



A27 CORRIDOR FEASIBILITY STUDY
REPORT 3 OF 3: INVESTMENT CASES

HIGHWAYS AGENCY

[Job number: 3511134ABL]

A27 Corridor Feasibility Study

Report 3 of 3: Study Stage 3 – Investment Cases

Job number: 3511134AFJ-PTG

Prepared for
Highways Agency
Federated House
Dorking

Prepared by
Parsons Brinckerhoff

www.pbworld.com

AUTHORISATION SHEET

Client: Highways Agency
Project: A27 Corridor Feasibility Study
Address:

PREPARED BY

Name: Theo Genis
Position: Regional Associate – Parsons Brinckerhoff
Date: November 2014

AGREED BY

Name: Colin McKenna
Position: Technical Director – Parsons Brinckerhoff
Date: February 2015

AUTHORISED FOR ISSUE

Name: Theo Genis
Position: Regional Associate – Parsons Brinckerhoff
Date: February 2015

DISTRIBUTION

ACCEPTED BY

Name:
Position:
Date:

ACCEPTED BY

Name:
Position:
Date:

CONTENTS

	Page
1	Executive summary 9
1.1	Study Overview 9
1.2	Methodology for Study Stage 3 10
1.3	Investment Case at Arundel 11
1.4	Investment Case at Worthing and Lancing 11
1.5	Investment Case to the East of Lewes 11
1.6	Next Steps 12
2	Introduction and purpose 13
2.1	Introduction and Purpose 13
2.2	Feasibility Study Background 13
2.3	Stakeholder Engagement during Study 13
2.4	Purpose and Content of this Report 14
3	Overview of A27 Corridor and Study Stages 1 and 2 15
3.1	A27 Corridor Overview 15
3.2	Study Stage 1 Summary 16
3.3	Study Stage 2 Summary 18
4	Study Stage 3 Methodology 21
4.1	Introduction 21
4.2	Strategic Case Assessment 21
4.3	Economic Case Assessment 21
4.4	Calculation of Benefit-Cost Ratios (BCRs) 22
5	Investment Case at Arundel 24
5.2	Options Considered at Arundel 24
5.3	Arundel - Strategic Case for Intervention 26
5.4	Arundel – Economic Case for Intervention 27
5.5	Arundel – Investment Case Conclusion 28
6	Investment Case at Worthing and Lancing 29
6.2	Options Considered at Worthing and Lancing 29
6.3	Worthing and Lancing - Strategic Case for Intervention 30
6.4	Worthing and Lancing – Economic Case for Intervention 31
7	Investment Case for East of Lewes 33
7.2	Options Considered for East of Lewes 33
7.3	East of Lewes - Strategic Case for Intervention 34
7.4	East of Lewes – Economic Case for Intervention 34
7.5	East of Lewes – Investment Case Conclusion 35
8	Next Steps 36
8.2	Project Planning 36
8.3	Governance Structure 37
8.4	Risk Management 37

8.5	Communications and Stakeholder Management	38
9	Summary and Conclusions	39

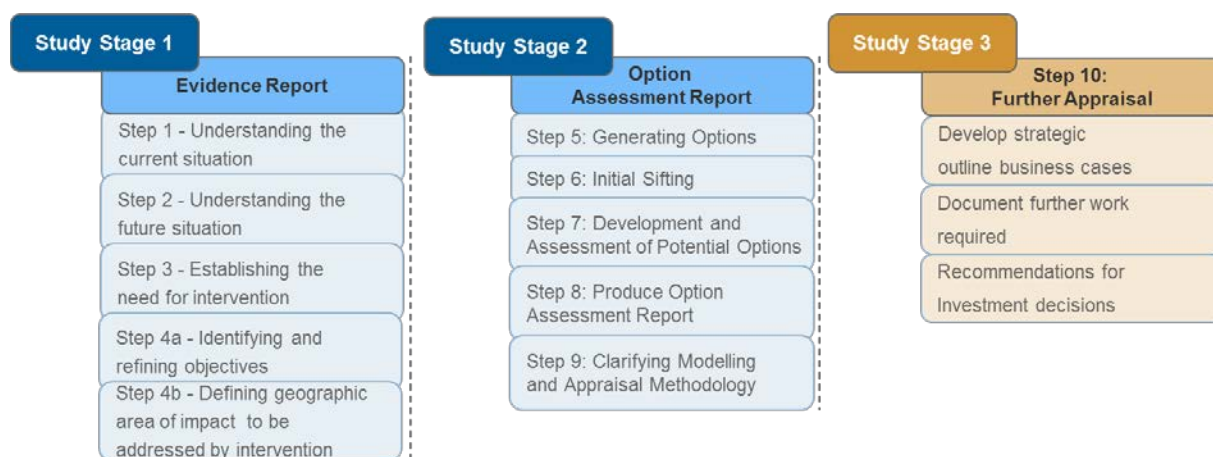
1 EXECUTIVE SUMMARY

1.1 Study Overview

1.1.1 Parsons Brinckerhoff (PB) was commissioned by the Highways Agency (HA) to undertake a feasibility study on the A27 Corridor on behalf of the Department for Transport (DfT) in November 2013.

1.1.2 The purpose, scope and approach used for the A27 Corridor Feasibility Study are set out in a Scope Document issued by the Department of Transport and the Highways Agency¹. This required the study to be consistent as far as possible with other feasibility studies being undertaken which also take a proportionate approach and follow the DfT’s Transport Analysis Guidance (January 2014). This study has been undertaken in three stages which are set out below.

1.1.3 This report is the third of three reports covering the Study Stages, which are as follows:



1.1.4 **Study Stage 1** covers the evidence gathering phase of the A27 Corridor Feasibility Study, with an emphasis on gaining a comprehensive understanding of the current and future transport situation and the need for intervention. The evidence assessment was used to identify intervention specific objectives and to define the geographic area of interest.

1.1.5 From the evidence and analysis of identified problems and issues, three locations or 'hotspot areas' were prioritised for targeting interventions during Study Stage 2. These were:

- Arundel;
- Worthing and Lancing; and
- East of Lewes - specifically the stretch of road between Lewes and Polegate.

1.1.6 **Study Stage 2** assessed the range of infrastructure proposals that could address the need for intervention at the priority problem locations identified. This stage considered whether such proposals are likely to be deliverable, affordable and offer value for

¹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/345568/a27-feasibility-study-scope.pdf

money (VfM), and capable of achieving the intervention-specific objectives identified in Study Stage 1.

1.1.7 A range of individual investment proposals, as well as combinations of investment propositions, were considered. A long list of discrete interventions at each of the three prioritised locations was considered and shortlisted for assessment using the Department's Early Assessment and Sifting Tool (EAST). This stage culminated in the production of the Study Stage 2 Report: Option Assessment Report.

1.1.8 Options which indicated strategic fit and/or potential VfM were prioritised for further consideration in Study Stage 3. The study prioritised:

- two of the Arundel bypass options;
- three markedly different tunnel and online improvement options for Worthing/Lancing; and
- all five options for the section east of Lewes.

1.1.9 **Study Stage 3** takes a proportionate approach in considering the case for each of the transport investment proposals and evaluates the cumulative or additional benefits and impacts from investment in the corridor as a whole. The main focus of this stage is on the strategic and economic cases, with the financial, management and commercial cases falling under the 'Next Steps' and following a routine and equivalent approach for all the options.

1.2 Methodology for Study Stage 3

1.2.1 The strategic case builds upon the option assessment in Study Stage 2, and refines the cases, incorporating information provided by stakeholders through Reference Group comments and written responses and from transport modelling.

1.2.2 The economic case considers the modelled potential benefits to users (in a quantitative manner), as well as the environmental and social impacts of schemes (in a qualitative manner).

1.2.3 Traffic modelling was used to make forecasts and assessments to support the economic appraisals of the options. This approach utilises amended versions of the existing traffic models developed by the local highway authorities: the West Sussex County Model (WSCM) in relation to Arundel and Worthing, and the South Wealden and Eastbourne Transport Study (SWETS) model in relation to the area east of Lewes.

1.2.4 Initial cost estimates were developed based on high level designs of options, and these were compared to the benefits determined from the traffic modelling in order to determine the economic case for investment.

1.2.5 Minor highway improvements and sustainable transport improvements are considered along the length of the corridor to enhance the opportunities for walking, cycling and public transport, and to address severance and safety issues.

1.2.6 The investment cases for investment on the A27 at each of the prioritised areas are set out in this report, with a focus on the strategic and economic case.

1.3 Investment Case at Arundel

1.3.1 The bypass options evaluated within this stage are options for a dual carriageway bypass south of the existing A27. Two options were considered:

- **A27 Arundel Bypass Option A**, based on the previous preferred route (pink/blue line) announced in 1993. Estimated cost range: £170m – £210m.
- **A27 Arundel Bypass Option B**, based on an option to avoid land designated as National Park. Estimated cost range: £210m-£250m.

1.3.2 On the basis of the evidence available, there *is an investment case for a dual carriageway at Arundel* which could provide value for money, subject to consultation with the National Park Authority, local government and the public on this, and alternative options.

1.4 Investment Case at Worthing and Lancing

1.4.1 The following options were considered at Worthing and Lancing:

- **A27 Worthing Option A**, based on maximising tunnelling. Estimated cost of £1,315m + additional operational and maintenance costs.
- **A27 Worthing Option F**, based on previous on-line dualling proposals. Estimated cost range: £90m- £100m.
- **A27 Worthing Option G**, based on localised widening and junction improvements. Estimated cost range: approximately £50m.

1.4.2 On the basis of the evidence available, there *is an investment case for online improvements at Worthing and Lancing* which could provide value for money, subject to consultation with the National Park Authority, local government and the public on this, and alternative options.

1.4.3 **Combined Arundel and Worthing Option:** Study Stage 3 concluded that the implications of combining options for Arundel and Worthing should be considered in further detail in the next stage of any scheme development. The combination of these options demonstrated a strong economic case.

1.5 Investment Case to the East of Lewes

1.5.1 The options considered along the East of Lewes section were:

- The two **offline options** for East of Lewes between Beddingham and Cophall Roundabout: **Option A** as a 12.6km dual carriageway off-line route with an estimated cost range of £390m-420m. **Option B** is a single carriageway with an estimated cost range of £290m-330m.
- The **three localised bypass options** (Options C, D and E – bypasses at Selmeston, Wilmington and Folkington) would have benefits for users in the sections of the A27 affected, but would not address the challenges identified along the length between Lewes and Polegate.

- The **online improvements** considered (Option F) would provide some improvements to journey time reliability, road safety and accessibility, but would not significantly reduce travel time or improve resilience.

1.5.2 The analysis indicated that the options for a new offline road to the north of the existing A27 could provide a good strategic fit with the intervention specific objectives but were unlikely to offer the prospect of VfM. Conversely, options for online improvements and short bypasses - including those which indicated high VfM - fell short of meeting the intervention specific objectives. Hence, the conclusion of the study is ***that there is not an option that currently presents a clear investment case for the East of Lewes section of the A27.***

1.5.3 Ultimately, whilst there is a general recognition that there are congestion and safety problems on the section of the A27 to the east of Lewes, a diversity of opinions about how best to alleviate these exists.

1.6 Next Steps

1.6.1 If any of the options are taken forward they would enter the next stage of assessment and would be managed in accordance with the Highways Agency's Project Control Framework (PCF) - the Agency's approach to managing major projects. The options would be placed in PCF Stage 1 (Option Identification). Note: the Highways Agency will change its status from the 1st April 2015 to become Highways England - a government owned company - and it will retain the PCF process for the immediate future.

1.6.2 Key outputs/ deliverables of PCF Stage 1 include, identification of the options to be taken to public consultation; option assessment in terms of environmental impact, traffic forecasts and economic benefits; and refinement of the cost estimate of options (including an allowance for risk), alongside the development of a Public Consultation Strategy.

1.6.3 As part of the management of PCF Stage 1, a project governance structure would be established, a proportionate level of risk assessment would be undertaken, and a detailed communications and stakeholder management strategy would be developed. Issues that may benefit from further stakeholder discussions, prior to public consultation on the options, would include the mitigation of environmental and landscape impacts, assessment of the wider economic benefits, and the local road and vulnerable road user impacts. This would involve, among others, the local planning authorities, West Sussex County Council, Statutory Bodies, and the Coast to Capital and South East Local Economic Partnerships.

2 INTRODUCTION AND PURPOSE

2.1 Introduction and Purpose

2.1.1 This chapter provides a reminder of the purpose of the A27 Corridor Feasibility Study and approach taken. It also outlines the content of this report which is the third and final report in a suite of three study reports.

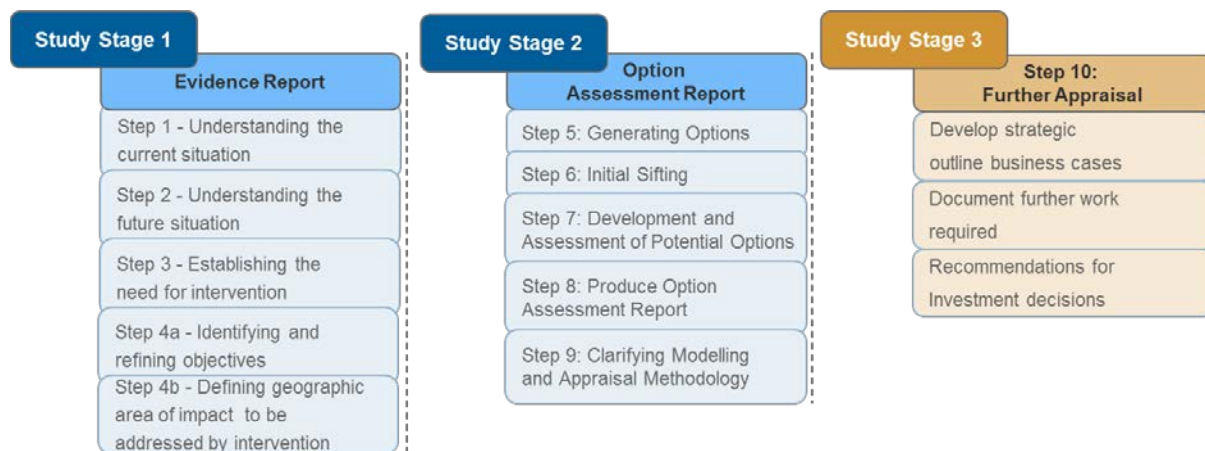
2.2 Feasibility Study Background

2.2.1 Parsons Brinckerhoff (PB) was commissioned by the Highways Agency (HA) to undertake a feasibility study on the A27 Corridor on behalf of the Department for Transport (DfT) in November 2013.

2.2.2 The purpose, scope and approach used for the A27 Corridor Feasibility Study are set out in a Scope Document issued by the Department of Transport and the Highways Agency². This required the study to take a proportionate approach and to be completed in accordance with DfT’s Transport Analysis Guidance (January 2014) and in three stages which are set out below.

2.2.3 This report is the third of three reports covering the Study Stages. The overall structure of the study and steps and tasks undertaken during Study Stage 3 are set out in Table 2-1.

Figure 2-1: Steps of Study Stage 3 and overall study structure



2.3 Stakeholder Engagement during Study

2.3.1 Stakeholder engagement has been a key aspect of the study process, for the verification of the evidence base and for agreeing the intervention-specific objectives. This engagement has been managed largely by means of the A27 Study Stakeholder Reference Group. The main role of the Group has been to ensure stakeholders’ views are captured and considered during the study process, particularly at key points in the study’s work and at times of the development of key outputs. The establishment of the Stakeholder Reference Group enabled the views of a wider community of stakeholder

² https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/345568/a27-feasibility-study-scope.pdf

organisations to be considered and fed into the work of the A27 Corridor Feasibility Study (in accordance with their Terms of Reference).

- 2.3.2 The study team have received a number of items of direct correspondence from stakeholders, amounting to approximately 150 separate pieces of communication received at the time of writing. Additionally, documents and position statement correspondence have been submitted by various lobby groups.

2.4 Purpose and Content of this Report

2.4.1 This report forms the first part of a suite of documents setting out the results of each stage of the A27 Corridor Feasibility Study:

- Study Stage 1: Evidence Report, describing the review of evidence and identification of problems along the A27 corridor;
- Study Stage 2: Option Assessment Report, describing work to finalise the range of infrastructure proposals that could address the problems along the corridor at the priority locations identified; and
- **Study Stage 3: Investment Cases, which describes the work to assess the affordability, value for money (VfM) and deliverability of prioritised infrastructure proposals.**

2.4.2 This report provides a summary of the previous two stages of work, and sets out the further analysis – assessment of VfM – undertaken during Study Stage 3. The report then sets out the conclusions of the Feasibility Study.

2.4.3 The technical content and conclusions set out in this report were completed prior to and formed part of the input to the Road Investment Strategy (RIS) announced in December 2014.

3 OVERVIEW OF A27 CORRIDOR AND STUDY STAGES 1 AND 2

3.1 A27 Corridor Overview

3.1.1 The study considered the length of the A27, from its junction with the M27 in the west (between Cosham and Portsmouth), and its junction with the A259 at Pevensey in the east. A map of the geographical scope of the study is included in Figure 3-1 below.

Figure 3-1: Geographic scope of A27 Corridor Feasibility Study



3.1.2 The A27 is the only east-west trunk road south of the M25. It links various cities and towns along the south coast, accommodating over three quarters of a million people, including Portsmouth, Havant, Chichester, Arundel, Worthing, Brighton and Hove, Lewes and Eastbourne. The A27 also provides access to Bognor Regis and the ports of Portsmouth, Shoreham and Newhaven, and provides businesses and residents in this corridor with access to the rest of the strategic road network.

3.1.3 The local economy has strengths in advanced engineering, tourism and other sectors, and has accommodated substantial population and household growth over the past decade, particularly in the urban areas. The A27 corridor runs alongside and across the South Downs National Park (SDNP) and is also constrained by the urban areas along the route and the sea to the south.

3.1.4 There have been long-standing calls to improve the A27 corridor. Infrastructure enhancements along the A27 and beyond were previously considered as part of the South Coast Multi Modal Study (SoCoMMS) which reported in 2002

- 3.1.5 The study concluded that there was little justification for a long distance strategic south coast route between Southampton and Margate. It did, however, identify the need for a number of investments along the A27. Only some of these were progressed at the time owing to concerns about the potential difficulties of delivering major road schemes in environmentally sensitive locations.
- 3.1.6 Further studies have since been undertaken by the Highways Agency and local authorities. Transport improvements have also been developed by the Highways Agency (for example, at Beddingham) and local authorities (for example, the Bexhill to Hastings link road).
- 3.1.7 As part of the outcomes of the 2013 Spending Review, Government committed to investment for major improvements to the A27 Chichester bypass as part of its pipeline of future major road schemes, subject to value for money (VfM) and deliverability.

3.2 Study Stage 1 Summary

- 3.2.1 The first stage of the study reviewed evidence from other relevant studies and undertook analysis to form a view as to the nature and scale of current and future performance on the A27 corridor. It also established the availability of transport modelling tools and supporting data.
- 3.2.2 The Study Stage 1 Report set out the analysis which was undertaken in order to establish the need for and scope for intervention on the A27. This followed four steps in line with DfT's Transport Analysis Guidance (WebTAG):
- Step 1: Understanding the current situation
 - Step 2: Understanding the future scenario
 - Step 3: Establishing the need for intervention
 - Step 4a: Identifying and refining objectives
 - Step 4b: Defining geographic area of impact to be addressed by the intervention

Current Situation - Travel Demand

- 3.2.3 Analysis of Census Journey to Work and historic roadside interview data shows the following:
- There are a variety of short and long distance trips made across the districts along the A27, with little change in travel patterns between 2001 and 2011;
 - Over 60% of trips along the coastal area were estimated to be journeys made entirely within the respective counties of West and East Sussex;
 - Between 1.5 and 2% of commuter journeys in Arun, Worthing and Wealden are made using bus, and between 3 and 4% using rail.
 - A high proportion of work-related journeys in the coastal area are made by road.
 - Goods vehicles represent more than 15% of the daily traffic volumes along A27 and a third of this is heavy goods traffic.

Current Situation - Transport Provision

- 3.2.4 **Rail Provision:** The coastal area is served by a number of rail routes, including the west and east Main Line routes and the west and east Coastway routes. These routes

run parallel to the A27, and could provide an alternative to journeys along the A27. However, these routes cater for local stopping stations, providing good rail accessibility for shorter journeys but lengthy journey times for longer distance journeys. Consultation with Network Rail has found that the rail network is close to capacity with no significant improvements planned.

3.2.5 **Bus Provision:** There are various bus routes serving the communities within the A27 corridor. Consultation with the various Local Authorities along the corridor indicates that no major road-based public transport investment is anticipated.

3.2.6 **Highway Provision:** For most of its 67 mile length the A27 is dual carriageway. Four stretches of road remain single carriageway, namely at Arundel, Worthing, and along two stretches to the east of Lewes. Such sections of road tend to experience peak hour congestion and poor time reliability.

Future Situation

3.2.7 The region is planning for significant growth. Over 60,000 new homes and substantial employment development are expected within the coastal study area (West and East Sussex).

3.2.8 The ability of the transport system to support such growth will, however, be constrained by:

- the capacity of the A27, the capacity of the local road network and the junctions linking the routes; and
- limitations on rail and other public transport modes to significantly improve their offer of an alternative choice of travel, other than in the larger urban areas.

3.2.9 High level traffic modelling undertaken as part of this study indicates that congestion is expected to worsen in future, particularly along the single carriageway and narrow lane sections with reduced capacity.

3.2.10 The current and future issues identified along the A27 can be summarised as follows:

- **Environmental Constraints:** The route passes along and through the South Downs National Park and north of the coastal floodplains of the River Arun and River Adur. A number of areas are also protected by environmental designations.
- **Air Quality:** Traffic and congestion affect air quality, in particular at locations such as Worthing and Storrington where Air Quality Management Areas (AQMA) have been declared due to high volumes of traffic.
- **Capacity:** Annual Average Daily Traffic Volumes (AADT) on specific single carriageway links were close to or above the theoretical capacity of the road at Arundel, Worthing and on the stretch between Lewes and Polegate. AADT volumes on most sections of the dual carriageway along the A27 are within the theoretical road capacity.
- **Reliability:** sections of single carriageway and at-grade junctions result in congestion and delays which impact on the efficient and safe movement of people and goods. Congestion is a problem at a number of locations including Chichester, Arundel, Worthing and between Lewes and Polegate.
- **Road Safety:** Accidents are a significant challenge along certain links, with incidents leading to further impacts on journey-time reliability.
- **Severance:** The route runs through and close to settlements causing severance issues at Arundel, Worthing and Lancing and villages east of Lewes.

The Need for Intervention

- 3.2.11 The evidence demonstrates that whilst bus/rail network or alternative methods such as Light Rail and demand management measures may provide opportunities for modal transfer, these measures are unlikely to be able to adequately address the intervention specific objectives (established in Study Stage 1), of reducing travel time, improving journey time reliability and enabling local planning authorities to manage the impact of planned growth.
- 3.2.12 The Government's policy on the Strategic Road Network (SRN) is to ensure that it operates effectively and efficiently, and that it supports and facilitates economic growth. A more efficient network would enable firms reliant on the A27 for access to operate more efficiently, and encourage investment in existing and new businesses. With greater certainty over journey times, businesses would be better positioned to compete.
- 3.2.13 In the light of current capacity constraints, the planned growth in housing and employment will likely result in the worsening of congestion and delays. There are clear limitations to alternative public transport solutions in meeting most of the current pattern of demand, and hence **there is a need to invest in road-based solutions.**

Geographic Area of Interest for A27 Corridor Feasibility Study

- 3.2.14 The analysis was used to prioritise three locations or 'hotspot areas' for targeting interventions:
- Arundel
 - Worthing and Lancing, and
 - East of Lewes - specifically the stretch of road between Lewes and Polegate.

Intervention Specific Objectives

- 3.2.15 Based on the analysis of available evidence and discussion with the Study Stakeholder Reference Group, the study team defined a number of intervention specific objectives:
- Reducing travel time and improving journey time reliability in the key hotspot areas;
 - Reducing severance and pollution impacts;
 - Enabling local planning authorities to manage the impact of planned growth and, in doing so, support the wider economy;
 - Providing safer roads which are resilient to delay and which are able to adequately cater for the impacts of adverse weather;
 - Minimising impacts on the natural environment and optimising environmental opportunities and mitigation; and
 - Providing opportunities for improved accessibility for all users.

3.3 Study Stage 2 Summary

- 3.3.1 Study Stage 2 assessed the range of infrastructure proposals that could address the challenges at the priority problem locations identified. This stage considered whether options are deliverable, affordable and offer VfM, and that were likely to achieve the intervention-specific objectives identified in Study Stage 1.

- 3.3.2 A range of individual investment proposals, as well as combinations of investment propositions, were considered. This approach looked to build on work done to date, rather than completing a completely fresh process of identification of investment proposals. Impacts were assessed on a qualitative basis.
- 3.3.3 The option generation process identified an initial long list of discrete interventions at each of the three prioritised locations. Over 40 interventions - comprising a variety of online and offline solutions - were considered at a high level. Only those which met most of the intervention-specific objectives and appeared deliverable and feasible were taken forward.
- 3.3.4 The shortlisted options were then assessed using the Department's Early Assessment and Sifting Tool (EAST). This stage culminated in the production of this report - an Option Assessment Report, in accordance with Step 8 of the guidance in Transport Appraisal Guidance (WebTAG) unit 2.1.2.
- 3.3.5 The following is a brief summary of the options generation and sifting:
- *Generating a long list of options* - The option generation process identified an initial long list of 46 interventions at each of the three prioritised locations, comprising a variety of online, offline and public transport solutions.
 - *Initial Sift* - All the 46 interventions were considered at a high level. 20 of these, which met most of the corridor-specific study objectives and were considered potentially deliverable and feasible, were taken forward, either as individual options or packages of options.
 - *EAST assessment* - The 20 shortlisted options were assessed using EAST, resulting in 4 options being discarded and 16 options being identified for further assessment.
 - *Further Assessment* – 16 shortlisted options were assessed using the DfT's Option Assessment Framework, with evidence presented about their strategic and economic fit, and their deliverability.
- 3.3.6 The following options were shortlisted into the EAST assessment:
- At Arundel:
- three new bypass options - (a) partly through the National Park, (b) avoiding the National Park or, (c) closer to the town limits through the National Park;
 - online dualling of the existing road including a 250 metre tunnel and a short stretch of bypass;
 - online improvements.
- At Worthing and Lancing:
- tunnels throughout;
 - combinations of tunnel, bypass and dualling;
 - online dualling throughout;
 - online junction improvements;
 - travel demand management and public transport.

East of Lewes:

- two versions of a new offline route: (a) single carriageway and (b) dual carriageway;
- bypasses at (a) Selmeston and (b) Wilmington;
- online improvements at Selmeston;
- new link road at Folkington;
- Polegate junction improvements;
- low cost online improvements.

Options taken forward to Study Stage 3

3.3.7 Options which indicated strategic fit and/or potential VfM were prioritised for further consideration in Study Stage 3. The study prioritised:

- two of the Arundel bypass options;
- three markedly different tunnel and online improvement options for Worthing/Lancing;
- combined option for Arundel Option A and Worthing Option F - due to the close links between the Arundel and Worthing schemes; and
- all five options for the section east of Lewes.

4 STUDY STAGE 3 METHODOLOGY

4.1 Introduction

4.1.1 The affordability, Value for Money (VfM) and deliverability of the prioritised proposals are assessed in Study Stage 3. This chapter sets out the methodology used for this purpose.

4.1.2 The study used the DfT's transport appraisal guidance and considered the benefits and business cases for each of the transport investment proposals using a proportionate approach, as well as the cumulative or additional benefits and impacts from investment in the corridor as a whole.

4.1.3 The technical work undertaken in the review of the investment cases considered HM Treasury's 5 case model³, but focussed on the following:

- Strategic Case Assessment
- Economic Case Assessment, including:
 - Impact on the economy (reliability, regeneration), environment and society on a qualitative basis, drawn from the work done in Study Stage 2;
 - Modelling of benefits using available modelling tools;
 - Consideration of cost estimates for options;
 - Calculation of a benefit-cost ratio for each option based on a 2010 base; and
 - Refinement of the Appraisal Summary Tables for impacts, taking into consideration comments received during the study from stakeholders.

4.2 Strategic Case Assessment

4.2.1 The strategic case determines whether or not an investment is needed, either now or in the future. It demonstrates the case for change – that is, a clear rationale for making the investment and strategic fit, how an investment will further the aims and objectives of the promoting organisation and government.

4.2.2 The Strategic Case was reviewed under the following categories:

- Existing Arrangements and Local Context
- Identified Problems and Issues
- Key Drivers for Improvement Options
- Fit against Intervention Objectives
- Fit against Policy
- Fit – Economy (including wider economic impacts)
- Fit – Environment
- Fit – Key Government Objectives
- Fit – Key Risks
- Fit – Stakeholder Views

4.3 Economic Case Assessment

4.3.1 The benefits of the better performing options prioritised from Study Stage 2 were evaluated, in accordance with WebTAG, for the following:

³ THE GREEN BOOK - Appraisal and Evaluation in Central Government, HM Treasury, 2003
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf

- User Benefits (Business and Commuter) in terms of travel time savings
- Accident benefits (based on existing accident rates for the current road sections, and standard accident rates for proposed road sections)
- Wider Benefits (calculated as a rough estimate of 10% of Business User benefits)

4.3.2 Traffic modelling was used to make forecasts and assessments to support the environmental and VfM assessments within these business cases. This used amended versions of the models developed by the local highway authorities: West Sussex County Model (WSCM) in relation to Arundel, Worthing and Lancing, and the South Wealden and Eastbourne Transport Study (SWETS) Model in relation to the area east of Lewes.

4.3.3 Travel time benefits and the impact to vehicle operating costs for each proposed scheme option were assessed using TUBA⁴ (version 1.9.4) over 60 years.

4.3.4 Key assumptions applied to the TUBA runs were subject to an internal peer review which concluded that the correct factors (e.g. annualisation) had been applied in the options appraisals.

4.3.5 The traffic modelling and economic appraisal were reviewed by the HA TAME⁵ team at the start and end of Study Stage 3, and an Analytical Assurance Statement (AAS) and Appraisal Certification Office (ACO) minute produced which sets out the level of technical assurance ascribed to the modelling and appraisal undertaken.

4.3.6 TAME identified the limitations of the modelling and specified these to be addressed as part of any future scheme development, but were satisfied that a proportionate approach had been taken to this point.

4.4 Calculation of Benefit-Cost Ratios (BCRs)

4.4.1 Benefit-cost ratios for the options under consideration were determined by dividing the total benefits (the summation of all the positive and negative user benefits calculated during the economic appraisal) by the summation of all the costs to the broad transport budget (excluding the operations and maintenance costs), representing costs to the public sector.

4.4.2 The calculation is made using the formula:

$$BCR = \frac{PVB}{PVC}$$

BCR = Benefit-Cost Ratio

PVB = Present Value Benefits – discounted sum of positive and negative benefits*

PVC = Present Value Costs – discounted costs to the public sector*

*summation over 60-year appraisal period, discounted to 2010 values

4.4.3 BCR calculations have been based on TAG guidance and on the document Value for Money Assessment: Advice Note for Local Transport Decision Makers, published by the DfT in December 2013.

⁴ TUBA - Transport User Benefit Appraisal software suite

<https://www.gov.uk/government/publications/tuba-downloads-and-user-manuals>

⁵ Traffic Appraisal, Modelling and Economics (TAME)

- 4.4.4 The assessment of the VfM for the options considered has been drawn together from the cost estimates and the outputs from the TUBA economic assessments of the options.
- Core and Adjusted BCRs
- 4.4.5 The core PVB value represents the sum of the positive and negative benefits (summed over the 60-year appraisal period and discounted to 2010 values) resulting from journey time savings and accident savings.
- 4.4.6 The adjusted PVB value represents the total core PBV plus the benefits attributed to Wider Benefits, in accordance with the Value for Money Assessment: Advice Note for Local Transport Decision Makers (December 2013)⁶. The core and adjusted PVBs were then used in the calculation of Core and Adjusted BCRs.
- 4.4.7 For A27 Corridor Feasibility Study, the following impacts were monetised:
- business users and providers;
 - commuting and other users;
 - accidents; and
 - cost to broad transport budget.
- 4.4.8 In addition, the wider economic benefits were estimated using a 10% uplift to Business User Benefits. This represents the additional consumer surplus associated with increased output in imperfectly competitive markets⁷.
- 4.4.9 For the calculation of benefits, Present Value Benefits included Travel Time savings, Vehicle Operating Costs (Fuel and Non Fuel) savings and Indirect Tax Revenues. PVB exclude noise, air quality, greenhouse gases and accident benefits. These elements were excluded due to a lack of suitable data at this early stage of options assessment.

⁶ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267296/vfm-advice-local-decision-makers.pdf

⁷ Derived from paragraph 3.19 of the Value for Money Assessment: Advice Note for Local Transport Decision Makers

5 INVESTMENT CASE AT ARUNDEL

5.1.1 This chapter sets out the outcome of the investment case assessment for the proposed intervention at Arundel (from Study Stage 1). It sets out the individual option cases and recognises the interaction between Arundel and Worthing. The chapter looks at the outcomes of the review of Strategic Fit and then at the Economic Fit.

5.2 Options Considered at Arundel

5.2.1 At Arundel the following options were further appraised against their strategic fit and economic fit, following on from the Study Stage 2 conclusions:

- **Proposed Scheme: Option A - Bypass (through SDNP – Pink/Blue Line)**, a dual carriageway bypass to the south of Arundel between the A27 Crossbush junction and a new junction on the A27 to the west of Arundel. Option A has the same alignment as the previously identified 'Preferred Scheme', also referred to as the Pink / Blue Route, which was announced by the Secretary of State for Transport in 1993. Costs are estimated at £175m – £225m.
- **Alternative Scheme: Option B - Bypass (longer to avoid SDNP)**, a dual carriageway bypass, similar to that proposed in Option A, but with a revised alignment at the western end to avoid Tortington Common and Lake Copse. Costs are estimated at £200m-£250m.

5.2.2 Both options would include measures along the existing A27 corridor to reduce severance, improve access to the South Downs National Park, improve access between Arundel and the railway station, and maximise opportunities for improvements to public transport, and travel on foot or on bicycle.

5.2.3 The proposed bypass at Arundel will take the form of a two-lane dual carriageway, and be subject to the national speed limit.

Option A - Bypass (through SDNP – Pink/Blue Line)

5.2.4 The bypass (through SDNP) consists of a total length of 5.5km of new dual carriageway. Option A has the same alignment as the previously identified 'Preferred Scheme', also referred to as the Pink / Blue Route, which was announced by the Secretary of State for Transport in 1993.

5.2.5 At its eastern end the proposed scheme would start at the existing junction between the A27 and A284 Lymington Road at Crossbush. As part of the implementation of the Crossbush Bypass in the 1990's, which terminates at the Crossbush junction, provision was made for the future implementation of a bypass of Arundel, and as such the junction has been designed to incorporate future-grade separation, with provisions made for the A27 to pass under the junction.

5.2.6 From the Crossbush junction, the proposed bypass would initially continue broadly east for approximately 800m as it enters Arun Valley and crosses the Arun Valley Railway via a new overbridge. From the railway bridge, the bypass would turn slightly southwards across the Arun Valley for approximately 1.1km where it crosses the River Arun, again via a new overbridge.

5.2.7 From the River Arun overbridge the proposed bypass continues on a straight alignment over Ford Road, via a new bridge and to a new interchange junction with Ford Road, approximately 500m to the west of the River Arun Bridge.

- 5.2.8 The proposed junction with Ford Road will be grade-separated, with the proposed bypass passing over Ford Road. Access between the bypass and Ford Road would be via slip roads. The westbound exit and entry slip roads would meet Ford Road as the minor arm of a new 3-arm priority junction to the south of the bypass alignment, and the eastbound exit and entry slip roads would form the minor arm of a new priority junction to the north of the bypass alignment.
- 5.2.9 After crossing Ford Road, the alignment curves round to the north before curving west to meet the alignment of the current A27, approximately 1.5km to the east of the Yapton Lane junction. The majority of Option A to the west of Ford Road passes through the South Downs National Park, specifically passing through Tortington Common.
- 5.2.10 The proposed scheme includes the de-trunking and downgrading of the existing A27 route to the east of the proposed new junction, between the new junction and the Ford Road roundabout in Arundel. The existing dual carriageway section, which bisects Paine's Wood and Rewell Wood, would be converted to single carriageway, in effect returning current highway carriageway to the South Downs National Park. In addition, downgrading and de-trunking the existing A27 carriageway will give the opportunity for measures to increase permeability of the route, and in particular, reducing the severance that the current A27 alignment causes through Arundel. The downgrading will also provide opportunities to improve access to the town's railway station which currently is located approximately 1km from the town centre, but with poor pedestrian and cycle facilities (particularly at the A27 / The Causeway roundabout); opportunities to access the station via modes other than car currently are limited.
- Option B - Bypass (longer to avoid SDNP)
- 5.2.11 Option B (longer to avoid SDNP) consists of a total length of 6.0km of new dual carriageway. From the east, the alignment of Option B is the same as for Option A, up to where the proposed alignment crosses Ford Road.
- 5.2.12 From Ford Road the proposed route continues on a straight alignment for a further 600m (approximately), passing over Tortington Lane via a new bridge, before turning slightly to the east for approximately 800m to a new bridge over Binsted Lane. To the west of Binsted Lane, the proposed route curves northwards for approximately 700m and runs in a broadly straight alignment for 1.3km to a new junction on the existing A27 route. In this final section, the route passes over Spinningwheel, Old Scotland Lane and Binsted Lane (north), all of which are via new overbridges.
- 5.2.13 The proposed bypass would terminate at the western end via a new junction with the existing A27, approximately 0.8km to the east of the Yapton Lane junction. At this stage it has been assumed that the proposed junction would be an at-grade roundabout as this would be consistent with the types of junctions elsewhere on the A27 route. The proposed junction would have 3 arms with A27 (west) to / from Chichester, former A27 (east) for local access to Arundel, and A27 (east), the proposed Arundel Bypass.
- 5.2.14 Option B reduces the impact on the South Downs National Park compared to Option A, as the proposed alignment of Option B avoids Tortington Common and Lake Copse, whereas Option A passes through Tortington Common.
- 5.2.15 The two alignments are the same until the west of the proposed bridge over Binsted Lane. In the alternative layout the alignment curves round and continues broadly

straight in a north westerly direction where it meets the existing A27 carriageway to the west of Little Dane's Wood and to the north of Walberton, at location of the existing A27 / Yapton Lane junction.

- 5.2.16 The existing A27 route would be de-trunked and downgraded, as per Option A, providing similar opportunities to reduce severance and improve conditions for cyclists and buses.

5.3 Arundel - Strategic Case for Intervention

- 5.3.1 Based upon the available evidence presented in Study Stage 2 it is apparent that there remains a clear rationale for providing a bypass to the south of Arundel.

Fit Against Intervention Specific Objectives

- 5.3.2 The options considered at Arundel largely meet the Intervention Specific Objectives identified in Study Stage 1, although they would have significant environmental and landscape impacts. They would, however, result in overall beneficial impacts on air quality and noise on the network. The assessment of the options against these objectives is described in detail in the Study Stage 2 Report.

Strategic Fit - Policy

- 5.3.3 There is a good fit with national, regional and local policy in the area, and recognition of the impact of future growth on this stretch of the A27. The Government's policy on the SRN is to ensure that it operates effectively and efficiently, and that it supports and facilitates economic growth. There are very clear policy aspirations at a local and regional level that support the concept of a dual carriageway bypass, to upgrade existing single carriageway sections of the A27 and addressing at-grade junction capacity constraints. However, these have to be balanced against the direct and indirect impacts on the South Downs National Park and any impacts on any other sites of special planning designation such as the Binsted Woods "Ancient Woodland."
- 5.3.4 The policy fit is described in detail in the Study Stage 2 Report.

Strategic Fit - Impact on the Economy

- 5.3.5 The assessment shows that future increases in demand are likely to result in further delays along this section, potentially resulting in adverse effects on the local economy and drivers diverting to unsuitable local roads. Opportunities for new development may be constrained.
- 5.3.6 The scheme options are expected to have the following economic impacts:
- Large beneficial impact upon business users due to time savings through Arundel.
 - Moderate beneficial impacts on reliability by reducing congestion due to increased capacity along links and junctions. Resilience would also be improved.
 - Moderate beneficial impact on regeneration as it would improve access from the area to destinations to the east (towards Worthing and Brighton), and west (towards Chichester Havant and Portsmouth).
 - Slight beneficial impact on wider economy, as increased journey time reliability, safety and capacity on the Strategic Road Network will give more confidence to investors in the area, and improve the overall attractiveness of this part of the corridor.

Strategic Fit – Stakeholder Views

5.3.7 Stakeholder inputs demonstrate general support for a bypass, but local concerns about the potential environmental and community impacts – especially on the South Downs National Park and ancient woodland, have been raised.

5.4 Arundel – Economic Case for Intervention

5.4.1 This section describes the impact on the economy in further depth following the quantification – using transport modelling – of certain benefits. The impact on the environment and society is described in detail in the Study Stage 2 Report, and summarised below.

5.4.2 The most significant scheme benefits are likely to be delivered through improved journey times and reliability along the A27 (moderate to large beneficial). There are also likely to be benefits accruing from incident recovery efficiency, as well as maintenance, as the dual carriageway allows for more flexibility in traffic control during periods of accidents, incidents and maintenance. The proposed bypass is also expected to result in wider impact benefits such as the regeneration, and it would reduce the severance caused by the current alignment of the A27 in Arundel.

5.4.3 Environmental impacts are large adverse for the proposed option, as it runs through the South Downs National Park and a section of ancient woodland. Option B avoids the SDNP but will have a large adverse impact upon local historic communities. Both options have a large adverse impact upon landscape as they run across the existing floodplain and affect the setting of Arundel and the South Downs National Park.

5.4.4 Both options would have a slight adverse impact on air quality and noise in Arundel due to increased traffic in close proximity to the town (although there would be an positive impact along the existing A27), and would have a beneficial impact on villages and towns in the South Downs National Park (e.g. Amberley and Storrington) currently affected by diverting traffic.

5.4.5 Socially, improvements to the A27 are likely to have a beneficial impact on journey quality and severance but no other noteworthy impacts.

5.4.6 The BCR calculations are shown in Table 5-1 and indicate that Option A could result in a BCR ranging between 1.60 and 2.43, and Option B (due to higher construction costs) could result in a BCR ranging between 1.32 and 2.01.

Figure 5-1: Benefit-Cost Ratio Calculations - Arundel Investment Case

Option name		Option A – offline dual bypass through National Park (pink/blue line) (£m)	Option B – offline dual bypass - longer to avoid National Park (£m)
Overall cost of scheme (£ undiscounted)		188.0	228.6
Present Value Costs (PVC)		159.3	192.7
Accident Benefits		26.8	27.1
Present Value Benefits (PVB) <i>total including accidents</i>	Core	322.4	320.6
	Adjusted	335.2	333.3
Core BCR		2.0	1.7

Adjusted BCR		2.1	1.7
Range of BCR	[Low Growth]	1.6	1.3
	[High Growth]	2.4	2.0

5.5 Arundel – Investment Case Conclusion

5.5.1 On the basis of the evidence available, there ***is an investment case for a dual carriageway bypass at Arundel to the south of the existing A27*** which could provide Value for Money (VfM), subject to consultation with the local planning authorities, West Sussex County Council, Statutory Bodies, Coast to Capital Local Economic Partnership and the public on the alignment including environmental and landscape mitigation measures.

6 INVESTMENT CASE AT WORTHING AND LANCING

6.1.1 This chapter sets out the outcome of the investment case assessment for the prioritised problem area at Worthing and Lancing (from Study Stage 1). It sets out the individual cases but recognises the interaction between Arundel and Worthing. The chapter looks at the outcomes of the review of Strategic Fit and then at the Economic Fit.

6.2 Options Considered at Worthing and Lancing

6.2.1 At Worthing and Lancing the following options were further appraised against their strategic fit and economic fit, following on from the Study Stage 2 conclusions:

- **Option A**, based on maximising tunnelling. Estimated cost range of £1,250m - £1,350m + additional operational and maintenance costs.
- **Option F**, based on previous on-line dualling proposals. Estimated cost range: £90m- £100m.
- **Option G**, based on localised widening and junction improvements. Estimated cost range: approximately £50m.

6.2.2 The online improvements proposed in Option F include the following:

- Widening the A27 to 4 lane carriageway through Worthing, connecting dual carriageway sections to each side of Worthing and incorporating improvements to intermediate junctions.
- At-grade junction improvements in Worthing, with widening / signal control at the following locations:
 - Salvington Hill intersection;
 - Offington Corner roundabout;
 - Grove Lodge roundabout; and
 - Sompting Road / Lyons Way intersection.
- Introduction of local restrictions / banned turning manoeuvres / stopping up side road approaches etc. with complementary measures required on the adjoining highway network.
- Online dualling of existing 4 lane carriageway through Lancing, between Upper Boundstone Lane and Manor Road.
- At-grade junction improvements in Lancing, with widening / signal control at the following locations:
 - Busticle Road junction; and
 - Manor Road roundabout.
- Improvements to North-South connectivity in Worthing and Lancing to make crossing of the A27 easier for pedestrians and cyclists.

6.2.3 Option G has been derived from the ⁸WASTM work undertaken for the Highways Agency in 2009/2010. It included online improvements packaged together with a range of public transport improvements and travel demand management measures.

⁸ Worthing & Adur Strategic Transport Model – Strategy Development Report (March 2010), Parsons Brinckerhoff Ltd for the Highways Agency

6.3 Worthing and Lancing - Strategic Case for Intervention

6.3.1 Based upon the available evidence presented, it is apparent that there remains a clear rationale for improving the A27 through Arundel and Worthing.

Fit against Intervention Specific Objectives

6.3.2 The proposed options meet the Intervention Specific Objectives identified in Study Stage 1.

Strategic Fit - Policy

6.3.3 There is a good fit with national, regional and local policy in the area, and recognition of the impact of future growth on this stretch of the A27. There are very clear policy aspirations at a local and regional level that support the concept of improvements to the single carriageway sections of the A27, in particular addressing at-grade junction capacity constraints. Road user benefits and wider economic benefits would have to be balanced against the impacts on the South Downs National Park and any other sites with special planning designations.

6.3.4 The policy fit is described in detail in the Study Stage 2 Report.

Strategic Fit - Impact on the Economy

6.3.5 The assessment shows that future increases in demand are likely to result in further delays along this section, potentially resulting in adverse effects on the local economy and drivers diverting to unsuitable local roads. Opportunities for new development may be constrained.

6.3.6 The scheme options are expected to have the following economic impacts:

- Large beneficial impact upon business users due to travel time savings on journeys through Worthing (both east-west and north-south) and Lancing resulting from a reduction in delays along links and at junctions.
- Moderate beneficial impacts on reliability by reducing congestion due to increased capacity along links and junctions. Resilience would be improved.
- Moderate beneficial impact on regeneration as it would improve access from the area to destinations to the east (along A27), west (A27 through Arundel) and north (A24).
- Slight beneficial impact on wider economy, as increased journey time reliability, safety and capacity on the Strategic Road Network will give more confidence to investors in the area, and improve the overall attractiveness of this part of the corridor.

Strategic Fit – Stakeholder Views

6.3.7 Stakeholder inputs demonstrate general support for improvements at Worthing and Arundel.

6.4 Worthing and Lancing – Economic Case for Intervention

- 6.4.1 This section describes the impact on the economy in further depth following the quantification – using transport modelling – of certain benefits. The impact on the environment and society is described in detail in the Study Stage 2 Report, and summarised below.
- 6.4.2 The most significant scheme benefits are likely to be delivered through improved journey times, resulting in travel time savings, along the A27 through Worthing and Lancing. There are also likely to be notable benefits accruing from accident savings (Options F and G) and incident recovery and maintenance (Option F only) as the dual carriageway allows for greater flexibility in traffic control during periods of accidents, incidents and maintenance.
- 6.4.3 Impacts against the Economic Case are summarised for the three assessed options:
- **A27 Worthing Option A**, based on maximising tunnelling. Cost range £1,200m - £1,400m
 - It would have significant benefits in terms of journey time savings and reduced congestion, but not enough to offset the high scheme costs.
 - It would have a beneficial impact on severance and noise by removing a large proportion of the A27 traffic from the town.
 - It would have an adverse impact on landscape and townscape, as existing open space in Worthing and small parts of the South Downs National Park adjacent to the route would be affected by tunnel portals and grade-separated all-access junctions.
 - **A27 Worthing Option F**, based on previous on-line dualling proposals. Estimated cost range: £75m- £125m.
 - It would have an adverse impact on townscape and severance as it would impact existing properties, and an adverse impact on noise due to increased traffic along the A27
 - The delivery of this option would be challenging due to the requirement of online construction within an urban area.
 - **A27 Worthing Option G**, based on localised widening and junction improvements. Estimated cost range: approximately £50m.
 - It would have an adverse impact on severance and noise due to increased traffic along the A27.
 - The delivery of this option would be challenging due to the requirement of online construction within an urban area.
- 6.4.4 All three options would have a beneficial impact on air quality by reducing congestion.
- Value for Money of combined Arundel and Worthing Options
- 6.4.5 A bypass scheme option at Arundel (Option A) and an online improvement scheme option at Worthing/Lancing (Option F) were tested together. The resulting BCR calculations show a high potential value for money (VfM) for this option. Unique strategic and economic cases were not determined for the combined option at this stage.

Benefit-Cost Ratio Calculations for Worthing and Lancing Options

6.4.6 The BCR calculations are shown in Table 6-1 and indicate that Option A could result in a BCR ranging between 0.69 and 1.22. Option F could result in a BCR ranging between 5.12 and 8.07.

Figure 6-1: Benefit-Cost Ratio Calculations – Worthing and Arundel Investment Case

Option name		Option A - tunnels at Worthing and Lancing	Option F - online dualling improvements at Worthing and Lancing	Option G – online localised widening and junction improvements	Arundel Bypass (A) + Online dualling improvements at Worthing and Lancing (F)
Overall cost of scheme (£ undiscounted)		1,314.2	96.5	50.0	284.5
Present Value Costs (PVC)		1,098.7	82.9	48.6	242.3
Accident Benefits		5.6	N/A	N/A	N/A
Present Value Benefits (PVB) <i>total including accidents</i>	Core	1,001.3	540.8	291.0	927.7
	Adjusted	1,044.2	564.1	303.5	967.7
Core BCR		0.9	6.5	6.0	3.9
Adjusted BCR		0.9	6.8	6.3	4.0
Range of BCR	[Low Growth]	0.7	5.1	3.8	N/A
	[High Growth]	1.2	8.1	8.5	N/A

Worthing and Lancing – Investment Case Conclusion

6.4.7 On the basis of the evidence available, there *is an investment case for online improvements at Worthing and Lancing* which could provide VfM, subject to consultation local planning authorities, West Sussex County Council, Statutory Bodies, Coast to Capital Local Economic Partnership and the public on alignment options including environmental and landscape mitigation measures.

7 INVESTMENT CASE FOR EAST OF LEWES

7.1.1 This chapter sets out the outcome of the investment case assessment for the prioritised problem area for the stretch of the A27 East of Lewes (from Study Stage 1). The chapter looks at the outcomes of the review of Strategic Fit and then at the Economic Fit.

7.2 Options Considered for East of Lewes

7.2.1 For the section of the A27 corridor to the East of Lewes, the following options were further appraised against their strategic fit and economic fit, following on from the Study Stage 2 conclusions:

Figure 7-1: Better performing options following Study Stage 2 considered for East of Lewes

Options	Description
East of Lewes	
Option A Dual offline bypass (H)	Provision of a Dual carriageway between Beddingham and the Cophall roundabout (including throughabout improvement and signals at Cophall). Extension of the dual carriageway between Beddingham and Southerham roundabout. Extension of the existing online shared space cycleway and complimentary measures including junction improvements online between Lewes and Polegate. Cost range: £375m-£425m
Option B Single offline bypass (A)	Provision of a single carriageway between Beddingham and the Cophall roundabout (including throughabout improvement and signals at Cophall). Extension of the dual carriageway between Beddingham and Southerham roundabout. Extension of the existing online shared space cycleway and complimentary measures including junction improvements online between Lewes and Polegate. Cost range: £275m-£325m
Option C Wilmington Bypass	Provision of a single carriageway bypass at Wilmington (including throughabout improvement and signals at Cophall). Extension of the dual carriageway between Beddingham and Southerham roundabout. Extension of the existing online shared space cycleway and complimentary measures including junction improvements between online Lewes and Polegate. Cost range: £75m-£100m
Option D Selmeston Bypass	Provision of single carriageway bypass at Selmeston. Extension of the dual carriageway between Beddingham and Southerham roundabout. Extension of the existing online shared space cycleway and complimentary measures including junction improvements between online Lewes and Polegate. Cost range: £40m-£50m
Option E Folkington Link (D)	Offline bypass of Polegate (Folkington Link) joining at the Cophall roundabout combined with junction improvements at Polegate, provision of the Eastbourne to Hailsham Quality Bus Corridor and the extension of the existing online shared space cycleway between Lewes and Polegate. Cost range: £35m-£45m
Option F* Online improvements	Online improvements to the existing A27 carriageway. These improvements would include suggested schemes from the Highways Agency route manager and concepts considered as part of the Route Strategy scheme proposal for the South Downs Good Neighbour Study. These could include improved NMU crossing facilities, carriageway widening in certain locations, and junction improvements to improve road safety. Cost range: £10m+

** Not considered in full detail*

7.3 East of Lewes - Strategic Case for Intervention

7.3.1 Based on the available evidence there is a need for intervention on the basis of problems identified as part of Study Stage 1, and recognition of the impact of future growth on this stretch of the A27.

Fit against Intervention Specific Objectives

7.3.2 The offline options (A and B) best meet the intervention objectives across the length of the A27 between Lewes and Polegate, although they do have significant environmental impacts. The localised offline options (Selmeston, Wilmington and Folkington Link bypasses) and online improvement options either do not meet the objectives or do so only for a section of the A27 assessed.

Strategic Fit - Policy

7.3.3 The concept of improving the A27 has a good fit with national, regional and local policy in the area. Government's policy on the SRN is to ensure that it operates effectively and efficiently, and that it supports and facilitates economic growth. The offline options (A and B) demonstrate a good policy fit, whilst the other options considered demonstrate a partial fit.

7.3.4 The policy fit is described in detail in the Study Stage 2 Report.

Strategic Fit - Impact on the Economy

7.3.5 The assessment shows that future increases in demand are likely to result in further delays along this section, potentially resulting in adverse effects on the local economy and drivers diverting to unsuitable local roads. Opportunities for new development may be constrained.

7.3.6 The offline options (A and B) would provide additional capacity in order to address the future constraints, whilst the other options considered would have a smaller beneficial impact on the economy, except for localised benefits (e.g. journey time savings at the eastern end of the section due to the Folkington Link).

Strategic Fit – Stakeholder Views

7.3.7 Stakeholder inputs demonstrate the importance and sensitivity of the landscape affected by the offline route options and that there is a diversity of opinion about the most appropriate solutions.

7.4 East of Lewes – Economic Case for Intervention

7.4.1 This section describes the impact on the economy in further depth following the quantification – using transport modelling – of certain benefits. The impact on the environment and society is described in detail in the Study Stage 2 Report, and summarised below.

7.4.2 The most significant scheme benefits are likely to be delivered through improved journey times between Lewes and Polegate through an offline scheme (Option A). There are also likely to be notable benefits accruing from accident savings and maintenance delay savings as the dual carriageway allows for more flexibility in traffic control during periods of maintenance.

- 7.4.3 Environmental impacts are dependent on the option considered; offline options (A, B and C) would have a beneficial impact on air quality and noise along the existing A27, but would have an adverse impact along the new alignment. They would have an adverse impact on landscape and biodiversity due to crossing agricultural land to the north of the railway, and may adversely impact long views from the South Downs National Park. Options C and E would impact upon the Folkington Estate. Option D (Selmeston Bypass) would run through the National Park.
- 7.4.4 Socially, improvements to the A27 are likely to have a beneficial impact on journey quality and severance but little or no other impacts.
- 7.4.5 The BCR calculations are shown in Table 5-1 and indicate that options considered could result in a BCR ranging from 0.13 (Option D) to 6.7 (Option E). A BCR was not calculated for Option F – online improvements.

Figure 7-2: Benefit-Cost Ratio Calculations - East of Lewes Investment Case

Option name		A) Dual carriageway bypass east of Lewes	B) Single carriageway bypass east of Lewes	C) Bypass at Wilmington	D) Bypass at Selmeston	E) New road link at Folkington to East of Lewes
Overall cost of scheme (£ undiscounted)		405.3	310.2	85.3	43.7	41.5
Present Value Costs (PVC)		337.7	261.5	72.5	37.2	35.3
Accident Benefits		30.5	15.1	21.8	< 5.0	21.3
Present Value Benefits (PVB) total including accidents	Core	430.8	381.7	191.7	Nil	128.9
	Adjusted	452.6	401.7	201.2	Nil	134.8
Core BCR		1.3	1.5	2.6	0.1	3.7
Adjusted BCR		1.3	1.5	2.8	0.1	3.8
Range of BCR	[Low Growth]	1.0	1.0	2.0	0.1	2.5
	[High Growth]	1.8	2.1	3.8	0.1	6.7

7.5 East of Lewes – Investment Case Conclusion

- 7.5.1 The analysis indicated that the options for a new offline road to the north of the existing A27 could provide a good strategic fit with the intervention specific objectives but were unlikely to offer the prospect of value for money (VfM). Conversely options for online improvements and short bypasses - including those which indicated high VfM - fell short of meeting the intervention specific objectives. Hence, the conclusion of the study is that there is not an option that currently presents a clear investment case for the East of Lewes section of the A27.

8 NEXT STEPS

8.1.1 This section presents details of the project planning, governance structure, risk management, communications and stakeholder management that would be required for developing any proposals that are included in Roads Investment Strategies.

8.2 Project Planning

8.2.1 In taking forward any of the options through a detailed investment case and subsequently through statutory procedures and construction, they would enter the next stage of assessment and would be managed in accordance with the Highways Agency's Project Control Framework (PCF) - the Agency's approach to managing major projects.

8.2.2 The seven stages of the PCF delivery process are shown below.

- PCF Stage 1: Options Identification
- PCF Stage 2: Options Selection
- PCF Stage 3: Preliminary design
- PCF Stage 4: Statutory Procedures and Powers
- PCF Stage 5: Construction Preparation
- PCF Stage 6: Construction, Commissioning and Handover Open for Traffic
- PCF Stage 7: Closeout

8.2.3 Stages 1 and 2 are referred to as the Options Phase; Stages 3 to 5 as the Development Phase and Stages 6 and 7 as the Construction Phase.

8.2.4 A typical timescale to develop proposals to the end of Stage 5 is between 57 - 63 months. This assumes that the proposal would require a Development Consent Order (DCO).

8.2.5 DCO is the means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects (NSIP), introduced by the Planning Act in 2008. Development Consent Orders are required for designated Nationally Significant Infrastructure Projects rather than other consents such as planning permission, listed building consent and compulsory purchase orders.

8.2.6 The options taken forward would be placed in PCF Stage 1 (Option Identification). Key outputs/ deliverables of this stage are:

- Identification of the options to be taken to public consultation;
- Option assessment in terms of environmental impact, traffic forecasts and economic benefits;
- Refinement of the cost estimate of options (including an allowance for risk);
- Appraisal Specification Report;
- Options Estimate;
- Economic Assessment Report;
- Traffic Forecasting Report;
- Technical Appraisal Report;
- Statement of Intent;
- Public Consultation Strategy;
- Statutory Undertaker Estimates; and
- Departures from Standards Checklist.

8.2.7 Interim Stage Gate Assessment Review (SGAR) and SGAR 1 at the end of Stage 1 measure the success of the project and provide evidence for the Senior Responsible Owner (SRO) and key stakeholders on the continued viability (or not) of the project.

8.3 Governance Structure

8.3.1 Any project would be governed by a Project Board. The Project Board includes the Senior Responsible Officer (SRO), Senior User and Senior Supplier. The board is supported by the Project Manager and various technical specialists from the Highways Agency and supply chain at the request of the SRO. The Project Board would be appointed as part of starting up the project.

8.3.2 Assurance for the project would be carried out under the Highways Agency Investment Control Framework processes, Highways Investment Board, and internal Major Project procedures, such as the Project Control Framework. On entry to the Project Control Framework the proposals would be subject to peer reviews and audits such as Office of Government Commerce Gateway Reviews and Stage Gate Assessment Reviews.

8.3.3 The Highways Agency (HA) project team and delivery specialists have the necessary skills and experience to deliver the Client side activities of the scheme.

8.3.4 In terms of the external expertise for project management and design the HA have contract frameworks in place with consultants that are highly experienced with multi-disciplinary teams which have substantial experience of working on Major Highways Projects for the HA.

8.4 Risk Management

8.4.1 A proportionate level of assessment has been undertaken, at an appropriate level of detail for a feasibility study.

8.4.2 The key risks are:

- The findings of the feasibility study are indicative; therefore there is a risk that the value for money (VfM) assessment and BCR calculation could change as a result of further assessment using a bespoke transport modelling tool in the next stage.
- The forecast cost of the scheme identified by the feasibility study is an order of magnitude estimate. Therefore there is a risk that the costs are likely to change when the solution is designed.
- The assessment of the environmental impact of options undertaken as part of the feasibility study is desktop-based, and may change as a result of further detailed assessment in the future.
- The assessment of the technical feasibility and deliverability of options undertaken as part of the feasibility study is heavily reliant on engineering judgement and may change as a result of further assessment in the future.
- Land cost estimates have been prepared as a desk top exercise as part of the feasibility study. There is a risk that the costs and time associated with acquiring land may change as a result of further consideration in the next stage.
- Broad assumptions have been made about the time required for acquiring land and following statutory planning processes (where applicable). Therefore there is

a risk that these processes will take longer and be more costly than have been assumed, once these issues are considered in more detail.

- Generally broad assumptions have been made about the potential impact upon Statutory Undertakers Plant, overall the need for replacement, diversion or protection of plant could be found to take longer and be more costly than has been assumed when considered in more detail.

8.4.3 On entry to the Project Control Framework, a risk workshop would be held to identify the delivery risks to the scheme.

8.5 Communications and Stakeholder Management

8.5.1 A detailed communications and stakeholder management strategy would be developed.

8.5.2 Consultation with local enterprise partnerships, local authorities and statutory bodies would take place in line with best practise and statutory procedures.

8.5.3 There would be a requirement to conduct consultation with the public leading to a preferred route for the proposal. This would take place during PCF Stage 2: Options Selection. Further public consultation would take place prior to the Development Consent Order (DCO) application being made. This would take place at the end of PCF Stage 3: Preliminary Design.

8.5.4 In respect of both Arundel and Worthing/Lancing locations, consideration of the environmental and landscape mitigation measures and the wider economic benefits may benefit from discussions with the local planning authorities, West Sussex County Council, the Statutory Bodies, and Coast to Capital Local Economic Partnership. The impact on local communities, vulnerable road users and the wider economic benefits are also matters that could be included.

9 SUMMARY AND CONCLUSIONS

- 9.1.1 The evidence and analysis of identified problems and issues in Study Stage 1 were used to identify the need for intervention, the intervention specific objectives, and prioritised locations or 'hotspot areas' for targeting interventions. These were:
- Arundel;
 - Worthing and Lancing; and
 - East of Lewes - specifically the stretch of road between Lewes and Polegate.
- 9.1.2 Following identification and sifting of potential interventions in Study Stage 2, the following options which indicated strategic and economic fit, were prioritised for further consideration. The study prioritised:
- two of the Arundel bypass options;
 - three markedly different tunnel and online improvement options for Worthing/Lancing;
 - all five options for the section east of Lewes.
- 9.1.3 Study Stage 3 further assessed the value for money (VfM), strategic and economic fit to inform the Investment Case of the better performing options considered in Study Stage 2. This report sets out the investment cases at each of the prioritised locations.
- Investment Case at Arundel:
- 9.1.4 On the basis of the evidence available, there **is an investment case for a dual carriageway bypass at Arundel to the south of the existing A27** which could provide VfM, subject to consultation with the local planning authorities, West Sussex County Council, Statutory Bodies, Coast to Capital Local Economic Partnership and the public on the alignment including environmental and landscape mitigation measures.
- Investment Case at Worthing and Lancing:
- 9.1.5 On the basis of the evidence available, there **is an investment case for online improvements at Worthing and Lancing** which could provide VfM, subject to consultation local planning authorities, West Sussex County Council, Statutory Bodies, Coast to Capital Local Economic Partnership and the public on alignment options including environmental and landscape mitigation measures.
- Investment Case at East of Lewes:
- 9.1.6 The analysis indicated that the options for a new offline road to the north of the existing A27 could provide a good strategic fit with the intervention specific objectives but were unlikely to offer the prospect of VfM. Conversely, options for online improvements and short bypasses - including those which indicated high VfM - fell short of meeting the intervention specific objectives. Hence, the conclusion of the study is that there is not an option that currently presents a clear investment case for the East of Lewes section of the A27.
- 9.1.7 Ultimately, whilst there is a general recognition that there are congestion problems on the section of the A27 to the east of Lewes, a diversity of opinions about how best to alleviate this problem exists.