friday 24 hour flows.
BCR	Benefit Cost Ratio This is the ratio of benefits to costs when both are expressed in terms of present value i.e. PVB divided by PVC
bvkm	billion vehicle kilometres
CO ₂	Carbon Dioxide , for transport, this is the main greenhouse gas
COBA	COst Benefit Analysis – a computer program which compares the costs of providing road schemes with the benefits derived by road users (in terms of time, vehicle operating costs and accidents), and expresses the results in terms of a monetary valuation. The COBA model uses the fixed trip matrix unless it is being used in Accident-only mode.
CUBE	Cube Voyager software used for modelling personal travel
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.
Do Nothing	In scheme modelling, this is the scenario which comprises only the existing road network.
Do Something	In scheme modelling, this is the scenario detailing the planned scheme plus improvement schemes that have already been committed
EA	Environment Agency
EN	English Nature
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.
FERA	Food & Environment Research Agency
FWI	Fatalities & Weighted Injuries
FWI/bvkm	This figure is a combined measure of casualties based on the numbers of fatal, serious and slight casualties. It is weighted by severity of injuries, with fatalities having the highest weighting. It can be expressed as a ratio per accident, per year or based on the amount of travel (bvkm, billion vehicle kilometres).
FYA	Five Years After
GCN	Great Crested Newt

Term	Meaning
HATRIS	Highways Agency Traffic Information System The Highways Agency (HA) currently maintains, operates and develops three traffic databases and associated applications. The Traffic Flow Data System (TRADS) holds information on traffic flows at sites on the network. The Journey Time Database (JTDB) system holds information on journey times and traffic flows for links of the network. These two databases are known collectively as the HA Traffic Information System (HATRIS).
HEMP	Handover Environmental Management Plan
HGV	Heavy Goods Vehicle. In the context of this report, the precise definition of the term is dependent on the way that traffic is being measured. Currently, traffic flow data as measured by ATCs uses a length based classification – the term HGV is used to refer to vehicles greater than 5.2m. Shorter vehicles are classified as ‘light’.
HMRI	Her Majesty's Railway Inspectorate. Organisation responsible for overseeing safety on Britain's railways up to 2009.
MAC	Managing Agent Contractor – organisation normally contracted in 5-year terms for undertaking the management of the road network within a HA area.
LMVR	Local Model Validation Report LMVR
NE	Natural England
NMU	Non-Motorised User. A generic term covering pedestrians, cyclists and equestrians
NNR	National Nature Reserve
NO ₂	Nitrogen Dioxide
NRTF	National Road Traffic Forecast. This document defines the latest forecasts produced by the Department of the Environment, Transport and the Regions of the growth in the volume of motor traffic. At the time this scheme was appraised, the most recent one was NRTF97, i.e. dating from 1997.
OYA	One Year After
PIC	Personal Injury Collision. A road traffic accident in which at least one person required medical treatment.
PIC/mvkm	Ratio of PIC to the level of travel measured in million vehicle kilometres (mvkm)
Present Value	Present Value is the value today of an amount of money in the future. In cost-benefit analysis, values in differing years are converted to a standard base year by the process of discounting giving a present value.
PVB	Present Value Benefits Value of a stream of Benefits accruing over the appraisal period of a scheme expressed in the value of a Present Value
PVC	Present Value Cost As for PVB but for a stream of costs associated with a project
SDJC	South Downs Joint Committee
SDNPA	South Downs National Park Authority
SOCOMMS	South Coast Multi Modal Study Transport Study completed in 2002 made recommendations for a long term strategy to address passenger and freight transport movement needs along the South Coast in a 150-mile arc between Southampton and Ramsgate in East Kent
SNCI	Site of Nature Conservation Importance Areas designated by local authority as of local conservation interest
SSSI	Site of Special Scientific Interest
STATS19	Record of injury accident statistics recorded by police officers attending accidents
TEMPRO	Trip End Model Presentation Program Program which provides detailed trip forecast including split by geographical area

Appendix B. Appraisal Summary Table (AST) and Evaluation Summary Table (EST)

Table B.1 – Appraisal Summary Table (AST) from Public Inquiry

	Description: On-line single carriageway with bridge crossing over railway, two lanes in westbound direction and minor junction improvements.		Present Value of Cost £42.1m	
Problems:	The Health and Safety Executive (Railway Inspectorate) has concerns about continuing vehicle/barrier incidents at Beddingham level crossing and wishes the Highways Agency to grade separate the highway and railway, otherwise they will instruct the installation of full barriers, the result of which would be the A27 being closed to traffic for up to 24 minutes of each peak hour. The existing carriageway and junctions are insufficient for existing traffic flows of 29,500 AADT leading to congestion at peak times.			
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE MEASURE	
ENVIRONMENT	Noise	As the scheme is largely an on-line improvement, changes in noise levels are minimal. Noise predictions for the preferred route are likely to be lower than the existing situation as a result of re-surfacing the carriageway with low noise surfacing and as a result of improvements to the highway network. A small number of properties are likely to be eligible for noise insulation.	Percentage of people annoyed by noise: Approx 13.1 (Do-Something) Approx 15.1 (Do-Minimum) Approx 2% less of the population annoyed by noise	Beneficial
	Local Air Quality	The scheme would have a positive local air quality impact.	Final net total assessment for the effect of the proposed scheme over do-minimum: 2008: PM10 = -54.60 NO2 = -43.05 2010: PM10 = -52.97 NO2 = -40.32	Slight Beneficial
	Greenhouse Gases	The Do-something scenario would increase levels of carbon dioxide, over the future do-minimum levels.	Carbon Dioxide levels: Current levels = 4,468 tonnes / yr Do-Minimum 2007 = 4,314 tonnes/yr Do-something 2007 = 5,024 tonnes /yr	Not applicable at this stage
	Landscape	The route would impact upon the landscape of the Sussex Downs Area Of Outstanding Natural Beauty (AONB). Changes to landscape patterns and views would occur, but adverse impacts would be reduced through appropriate design of ameliorative and enhancement planting.	Visual impact at residential property, taking landscape measures into account, winter 15 years after scheme opening: 4 properties Moderate Adverse, 14 Slight Adverse, 3 houses demolished at Beddingham Level Crossing.	Overall assessment, taking into account mitigation measures, would be Moderate Adverse at both scheme opening (winter) and 15 years after scheme opening (summer)
	Townscape	Not applicable	Not applicable	Not applicable
	Heritage of Historic Resources	Assessment suggests that the proposals would be unlikely to impact upon any archaeological remains.	Not applicable	Neutral
	Biodiversity	Main impacts on designated sites would be from noise, dust and vibration during construction. Aquatic species in the River Ouse Policy Area may experience temporary disturbance from encroachment and loss of habitat, but new highway drainage systems and replacement water features would improve water quality and aquatic biodiversity. The scheme would result in the loss of roadside planting, and some important hedgerows; however, replanting would aim to enhance conservation value in the long-term. New under-bridges would provide safe corridors for mammals.	Not applicable	Slight Adverse
	Water Environment	Installation of a new highway drainage system to treat water from the road would improve the management of both water quality and quantity.	Not applicable	Slight beneficial
	Physical Fitness	The works would not cut any people off from their local services or existing access routes. Extension of the Pedestrian and Cycle facilities would improve local access and decrease journey times for non-vehicle travellers.	-	Moderate Beneficial
	Journey Ambience	Driver stress would be reduced by improved traffic flow, particularly on the westbound carriageway. Road travellers would experience little long-term change to existing views.	-	Large beneficial
SAFETY	Accidents	Number of accidents exceeds the national average for single carriageways, and there have been over 25 incidents at the level crossing in the period August 1998 - December 2002. The scheme would significantly improve safety.	Savings in Total Accidents = 1099 Savings in Fatalities = 35.8 Savings in Serious Casualties = 277 Savings in Slight Casualties = 1155	Present Value of Benefits £66m
	Security	Improved traffic flow on the A27 and at junctions improves security.	-	Slight Beneficial
ECONOMY	Consumers	The removal of the level crossing will reduce journey times considerably.	Total vehicle hours saved = 41,600,000	PVB £202.0m
	Business	The removal of the level crossing will reduce journey times considerably.		PVB £163.8m
	Exchequer Costs	The removal of the level crossing will reduce journey times considerably.		PVC £42.1m
	Reliability	The addition of the westbound lane, combined with the construction of the bridge and improvements to the junctions at Southerham and Beddingham will improve reliability	Route stress before 114%, after 110%	Moderate Beneficial
	Wider Economic Impacts	The scheme does not serve a designated regeneration area, but will improve the route to the Port of Newhaven	No	No
ACCESSIBILITY	Option values	There is no significant change to public transport options. The extension of the Pedestrian / Cycleway from Ranscombe Lane to Beddingham will increase opportunities for travel by bike and by foot for residents of Southerham and Beddingham.	-	Slight Beneficial
	Severance	There will be no significant severance to communities or public access routes.	-	Neutral
	Access to the Transport System	Proximity to public transport service unaffected	-	Neutral
INTEGRATION	Transport Interchange	Not applicable to the scheme	Not applicable	Not applicable
	Land-Use Policy	Consistent with the South Coast Multi Modal Study	-	Beneficial
	Other Government Policies	Consistent with the Ten Year Transport Plan	-	Beneficial

Table B.2 – Evaluation Summary Table (EST)

OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE IMPACT	ASSESSMENT
Environment	Noise	Overall, there is a decrease in traffic flows within the scheme although this reduction is not sufficient to allow for a 'better than expected' evaluation.		Likely to be As Expected
	Local Air Quality	Observed traffic flows are lower than forecast and therefore it is concluded that the effects of the scheme are better than expected in terms of local air quality.		As expected
	Greenhouse Gases	There is an increase in Carbon emissions along the scheme section post opening due to additional traffic in the corridor.	16% increase in carbon tonnes/year	As expected
	Landscape	Lack of topsoil within planting plots and chalky soil conditions are likely to have led to the observed slow growth of trees and shrubs in some areas. Planting is generally too widely spaced and tended to provide narrow belts of screening. Some presence of invasive weeds and slow growth of species-rich chalk grassland is noted. With careful maintenance and potential fencing/replanting growth would be as expected by 15YA. Planting was better established and beginning to mature near listed buildings at Beddingham roundabout and along the extended footpath/cycleway and local PROW.		Moderate adverse As expected
	Townscape	n/a		n/a
	Heritage of Historic Resources	Archaeology has been closed out at OYA. Screen planting needs improvement at the location of Grade II listed Ranscombe House as sheep are grazing trees and shrubs planted as a part of the scheme for screening. Planting is well developed at St. Andrews Church and Courthouse Farm. Planting on the embankment at the Railway Bridge is inconsistent		Slight adverse As expected
	Biodiversity	Based on current information mitigation appeared to have been implemented effectively and the ecological pond was well established. Balancing ponds could have been better designed for wildlife and species-rich dry chalk grassland mixes were establishing very slowly.		Slight adverse As expected
	Water Environment	The ecological pond was well colonised with reeds and was well vegetated, as was the adjacent species-rich ditch. The EA suggested that due to the decision not to monitor a larger range of terrestrial and aquatic ecology, it is unclear whether reed beds are established and working to filter any road run-off. There were no recorded instances of flooding. However, based on current information and when compared to the pre-scheme provisions; water quality and drainage are 'as expected'.		Slight beneficial As expected
	Physical Fitness	Recent extension to the shared use path east to Firle has increased the use of the path built by this scheme and was performing as expected		Moderate beneficial As expected
	Journey Ambience	Overall, journey ambience is as expected based on the number of measures taken to provide easier navigation of the scheme, reduced congestion and the provision of the extended shared-use footpath/cycleway between Ranscombe Lane and Firle, which separates traffic from NMU users		Large beneficial As expected
Safety	Accidents	Collisions on scheme network reduced by 3.4 annually, mainly around the former location of the level crossing Safety benefits not monetised due to lack of statistical significance	Reduction of 3.4 annually. PVB=£0m	
	Security	Improved traffic flow on A27 improves security	-	Beneficial As expected
Economy	Public Accounts	Investment costs as expected but higher than expected indirect tax impact	PVC=£81.4m	
	Transport Economic Efficiency	Journey time savings for A27 traffic	PVB=£286.0m	
	Reliability	Improvement achieved through removal of level crossing and future benefits are from avoiding the additional delays which would have occurred with the installation of a full barrier crossing for safety reasons.	-	Moderate beneficial As expected
	Wider Economic Impacts	The scheme does not serve a designated regeneration area, but is likely to have improved the route to the Port of Newhaven	-	slight As expected
Accessibility	Options Values	There is has been no significant change to public transport options. The extension of the Pedestrian / Cycleway from Ranscombe Lane to Beddingham has increased opportunities for cyclists and pedestrians	-	slight As expected
	Severance	Links between the extended footpath/cycleway and the existing paths leading under Beddingham bridge have helped to reduce severance, however improved flow of traffic on the A27 and widened westbound carriageway likely to have worsened severance.	-	Neutral As expected
	Access to the Transport System	Proximity to public transport service unaffected by the scheme. Rail passengers not affected by scheme opening.	-	Neutral As expected
Integration	Transport Interchange	No impact	-	n/a
	Land-Use Policy	Consistent with recommendations of South Coast Multi Modal Study	-	Beneficial As expected
	Other Government Policies	Consistent with policies to reduce congestion and improve safety. Mitigation for impacts which are adverse to polices largely successful	-	Beneficial As expected

Appendix C. Average Journey Time Comparison between Timing Points on A27

Timing Points (TP) shown in Figure 2.7

TP1 – Drusilla Park Roundabout

TP2 – Beddingham Roundabout

TP3 – Southerham Roundabout

TP4 – Ashcombe Roundabout

Table C.1 – Average Journey Time (mm:ss) comparison along the A27 between Timing Points in the Eastbound Direction

		Timing Points		Before			OYA			FYA		
				AM	IP	PM	AM	IP	PM	AM	IP	PM
Average Journey Time (mm:ss)	TP2	TP1	06:08	05:57	06:10	09:39	07:51	07:59	08:04	08:03	09:22	
	TP3	TP2	02:36	03:03	02:58	02:34	02:14	02:58	02:24	02:22	03:23	
	TP4	TP3	04:50	02:48	05:00	02:47	02:20	05:20	02:45	02:22	04:37	
	Total		13:33	11:48	14:08	15:00	12:25	16:17	13:13	12:47	17:22	
Change compared with before	TP2	TP1	NA			-03:31	-01:53	-01:49	-01:56	-02:06	-03:12	
	TP3	TP2				00:01	00:49	00:01	00:12	00:41	-00:25	
	TP4	TP3				02:03	00:28	-00:20	02:05	00:26	00:23	
	Total					-01:27	-00:36	-02:09	00:20	-00:59	-03:14	

Table C.2 – Average Journey Time (mm:ss) comparison along the A27 between Timing Points in the Westbound Direction

		Timing Points		Before			OYA			FYA		
				AM	IP	PM	AM	IP	PM	AM	IP	PM
Average Journey Time (mm:ss)	TP1	TP2	11:07	07:08	07:25	09:24	08:49	07:54	09:23	08:16	08:36	
	TP2	TP3	02:52	02:54	02:59	01:53	01:55	01:56	01:50	01:53	01:49	
	TP3	TP4	02:35	02:31	02:37	02:50	02:24	05:19	02:30	02:21	02:51	
	Total		16:33	12:34	13:01	14:08	13:07	15:09	13:43	12:30	13:16	
Change compared with before	TP1	TP2	NA			01:43	-01:41	-00:29	01:44	-01:08	-01:11	
	TP2	TP3				00:58	00:59	01:03	01:02	01:01	01:10	
	TP3	TP4				-00:16	00:08	-02:42	00:05	00:10	-00:14	
	Total					02:25	-00:34	-02:08	02:50	00:04	-00:15	

Appendix D. Environment

Sources

Table D.1 Standard list of information required to evaluate the environmental sub-objective.

Environment Specific Requirements	Response
Environment Statement (ES) or if not a scheme requirement the latest Scheme Assessment Report (SAR).	A27 Southerham to Beddingham ES and Non-Technical summary dated February 2005
AST	AST September 2005
Any amendments, updates or addendums to the ES/SAR or any relevant further studies or reports. Any significant changes to the scheme since the ES.	One balancing pond was not constructed
As built drawings for landscape/ biodiversity/ environmental mitigation measures/ drainage/ fencing/ earthworks etc.	Received
Construction Environment Management Plan (CEMP)	None received
Landscape and Ecology Aftercare Plan (LEAP).	No separate LEAP
H& S File – environment information	None provided
Handover Environmental Management Plan (HEMP).	None provided
Relevant Contact Names for consultation.	Some provided others sourced by POPE team
Archaeological Reports (popular and academic).	The Cultural Heritage Final Report (2009)
The Road Surface Influence (RSI) value of any low noise surface installed	None provided
The insulation performance properties of any noise barriers installed (The BS EN 1794-2 result provided by the noise barrier manufacturer)	N/A
List of properties eligible for noise insulation.	None provided
List of Part 1 Claims regarding noise/air quality/lighting	N/A
Reports for any pre/post opening survey and monitoring work e.g. for noise, biodiversity, water quality).	Post Construction Ecological Monitoring, GCN Survey (June 2009) Post Construction Ecological Monitoring, Bat Survey (August 2009) Nest Box Monitoring and Maintenance Statement (February 2010) Ranscombe Cottage Noise Study (February 2009) A27 Aftercare: Landscape Walk-over (November 2010)
Animal mortality data	None provided. Key accident/collision data provided by MAC but did not record species.
Post opening Non-motorised User (NMU) Audit or Vulnerable User Survey	No pre and post-scheme NMU Audits undertaken.
Any information regarding environmental enhancements to streetscape/townscape for bypassed settlements.	N/A
Employers Requirements Works Information – environment section	None provided

Environment Specific Requirements	Response
Scheme Newsletters /publicity material/Award information for the scheme.	HA Press Release: New A27 cycle lane fills missing link in national cycle network (2012).
Other	N/A

C.1 Photographic Record of Scheme – ES photomontage comparisons

Figure D.1 – Photomontage of predicted view to south from Mount Caburn, predicted Opening Year

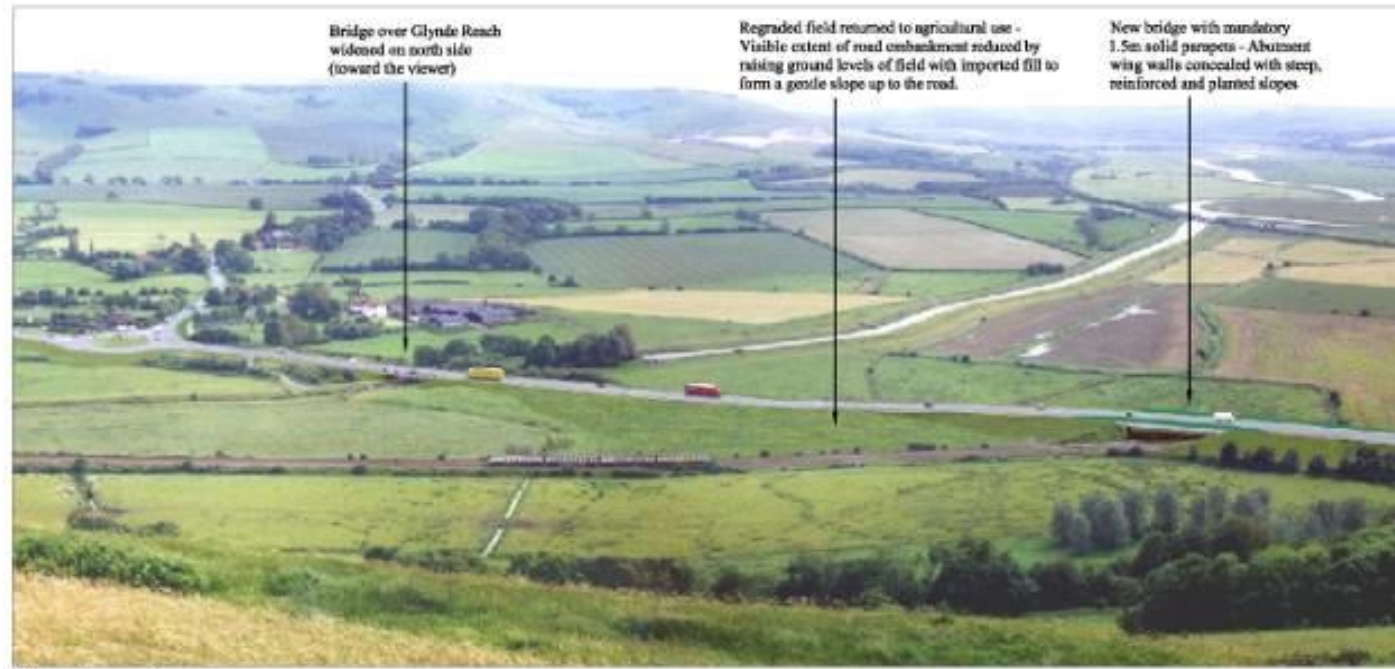


Figure D.2 – Photomontage view to south from Mount Caburn, One Year After Opening



Figure D.3 – Photomontage of view to south from Mount Caburn, Five Years After Opening



Figure D.4 – Photomontage view to south west from Mount Caburn, predicted Opening Year

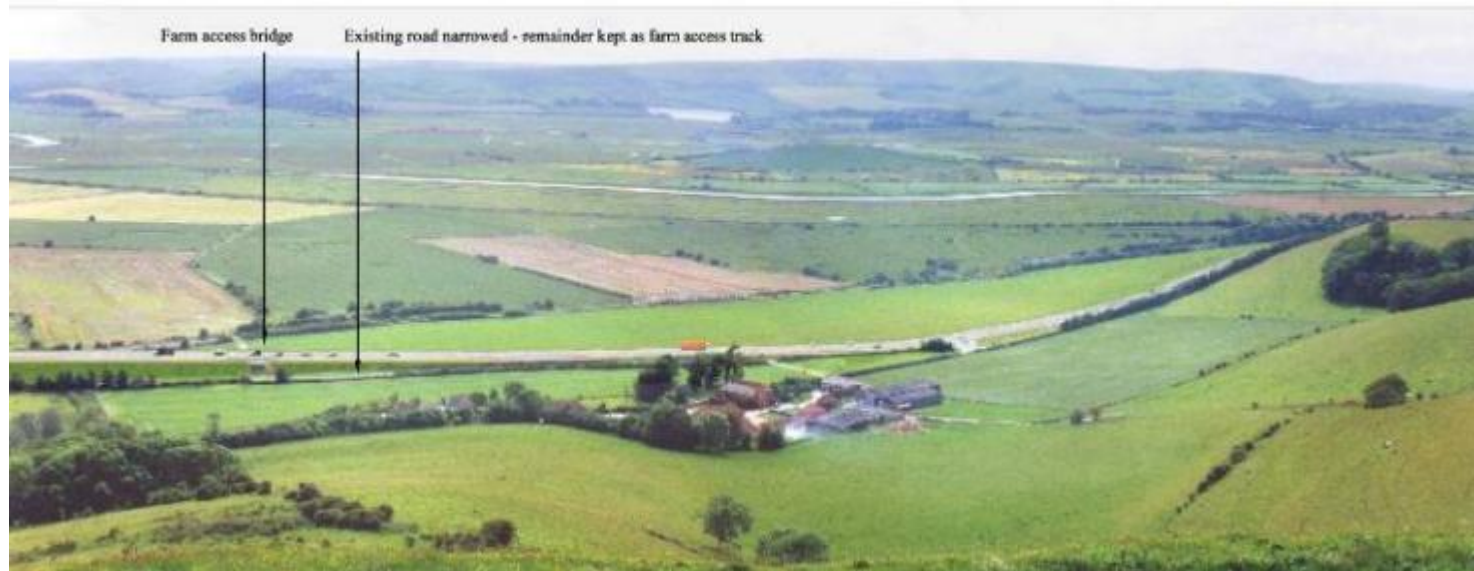


Figure D.5 – Photomontage view to south west from Mount Caburn, One Year After Opening



Figure D.6 – Photomontage view to south west from Mount Caburn, Five Years After Opening



Figure D.7 – Photomontage of predicted view to south from Ranscombe Lane, in predicted Opening Year



Figure D.8 – Photomontage of view to south from Ranscombe Lane One Year After opening



Figure D.9 – Photomontage of view to south from Ranscombe Lane, Five Years After Opening (view through gate in hedgerow)



Figure D.10 – View from St Andrews Church (pre-construction)



Figure D.11 – View from St Andrews Church (One year after opening)



Figure D.12 – View from St Andrews Church (Five year after opening)



Figure D.13 – View of A27 westward from junction with Ranscombe Lane (pre-construction)



Figure D.14 – View of A27 westward from junction with Ranscombe Lane (one year after opening)



Figure D.15 – View of A27 westward from junction with Ranscombe Lane (Five year after opening)



Figure D.16 – View of eastern approach to Beddingham Junction (pre-construction)



Figure D.17 – View of eastern approach to Beddingham Junction (One year after opening)



Figure D.18 – View of eastern approach to Beddingham Junction (Five year after opening) showing information signs not visible at OYA



Figure D.19 – View looking east along A27 from junction with Ranscombe Lane (pre-construction)



Figure D.20 – View looking east along A27 from junction with Ranscombe Lane (One year after opening)



Figure D.21 – Photomontage view looking east along A27 from junction with Ranscombe Lane (Five year after opening)



C.2 Photographic Record of Scheme (FYA)



Cyclist on shared use Footpath/Cycleway



Clear signage along shared-use Footpath/Cycleway



Sheep Grazing Scheme Planting at Ranscombe Lane



Approaching Beddingham Roundabout and verge planting



Glynde Reach Bridge



Badger and Rabbit fencing at Glynde Reach Bridge



Planting at top of embankment near Railway Bridge



Planting further from Railway Bridge on embankment slopes



Planting on Railway Bridge abutment



Path/cycle access around gate



Two specimen (deciduous) trees at Courthouse Farm (good growth) with two trees growing less well



Ranscombe Hill Chalk Face and narrow Footpath/Cycleway



Clear signage for Southerham roundabout on bend



Well vegetated ecological pond with adjacent species-rich ditch

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