

A47/A12 Corridor Feasibility Study

Stage 3: The Case for Investment

A Report by AECOM for the Highways Agency

February 2015

EXECUTIVE SUMMARY

AECOM has been commissioned by the Highways Agency to undertake a study into the problems along the corridor and consider the potential for interventions to address these problems, including an assessment of the affordability, value for money and deliverability of better options.

This report presents the case for making investment into the emerging schemes prioritised in the second stage of the study.

A high level assessment was undertaken of the case for dualling all remaining single carriageway sections of the A47. This suggested that dualling along the entire A47 corridor could result in a 32 minute journey time saving for end-to-end journeys at an approximate cost of £1.4 billion.

On the basis of the available evidence about the limited use of the road for end-to-end journeys and current capacity along sections of the road, the study concluded that the approach of identifying and tackling hotspots along the corridor would more likely to deliver better value for money. Analysis of the emerging schemes within this report was completed by November 2014 to inform the Department for Transport investment planning. An initial case for investment has been prepared for the following interventions along the A47/A12 corridor:

- A47 A1/Wansford to Sutton dualling (estimated cost range £61m to £86m) – this is anticipated to reduce the risk of collisions, increase resilience, improve capacity supporting economic growth

- A47/A141 Guyhirn Junction improvements (estimated cost range £11m to £16m) – this is anticipated to improve capacity supporting economic growth
- A47 North Tuddenham to Easton dualling (estimated cost range £110m to £155m) – this is anticipated to reduce the risk of collisions, increase resilience, improve capacity supporting economic growth.
- A47/A11 Thickthorn Interchange improvement (estimated cost range £67m to £103m) – potential to generate benefits, Thickthorn Interchange is considered to be of strategic importance to Norwich, the A11 corridor and the future growth aspirations for the area.

- A47 Blofield to North Burlingham dualling (estimated cost range £54m to £80m) – this is anticipated to reduce the risk of collisions, increase resilience, improve capacity supporting economic growth
- A47/A12 Vauxhall Roundabout and Great Yarmouth Station improvements (Estimated cost range £19.4m to £29.2m) – this is anticipated to improve capacity supporting economic growth
- A12 Package of roundabout improvements in Great Yarmouth, including Gapton Hall Roundabout, Harfreys Roundabout, Bridge Road and James Paget Hospital Junctions (estimated cost range £11m to £15m) – this is anticipated to improve capacity supporting economic growth

For Acle Straight proposals were developed to undertake minor safety improvements in the short term and further work on improvements in the medium and long term, working with Natural England to assess environmental impacts and potential mitigation.

This report also includes information about the range of stakeholder opinion about improvements. Generally there is support for making improvements to address problems along the route, albeit different stakeholders hold diverse views as to the nature and scale of intervention required.

There has also been interest from local MPs and the relevant highway authorities – Norfolk County Council and Suffolk County Council to re-designate the A12 trunk road to be an extension of the A47 trunk road in recognition of the strategic nature of the route.

1 INTRODUCTION AND PURPOSE

INTRODUCTION

AECOM is working on behalf of the Highways Agency (HA) for the DfT to identify the problems and propose solutions along the A47/A12 corridor. This is the third and final report of the suite of three reports. This report presents the case for making an investment for the emerging schemes prioritised at the second stage of the study. The report sets out the performance of the 12 emerging options against the strategic and economic case and identifies the next stage for progressing the options.

CONTEXT

The Department for Transport (DfT) commissioned the A47/A12 study to look at ways of improving the A47 trunk road between the A1 and Great Yarmouth and the A12 trunk road between Great Yarmouth and Lowestoft.

This was one of six studies announced at the 2013 Spending Review to tackle long-standing road hotspots in different parts of the country.

The Spending Review committed Government to an historic shift in the UK's approach to roads, underpinned by the biggest programme of investment since the 1970s. By 2021 the Government plans to treble investment in major new road enhancements from today's levels, marking the start of a radical new programme of renewal of the strategic road network. This is alongside an investment of £10 billion for repairs to ensure sustainability of the HA network.

Significantly, this investment is being underpinned by reforms to the way the HA manages the road network to lock-in investment and secure collaboration with the construction industry to deliver this step change in investment. The Government will invest over £28 billion in enhancements and the maintenance of national and local roads.

STUDY AIMS AND OBJECTIVES

The aim of the A47/A12 Corridor Feasibility Study was to identify and assess future options for investment in solutions along the A47/A12 corridor that are deliverable, affordable and offer value for money.

The specific objectives of the study were to:

- To identify and assess the case for the deliverability and timing of specific infrastructure investments that address existing problems on the A47/ A12 corridor;
- To understand the balance of benefits and impacts from potential individual investment proposals and any additional benefits or impacts from the perspective of the whole corridor; and
- To evidence where possible, the wider economic benefits of transport investment in the corridor.

The study was undertaken from spring to autumn 2014 by AECOM, and took a proportionate approach to option assessment in line with the Department for Transport's (DfT) guidance on transport analysis (WebTAG). A stakeholder reference group was formed to ensure effective external involvement in the study. This reference group acted as a sounding board and allowed the views of local stakeholders to be captured and considered during the study process.

parts of the motorway or trunk road network in the vicinity of the corridor, as these were considered as part of the preparation of HA's Route Strategies.

The study was undertaken in three stages and was guided by the DfT's Transport Analysis Guidance (WebTAG) 2014.

This report constitutes the third of three reports. **Table 1.1** provides a summary for each stage of the process and the related WebTAG steps that the report follows.

Table 1.1 Study stage process

STUDY SCOPE AND APPROACH

The scope and approach of the study was outlined in the Scope Document which was developed by the Department for Transport with input from Stakeholders¹. As its purpose was to inform investment planning for the strategic road network, the study focused on road-based solutions but was informed by analysis of travel demand in general and the availability of different transport modes.

The study did not consider specific issues or proposals in relation to other

Stage	Task
1	Step 1 – Understanding the current situation
	Step 2 – Understanding the future situation
	Step 3 – Establishing the need for intervention
	Step 4a – Identifying the objectives
2	Step 4b – Define the geographic area of impact to be addressed by the intervention
	Step 5 – Generating options
	Step 6 – Initial sifting of options
3	Step 7 – Development and assessment of potential options
	Step 8 – Produce an option assessment report
	Step 9 – Clarify modelling and appraisal methodology for further appraisal (Stage 2 of WebTAG)

¹ Scoping Document: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/345566/a47-feasibility-study-scope.pdf

REPORT PURPOSE AND CONTENT

The aim of this report is to document the case for investment into the A47 and A12 trunk roads, building upon the analysis documented in the first two reports. This report will also identify a range of infrastructure proposals likely to achieve the intervention objectives and which could potentially achieve a good case for investment. This report will also identify the next stages for developing any proposals that may be included in the Roads Investment Strategy.

The following structure for this report has been applied:

- **Chapter 2:** Context – provides a reminder of the scope of study and description of the corridor
- **Chapter 3:** Methodology – outlines the methods and findings recorded in the first two study reports and provides a description of the methods used during the third stage of the study
- **Chapter 4:** The Strategic Case for Investment – sets out the need for intervention and provides an overview of the work completed in previous reports
- **Chapter 5:** Economic Appraisal of Options – this chapter sets out the initial economic, environmental and social impacts of each of the emerging options for each challenge location
- **Chapter 6:** Next Stages – this chapter details the next stages of the study and how it will be managed through the Highways Agency Project Control Framework.
- **Chapter 7:** Conclusion

and the problems identified along the route and the specific intervention objectives

2 CONTEXT

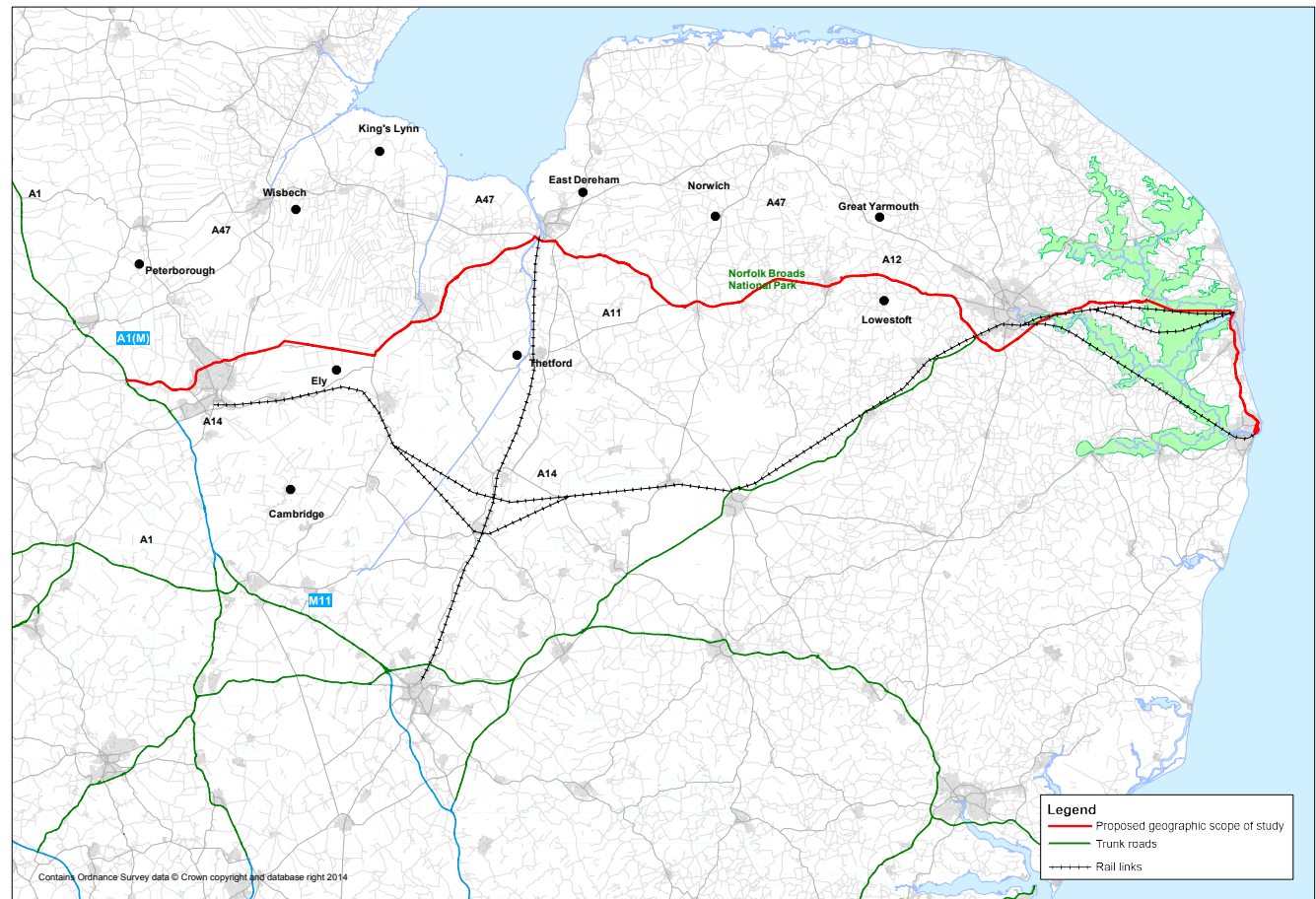
INTRODUCTION

This chapter provides a reminder of the scope of the study and description of the corridor.

STUDY SCOPE

In terms of geographic scope, the study considered the A47 trunk road, from its junction with the A1 at Wansford (west of Peterborough) through to Great Yarmouth, as well as the A12 trunk road from its junction with the A47 to the south-side of Lake Lothing in Lowestoft. The location and extent of the study corridor is illustrated in **Figure 2.1**.

Figure 2.1 Study Corridor – Geographical Scope



DESCRIPTION OF CORRIDOR

The A47 and A12 trunk roads form part of the strategic road network and provide for a variety of local, medium and long distance trips between the A1 and the eastern coastline. The corridor connects the cities of Norwich (population over 210,000) and Peterborough (population over 180,000), the towns of Wisbech, Kings Lynn, Dereham, Great Yarmouth and Lowestoft and a succession of villages in what is largely a rural area. The route also passes through the Broads National Park.

Norwich and Peterborough have developed service-based economies and the towns along the route have retained market town and other functions including agricultural-related industry. In recognition

of the potential on the eastern coast, the Chancellor announced in the 2011 budget the establishment of the Great Yarmouth and Lowestoft Enterprise Zone particularly for energy-related businesses to maximize support for the offshore energy sector. In December 2013 government announced a Greater Norwich City Deal to enable knowledge based industries to develop.

There has been rapid growth over the past decade and the area is expected to continue to grow. The cities of Peterborough and Norwich attract additional traffic along the route, particularly during the morning and evening peak periods.

The route is around 115 miles long; 54 miles or 47% is dual carriageway while 61 miles or 53% is single carriageway.

Previous studies have proposed dualling a number of sections of the A47 in the short and long term, together with a number of junction improvements.

Comprehensive improvement of the A47 is a strategic aspiration of local MPs, local government, business and other stakeholders who have organised themselves to form the A47 Alliance. The aim is to capitalise on the potential economic benefits of improved accessibility to the Midlands and the North as well as address safety issues.

Figure 2.2 provides a diagrammatic illustration of the corridor relative to various towns and cities, administrative boundaries and sections of dual and single carriageway.

Figure 2.2 A47/A12 Feasibility Study Corridor

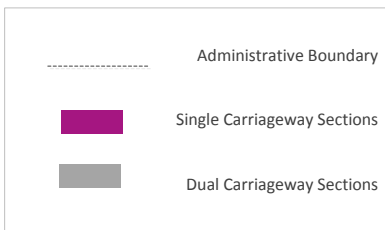
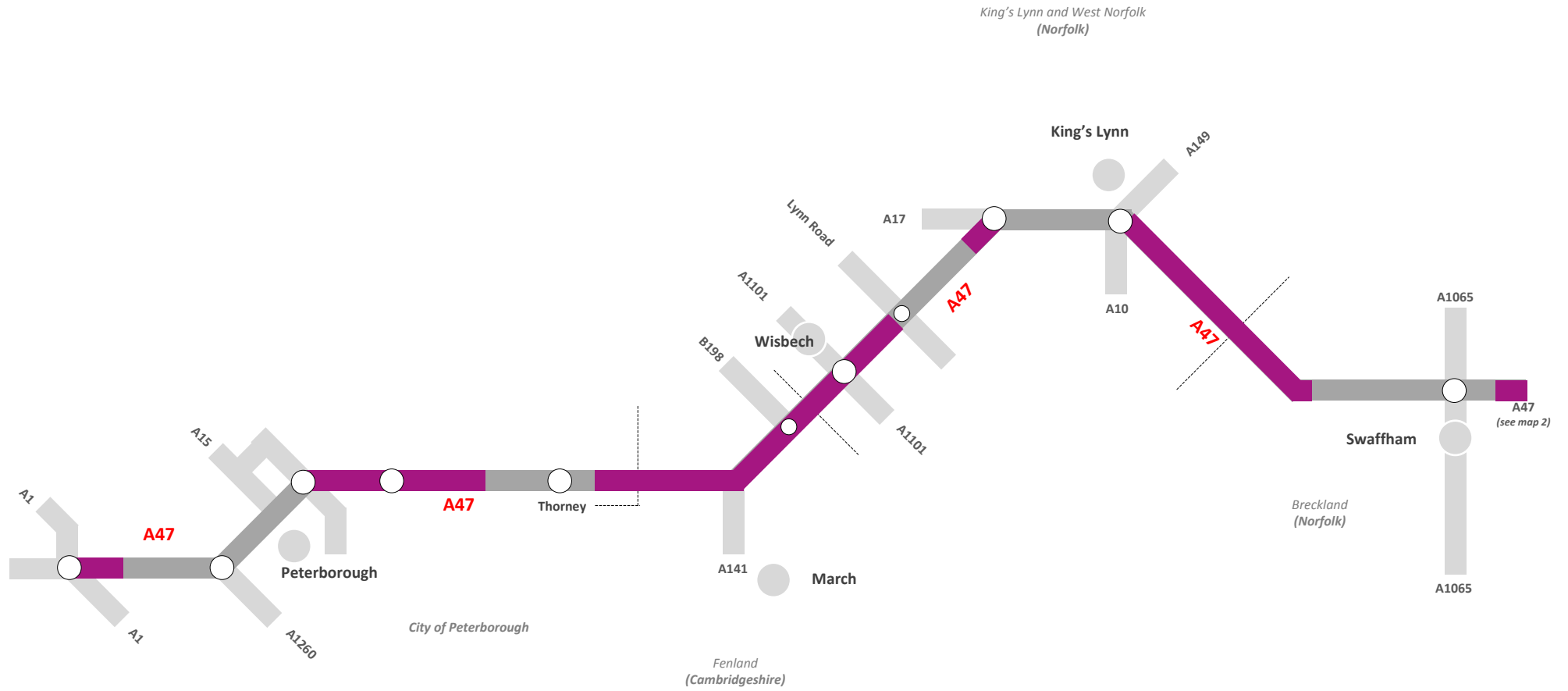
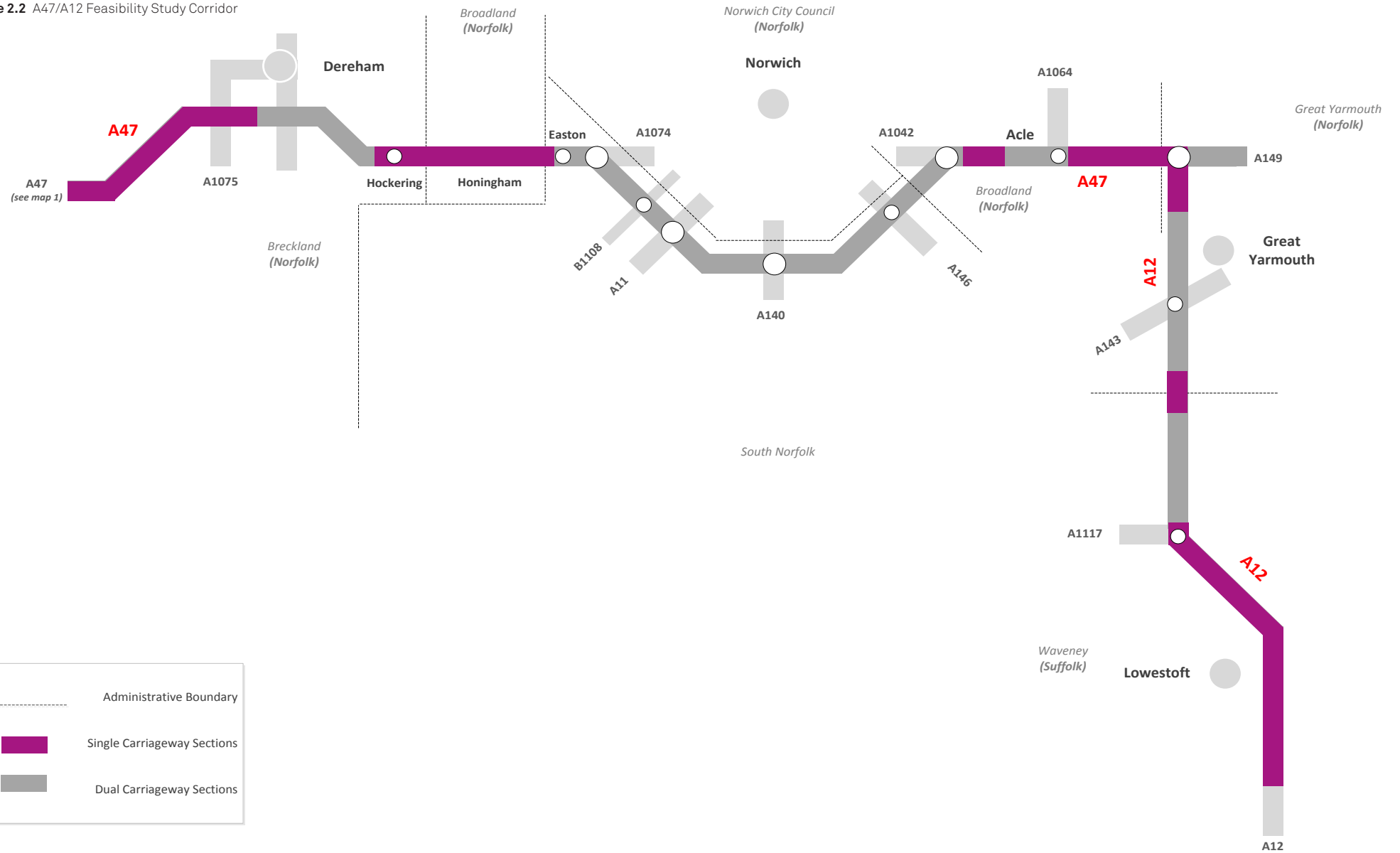


Figure 2.2 A47/A12 Feasibility Study Corridor



3 METHODOLOGY

Introduction

The study was completed in accordance with the DfT Transport Analysis Guidance (WebTAG) and in several stages. This chapter outlines the methods and findings recorded in the first two study reports and provides a description of the methods used during the third stage of this study.

STAGE 1: REVIEW OF EVIDENCE AND IDENTIFICATION OF PROBLEMS ALONG THE CORRIDOR

The Stage 1 report highlighted that the highway layout category and level of service on the A47 vary considerably over its length. It is understood that the widely held opinion by local authorities and the business community, is that the corridor in its current form is a significant constraint to growth.

Various studies and reports identified a number of challenges along the route

including those associated with safety and operation of the corridor. Proposed housing and employment growth adjacent to the A47/A12 corridor is anticipated to increase traffic volumes potentially exacerbating the current challenges reported. As a consequence, without intervention the economic, environmental and social costs associated with the route could worsen.

The current situation was summarised as a mix of dual and single carriageway, with a dualled bypass to Norwich and a handful of other short dualled sections. On single carriageway sections of the route, traffic flows are between 14,000 and 33,000 vehicles a day, or moderately busy.

Fluctuation in flows along the route indicates that a significant proportion of trips are made along relatively short sections of the route, rather than long-distance trips along the entire route.

The analysis of available traffic data and evidence from other studies indicated

a number of problems along the route that impact on the efficient and safe movement of people and goods and have consequential effects on the environment and local communities.

The data analysis, identification of current problems and future issues informed the definition of a set of intervention objectives. These objectives were subsequently used in generating and assessing options to improve the route. These objectives were to:

- Facilitate growth in employment at key centres and locations along the A47/A12 corridor
- Facilitate growth in housing at key development hotspots along the corridor
- Improve capacity, resilience and safety:
- Reduce delay and queues that occur during the peak hours and seasonal times of the year

- Improve the resilience of the route, such that the number of incidents and the effects of incidents is reduced
- Reduce the number of collision on the A47/A12 at key hotspots on the corridor
- Environmental concerns:
- Minimise unacceptable impacts on the surrounding natural environment and landscape and optimise the environmental opportunities and mitigation that the intervention could bring.

The study prioritised challenges to be addressed along the route. It did so by drawing upon the Route Strategy Evidence Report² to identify 32 challenges along the route and categorising these as either current problems or future problems. By prioritising the current and those future problems identified as being imminent based on forecast growth in the area, the study prioritised 23 challenges.

Stage 2: Option Assessment Report

Following the identification of intervention objectives and priority challenges, the study reviewed previous work to verify the severity of the challenge before identifying infrastructure proposals that could address the problems identified. The study built on work done to date wherever possible, drawing upon a range of completed or recent related studies and strategies including the Thickthorn Interchange Improvements undertaken by Norfolk County Council in June 2013³, and the A47 Blofield to North Burlingham Dualling Scheme that was withdrawn following the 2010 spending review.

22 locations were identified as having either current or imminent problems and these were considered further at a high non-detailed level. At this stage a range of possible measures were developed for comparison. The options were then assessed using criteria from the DfT's Early Assessment and Sifting Tool (EAST). In total approximately 66 options (22 challenges) were assessed in this way. Only those which met most

of the defined objectives and a high level deliverability and the feasibility criteria were taken forward. The 12 prioritised options were then assessed against the DfT's Option Assessment Framework, with evidence presented against the best practice Treasury five case model (which assesses the strategic, economic, financial, management/delivery and commercial cases). The 'economic case' requires consideration of environmental and social as well as economic impacts of options.

The results of the prioritising culminated in the following link and junction schemes to be taken through for further assessment:

Link Scheme Options

- A47 between the A1 and Sutton
- A47 North Tuddenham to Easton
- Blofield to North Burlingham
- Acle Straight (Safety remedial measure)

Individual Junction Scheme Options

- A47/A141 Guyhirn Roundabout
- A47/A11 Thickthorn Junction

² East of England Route Strategy: <http://assets.highways.gov.uk/our-road-network/route-strategies/East%20of%20England.pdf> – Accessed November 2014

⁴ Norfolk Council Engineering Report for Thickthorn: <http://www.gndp.org.uk/content/wp-content/uploads/downloads/2013/06/Final-Engineering-Report-P3-reduced-size.pdf> – Accessed November 2014

A12 Package 1 Options

- Vauxhall Roundabout & Asda Junction

A12 Package 2 Options

- Gapton Roundabout
- Harfreys Roundabout
- Bridge Road
- James Paget Roundabout

Analysis during Stage 3: The Case for Investment

The aim of this report is to set out the case for investment for each of the emerging options identified at as part of the second stage of the study.

Generally, no strategic transport model runs have been undertaken at this stage of the study. Instead assessment has made best use of existing information, in particular using:

- Evidence readily available in previous reports and datasets from local authorities and existing traffic flow data on main roads based on the Highways Agency Hatris TRADS database – data records kept by the Agency⁴; and

- Qualitative feedback from the option generation and sifting stage and from the Project Board

To forecast the traffic growth up to the assessment years TEMPRO V6.2 and NTM growth factors have been used. The impact of planned or individual committed developments in local areas has not been considered other than allowances already included within TEMPRO. At this stage of scheme identification this approach is considered to be proportionate. Furthermore all scheme assessments were undertaken adopting a fixed trip basis and hence do not reflect any travel demand suppression due to congestion or induced travel following network improvement, nor do they represent any wider traffic reassignment. Furthermore, in order to ensure unrealistic traffic demand was not taken through to subsequent analyses, traffic growth was capped.

The economic appraisal has been based on data from a variety of sources, with WebTAG assumptions applied where localised data was not available. The key input data related to traffic volumes,

journey times, and distances as well as traffic growth, with input assumptions relating to time periods, purposes and vehicle split/user classes. The Department for Transport's TUBA software has been applied in the appraisal of transport user benefits for each emerging option.

The approach taken was therefore proportionate given the constraints in terms of the programme and resources available. This straightforward approach minimises the risk of error and enabled prioritising the assessment of challenges that represented a current or future issue.

traffic databases and associated applications. The Traffic Flow Data System (**TRADS**) holds information on traffic flows at sites on the network. These two databases are known collectively as the HA Traffic Information System (**HATRIS**). - <https://www.hatris.co.uk/>

⁴ The Highways Agency (**HA**) currently maintains, operates and develops

4 THE STRATEGIC CASE FOR INVESTMENT

INTRODUCTION

The purpose of this chapter is to present the case for change and specifically to articulate the need for investment.

The Strategic Case for Investment establishes the need for intervention and considers the extent to which the emerging options will meet the specific intervention objectives it is intended to address; and whether it is consistent with, and will contribute to, wider policy aims.

The government's aim is to create a national road network fit for the 21st century, which gives road users the best possible quality of service and supports broader economic, environmental and safety goals.

For example the strategic road network performance specification 2013-15 published by DfT in April 2013 and the Draft National Policy Statement (DNNPS) set out the Government's vision

(Dec 2013) sets out five objectives for the Strategic Road Network (SRN):

- A strategic road network which supports and facilitates economic growth;
- A strategic road network which is maintained to a safe and serviceable condition;
- An efficiently and effectively operated strategic road network;
- A strategic road network which minimises its negative impacts on users, local communities and the environment; and
- A strategic road network which balances the needs of individuals and businesses that use and rely on it.

DRIVERS FOR CHANGE

The standards and level of service on the A47/A12 vary considerably over its length.

The corridor experiences peak time congestion along some sections of the corridor. Notably located at junctions in Peterborough, Norwich and Great Yarmouth at the northern end of the A12 at Vauxhall and Gapton Roundabout.

There are growth hotspots at several locations along the corridor, including development growth at Peterborough, Kings Lynn, Norwich and Great Yarmouth. There is potential for proposed developments to be constrained by the limitations on the ability of the highway network to accommodate additional trips.

The problems along the route were identified as being:

- Congestion at a number of locations particularly at peak periods
- inconsistent carriageway standards leading to problems where standards reduce
- lack of overtaking opportunities
- poor resilience owing to difficulty in passing incidents and lack of alternative routes
- collision hotspots where the collision rate is above the national average
- lack of alternative east-west rail connections.

The key short term problems associated with the A47 are understood to include congestion, delay and safety issues, which impacts on both strategic movements and more local traffic movements. These problems are anticipated to worsen in the longer term without any improvements as private car demand is expected to rise as will forecast growth in freight and strategic traffic.

The Stage 1 report reviewed the evidence and identification of problems along the corridor and the policy documents that set out key local authority growth forecasts. These documents indicated that investment in infrastructure will help strengthen and drive the economy, create jobs and act as a key enabler of economic growth. These schemes could help to provide for future travel demand across the Peterborough and Anglia LEP areas and to maximise the efficiency of the strategic network by addressing the bottlenecks on key routes and provide more efficient high quality sustainable transport links between the main urban areas and centres of employment.

Traffic modelling has shown that in the base case congestion will worsen considerably should planned growth take place in the towns without transport interventions.

For house building to start the development does not necessarily depend on possible infrastructure improvements. However the attractiveness of new housing locations could be harmed if the Strategic Road Network is congested.

The economic recovery and growth of the centres along the corridor such as the Enterprise Zone in Great Yarmouth and Lowestoft and Norwich depends upon attracting new employers to the area, either in existing industrial parks or at new locations. The ability of these businesses to compete with others elsewhere could be contingent upon easy and efficient access to the strategic road network. Without these improvements there is potentially a risk that businesses may decide to locate elsewhere and thus the area could lose opportunities to improve its economic performance.

INTERVENTION SPECIFIC OBJECTIVES

The aims of the study have been established and have been set out in Chapter 1. It is important to set clear objectives to help shape appropriate measures to address challenges. The objectives have been aligned and refined by the discussions that took place during the stakeholder engagement. The objectives have also been informed by an appreciation of the underlying issues gathered as part the evidence gathering process. **Table 4.1** below sets out the objectives as defined at Stage 1 of the study.

Table 4.1 Overall Objectives

Strategic Objectives	Supporting Economic Growth	Facilitate growth in employment at key centres and locations along the A47/A12 corridor	Facilitate growth in housing at key development hotspots along the corridor
Operational Objectives	Capacity	Reduce delay and queues that occur during the peak hours and seasonal times of the year	
	Resilience	Improve the resilience of the route, such that the number of incidents and the effects of incidents is reduced	
	Safety	Reduce the number of collision on the A47/A12 at key hotspots on the corridor	
	Environmental	Minimise unacceptable impacts on the surrounding natural environment and landscape and optimise the environmental opportunities and mitigation that the intervention could bring.	

MEASURES FOR SUCCESS

Measures for success relate to:

- improvements in traffic volumes and journey times
- reduction in congestion
- improvements in journey time reliability.
- indicators related to economic activity, for example the number of jobs created, the average wage levels and the number of new companies that have moved in the area within the area of influence of the scheme.

These and further measures for success will be developed as part of future option development in accordance with the Highways Agency's Project Control Framework (PCF), the Agency's approach to managing major projects.

KEY STAKEHOLDER ENGAGEMENT

During the course study from spring to autumn 2014 a stakeholder reference group was formed to ensure effective external involvement. This reference group acted as a sounding board and allowed the views of stakeholders to be captured and considered during the study process.

These included views from local highway and local planning authorities along the corridor, Local Enterprise Partnerships, statutory environmental bodies and other interested organisations. They provided important local knowledge about problems along the corridor and views on the acceptability of emerging proposals.

Included within the stakeholder reference were representatives of the A47 Alliance. The A47 Alliance brings together stakeholders to ensure a coordinated approach to securing improvements to the A47. Membership includes local authorities, local enterprise partnerships and representatives from the business community and road user groups all along the route from the A1 in the west to the east coast at Great Yarmouth and south to Lowestoft.

The Alliance considers that there is a strong case for investment and calls on the government to support this and agree to prioritise investment into the A47/A12 corridor. They have consistently requested that they would like the government to commit in the long-term to full dualling of the route with appropriate grade separation with a phased approach to improvement over the short, medium and long term.

There are also interests from environmental bodies such as Natural England with regards to design of emerging options and the safeguarding of the environmental and historical designations on the route. The stakeholder reference group also included representatives from Campaign for Better Transport and other statutory bodies such as English Heritage, Natural England and RSPB.

There has also been interest from local MPs and the relevant highway authorities – Norfolk County Council and Suffolk County Council to re-designate the A12 trunk road to be an extension of the A47 trunk road in recognition of the strategic nature of the route.

OPTION DEVELOPMENT

The development of the options utilised a range of resources and approaches to generate ideas. This approach enabled a range of possible measures to be developed in a proportionate, transparent and auditable manner.

Following investigation approximately three options had been developed for each prioritised challenge location identified for those sections on the route with existing or imminent problems. The generation of options was based on feedback from the earlier stakeholder consultations, supported by evidence gathered during the problem identifications stage.

A high level assessment of the benefits of dualling the A47 between the A1 and Great Yarmouth was carried out. This suggests a notional 32 minute journey time saving for end-to-end journeys at a cost of approx £1.4 billion but:

- link stress calculations up to 2031 suggest that some single carriageway sections of the A47 will not reach capacity
- dualling could require a doubling of traffic on certain single carriageway sections to achieve a Benefit Cost Ratio (BCR) of 2 or more
- there is no convincing evidence that end-to-end dualling would facilitate the levels of growth and additional traffic needed to justify the level of investment required.

A number of locations where identified where problems could potentially be solved by interventions that could potentially offer value for money. These are set out below:

- Dualling the A47 between A1 and Sutton (2.5 km)
- Dualling the A47 between North Tuddenham and Easton (4.5 km)

- Dualling the A47 between Blofield to North Burlingham (7.8 km)
- Increased capacity of junctions at:
 - A47/A141 Guyhirn
 - A47/A11 Thickthorn
- Acle Straight – small scale safety measures and work to investigate environmental measures that may be required for significant capacity improvements
- Packages of improvements to roundabouts and junctions on A12 in Great Yarmouth
 - Package 1 (Vauxhall roundabout and Asda junction)
 - Package 2 (Gapton Roundabout, Harfreys Roundabout, Bridge Road and entrance to James Paget Hospital)

5 *ECONOMIC APPRAISAL OF OPTIONS*

INTRODUCTION

The Economic (value for money) Case considers the likely benefits and dis-benefits of each emerging option in terms of economic, environmental and social impacts and the packages' impacts on public accounts.

A mix of qualitative and quantitative indicators were used to assess the relative performance of the emerging schemes against the Economic Case assessment factors. This chapter outlines economic, environmental and social impacts of each of the emerging options for each challenge location.

MONETISED COSTS AND BENEFITS TABLE

The monetised costs and benefits tables presented for each of the options and packages shows the overall Present Value Benefits (PVB) and Present Value Costs (PVC) values, the Net Present Value (NPV) and resultant Benefit Cost Ratio (BCR). The BCR is an indicator that summarises the overall value for money of an emerging scheme and considers the impacts to the economy, society and the environment. Additional monetary assessments for wider impacts were not considered as part of the study. Therefore adjusted BCR's have not been undertaken due to the high level (non-detailed) approach adopted and a lack of evidence to support assumptions.

Benefits and costs are for a standard 60 year appraisal (which is the required period in Department for Transport Guidance) from 2021 (the assumed opening year) to 2081 inclusive.

ESTIMATED COSTS

The estimated cost of each proposal has been prepared in accordance with the Highways Agency Commercial Cost Estimation Manual.

They are Order of Magnitude Costs to provide an assessment of proposals for entry to the forward programme of schemes and Project Lifecycle.

EMERGING SCHEMES

The following section lists the emerging schemes and the associated economic, environmental and social impacts.

A47 BETWEEN A1 AND SUTTON (WEST OF PETERBOROUGH)

Economic Impacts

Providing 2.5km upgrade on the A47 between A1 and Sutton from single to dual carriageway could lead to business accruing significant journey time benefits, though there could be a very marginal increase in Vehicle Operating Costs. The upgrade to dual carriageway and a provision of a free flow left turn from the A1 onto the A47 should result in users on this section of the route experiencing higher speeds and improved reliability. Journey time savings induced by this scheme could support planned regeneration in the Peterborough City Council area and could have a positive wider impact in Peterborough.

Environmental Impacts

This scheme could have a detrimental impact regarding noise due to higher speeds induced by the dual carriageway, which will also cause an increase in greenhouse gas emissions. This option will alter the existing alignment of the A47, bringing it closer to residential properties which could have an adverse impact on

air quality. Realignment will involve a loss of existing vegetation which will have negative landscape and visual impacts.

In addition, there is likely to be an adverse impact to historical features including a scheduled monument and the diminished setting of a nearby Roman Fort. A nearby SSSI could experience adverse changes to water and air quality on site and could experience a loss of priority habitats. The scheme could involve the addition of new culverts and works would be undertaken in an area of high flood risk.

Social Impacts

Commuters and other users could accrue journey time benefits from the increased capacity provided by the upgrade to dual carriageway and increased speeds. These users could also benefit from improved reliability resulting from improved junction movements. Road users should benefit from reduced stress as a result of journey time savings which improve reliability. In addition, it is anticipated there could be significant benefits, similar to that of journey time savings, associated with collision reduction over a 60 year period. Benefits regarding affordability are related

to changes in speed throughout the day may increase or decrease fuel efficiency.

The monetised costs and benefits are presented below:

Analysis of Monetised Costs and Benefits	A1 Sutton to Wansford	Estimated Cost Range
Travel Time Benefits	£58,364,000	£66m to £94m
VOC Benefits	-£3,773,000	
Indirect Tax Benefits	£2,139,000	
Accident Benefits	£25,033,000	
Greenhouse Gases	-£876,000	
Present Value Benefits (£ 000's, 2010 Prices)	£80,887,000	
Present Value of Costs (£ 000's, 2010 Prices)	£50,803,000	
Net Present Value (£ 000's, 2010 Prices)	£30,084,000	
Benefit Cost Ratio	1.6	

A47 GUYHIRN JUNCTION

Economic Impacts

Enlarging Guyhirn junction and providing two lane entries as well as a free flow left turn, should reduce queuing at the junction. This is expected to result in journey time benefits and reduced Vehicle Operating Costs (VOCs) for business users. An increased capacity at Guyhirn should result in improved reliability for business users. Journey time savings induced by this scheme could support residential developments and other planned regeneration in the March and Wisbech areas and potentially have a positive wider impact on Peterborough.

Environmental Impacts

There is likely to be an adverse impact with regard to noise for a number of individual properties located close to the proposed junction enlargement at Guyhirn, due to increased traffic flows. Likewise air quality is likely to be diminished at sensitive receptors close to the junction and the village of Guyhirn, whilst nitrogen deposition could have an impact on the nearby Nene Washes complex. The improvement to traffic movements through the junction and

the resultant reduction in queuing could lead to a small reduction in greenhouse gas emissions. The junction enlargement will mean land take of existing roadside vegetation and have a negative visual impact on nearby properties to the east of the junction. The proximity of the works to Nene Washes Ramsar Special Area of Conservation (SAC), Special Protection Area (SPA) and Site of Special Scientific Interest (SSSI) could diminish biodiversity at this site. Road drainage is expected to discharge into the River Nene but this could be an improvement to the existing discharge. The wider area including the A47 Fen Road to the west of the River Nene is within the 1-in-100 floodplain. These factors constitute an adverse impact on the water environment.

Social Impacts

The journey time benefits associated with commuters and other users are of a lesser scale than those associated with business users. The journey time savings are largely attributed to reduction in queue lengths at the junction, which could also improve reliability for commuters and other users. All road users should benefit from reduced stress as a result of journey time savings

which improve reliability. In addition, there are significant benefits, similar to that of journey time savings, associated with accident reduction over a 60 year period. The average user could see a marginal benefit from improvements to fuel efficiency resulting from an increase in reliability.

The monetised costs and benefits are presented below:

Analysis of Monetised Costs and Benefits	Guyhirn	Estimated Cost Range
Travel Time Benefits	£32,323,000	£11m to £17m
VOC Benefits	£1,955,000	
Indirect Tax Benefits	-£576,000	
Accident Benefits	-	
Greenhouse Gases	£236,000	
Present Value Benefits (£ 000's, 2010 Prices)	£33,937,000	
Present Value of Costs (£ 000's, 2010 Prices)	£9,458,000	
Net Present Value (£ 000's, 2010 Prices)	£24,478,000	
Benefit Cost Ratio	3.6	

A47 EASTON TO NORTH TUDDENHAM

Economic Impacts

This scheme will involve some off-line upgrading of the A47 from single to dual carriageway and the addition of new at-grade junction which could lead to higher speeds along the route and improved reliability. As a result business users are expected to benefit from substantial journey time savings. These benefits could facilitate new residential developments and other planned regeneration in the Dereham, Heathersett and Easton/Costessay areas, and could have a positive wider impact on the FUR of Peterborough.

Environmental Impacts

The proposed route will move the alignment closer to ribbon development and dwellings at Hall Drive, Honingham and this will cause adverse noise and air quality impacts. The upgrade to dual carriageway should allow traffic to travel at higher speeds along the route and this is likely to result in an increase in greenhouse gas emissions. The off-line bypass could require a significant amount of land take which could have a detrimental impact on the landscape and

have an adverse visual impact in the area. This could result in the loss of priority habitats along the route including Marsh BAP and Deciduous Woodland. As a result of this there a number of protected species that could be impacted such as badgers and bats. In addition, there could be a loss of hedgerows, trees and grasslands. Over the length of the route to be upgraded there are parts that are located in areas at risk of river and surface water flooding.

Social Impacts

Commuters and other users could accrue significant journey time benefits as a result of increased speed and capacity along the route, whilst reliability should also be improved as extra capacity is provided and access is maintained. This increase in reliability could contribute to improved journey quality and is linked to a reduction in traveller stress. There is anticipated to be a considerable reduction in collisions along the route as a result of the upgrade to dual carriageway and there are sizeable benefits associated with this reduction. Changes in speed throughout the day may increase or decrease fuel efficiency.

The monetised costs and benefits are presented below:

Analysis of Monetised Costs and Benefits	Easton to North Tuddenham	Estimated Cost Range
Travel Time Benefits	£186,222,000	£110 to £155m
VOC Benefits	-£7,389,000	
Indirect Tax Benefits	£5,731,000	
Accident Benefits	£42,611,000	
Greenhouse Gases	-£2,374,000	
Present Value Benefits (£ 000's, 2010 Prices)	£224,801,000	
Present Value of Costs (£ 000's, 2010 Prices)	£92,344,000	
Net Present Value (£ 000's, 2010 Prices)	£132,457,000	
Benefit Cost Ratio	2.4	

A47/A11 THICKTHORN JUNCTION

Economic Impacts

Most business users could have time savings of more than 5 minutes from a decrease in queue length; however some users could have an increase of journey time by traveling a longer distance (along the bypass).

Transport Providers benefits have not been specifically assessed.

Journey time benefits accrued to business users can be associated with the decrease in traffic using the Thickthorn Roundabout. The expected journey time benefits for business users could help support planned residential and employment regeneration in the Great Norwich Area and particularly in Norwich Research Park, Cringleford and Hethersett.

Option located in the core area of Norwich. The expected journey time benefits could help support the existing and planned employment of Norwich.

Environmental Impacts

New link passes close to residential properties to the south of the A11 (along Cantley Lane and Cantley Lane South) and to Ward's Wood and Cantley Wood (also south of the A11).

The proposed improvements to the interchange could have the potential to increase traffic speed resulting in an increase in greenhouse gases.

The proposed works could involve major substantial earthworks for the new roundabout and over bridges consisting of supporting embankments either side to carry the side road approaches and could result in the removal existing vegetation and habitats.

One scheduled monument could be located within approximately 12m of the proposed works impact to setting. The proposed roundabout and link road will potentially impact priority habitats.

This area is within 1 in 100 flood plain. Impacts from scheme embankments could affect flooding. Records of a historical landfill to the south of the A11.

Social Impacts

While most business users could experience time savings from a decrease in queue length; other users could have an increase of journey time by traveling a higher distance (along the bypass).

Journey time benefits accrued to commuters and other users could have savings of more than 5 minutes.

Benefits in journey time savings could improve resilience and reliability which directly affect journey quality, predominantly associated with traveller stress.

The proposed scheme is the major option, but the minor option with additional circulatory measures could more likely impact the collision problems at this location.

The scheme could improve the accessibility to Thickthorn Park&Ride, and therefore it could benefit the public transport (shuttle buses) that connects the Park&Ride to Norwich town centre.

The monetised costs and benefits are presented below:

Analysis of Monetised Costs and Benefits	Thickthorn	Estimated Cost Range
Travel Time Benefits	£31,669,000	£67m to £103m
VOC Benefits	£32,602,000	
Indirect Tax Benefits	£189,000	
Accident Benefits	-	
Greenhouse Gases	£48,000	
Present Value Benefits (£ 000's, 2010 Prices)	£64,508,000	
Present Value of Costs (£ 000's, 2010 Prices)	£71,375,000	
Net Present Value (£ 000's, 2010 Prices)	-£6,870,000	
Benefit Cost Ratio	0.9	

The illustrative scheme considered above for Thickthorn potentially has a low benefit cost ratio due to the high overall costs involved for the scheme. Alternative lower cost options were considered at a very high level which may potentially provide a higher BCR. Due to the strategic importance of the junction to the growth of Norwich further consideration should be given at the option development stage of the HA's PCF process to enable a suitable scheme to be progressed.

BLOFIELD TO NORTH BURLINGHAM

Economic Impacts

Sizeable journey time benefits could be accrued by business users as a result of the dualling of this stretch of the A47 as the increased capacity could allow higher speeds. There could also be improved reliability mainly associated with increased capacity and improved junction movements. Journey time benefits induced by this scheme could support planned regeneration in the local area and could have a positive wider impact on Norwich.

Environmental Impacts

Parts of Blofield could experience minor increases in noise levels due to increased traffic flows on the A47 and local roads as a result of the scheme. On the other hand, there could be minor decreases in noise levels between Blofield and North Burlingham as a result of the addition of noise barriers and route realignment in places. An increase in traffic volume and speed as a result of the scheme could lead to a slight increase in greenhouse gas emissions. Despite an increase in the scale and footprint of the road as a result of the upgrade to dual carriageway, the loss of mature trees and hedgerows can

be kept by a minimum if a good landscape fit is achieved. The addition of a new bridge and the lighting of the new grade separated junction could have an adverse effect on the landscape as the road could be more intrusive. Another grade separated junction could also increase the visibility of the road near Blofield. The scheme has the potential to directly interfere with a number of prehistoric, Saxon and medieval artefact scatters as well as indirectly impact on the setting of a number of listed buildings that are situated within 500m of the scheme. There are no sites of nature conservation interest in close proximity to the scheme and long term mitigation could lead to the creation of semi-natural habitats so there could be a positive impact on bio diversity. Similarly, there could be slight benefits in terms of water environment from the use of Pollution Control Units which deliver highway runoff to infiltration ponds.

Social Impacts

Commuters and other users could accrue similar benefits to those associated with business users due to journey time savings resulting from higher speeds along the route. There could be improved journey reliability resulting in positive changes to

journey quality, regarding traveller stress. Given that the number of observed collisions along this section of the A47 is lower than average, the benefits from collision reductions are expected to be minimal. Changes in speed throughout the day may increase or decrease fuel efficiency.

The monetised costs and benefits are presented below:

Analysis of Monetised Costs and Benefits	Blofield to North Burlingham	Estimated Cost Range
Travel Time Benefits	£124,726,000	£54m to £80m
VOC Benefits	-£5,667,000	
Indirect Tax Benefits	£5,933,000	
Accident Benefits	-	
Greenhouse Gases	-£2,510,000	
Present Value Benefits (£ 000's, 2010 Prices)	£122,483,000	
Present Value of Costs (£ 000's, 2010 Prices)	£44,184,000	
Net Present Value (£ 000's, 2010 Prices)	£78,298,000	
Benefit Cost Ratio	2.8	

ACLE STRAIGHT

The Acle Straight section of the A47 is within the Broads National Park and is adjacent to a number of environmentally designated sites. To widen the road or to make the road a dual carriageway could require significant

environmental constraints to be overcome. Investigation of the appropriate mitigation measures that may be required for such capacity improvements was recommended.

Therefore no economic appraisal was carried out in this study. The Highways

Agency is planning to carry out works to improve safety at collision sites and these will be appraised in accordance with the Agency's appraisal rules.



GREAT YARMOUTH PACKAGE 1

Economic Impacts

This scheme could involve significant enlargement of the existing roundabout potentially resulting in improved traffic flow and significant journey time benefits for business users. There could also be benefits associated with Vehicle Operating Costs (VOCs) as junction movements are improved. The enlargement of the existing roundabout and provision of a right turn lane for vehicles exiting the station should increase capacity and improve traffic flow that could result in improved reliability. Planned residential and employment regeneration in Great Yarmouth Borough could be supported by journey time benefits for business users and potentially support the large number of jobs associated with the Great Yarmouth and Lowestoft Enterprise zone.

Environmental Impacts

Residential properties on Bridge Road could experience adverse changes to noise and air quality levels as a result of the proposed new right turn lane. Improvements to traffic flow and junction movements could result in a reduction in greenhouse gas emissions. Loss of roadside vegetation or habitat is not anticipated as a result of this scheme but the townscape could be impacted by the increase in footprint of the roundabout. The scheme improvements are expected to have a limited indirect impact on the setting of 2 grade I listed buildings and a scheduled monument. There is not expected to be an impact on biodiversity as a result of this scheme as there no expected loss of habitats or species but the scheme is at risk of 1 in 1000 and 1 in 100 flooding.

Social Impacts

The journey time benefits associated with commuters and other users are expected to be larger than that accrued to business users. The roundabout enlargement and provision of turn lanes are expected to lead to a decrease in queue length which will reduce journey time and improve reliability, which should have a positive impact on journey quality for all users. The addition of a right turn to the station/ ASDA could mean an improvement in access to Great Yarmouth bus and train station. Users of this new turn will benefit from increased fuel efficiencies due to reliability improvements whilst other users should also see marginal improvements to fuel efficiency. The addition of signals as part of the Vauxhall Roundabout improvements could be beneficial to pedestrians with regards to severance. The improvement to bus and train station access associated with the new right turn could be slightly beneficial to option values.

GREAT YARMOUTH PACKAGE 2

Gapton Roundabout

Economic Impacts

This scheme could involve signalisation at the existing roundabout and provision of new additional and carriageways which could result in increased capacity, higher speeds and reduced queueing. This could lead to substantial journey time benefits for business users and benefits associated with Vehicle Operating Costs (VOCs) as traffic flow is improved. An increase in capacity and reduction in queuing as a result of the scheme improvements could result in improved reliability whilst planned residential and employment regeneration in Great Yarmouth Borough could be supported by journey time benefits. There are a large number of jobs associated with the Great Yarmouth and Lowestoft Enterprise Zone which could be supported by this scheme.

Environmental Impacts

Significant noise or air quality impacts are not anticipated as a result of these scheme improvements. The nearest receptor is approximately 80m away from the scheme but the works are expected to be relatively minor. There may be an improvement with regards to greenhouse gases as a result of the introduction of signals which will help regulate traffic flow.

Social Impacts

The journey time benefits associated with commuters and other users are expected to be larger than that accrued to business users. In particular a decrease in queue length on the A12 northbound could lead to journey time savings for commuters and other users.

Reliability could be improved for commuters and other users of this route as traffic flow is improved by roundabout signalisation; this could result in positive changes to journey quality relating to traveller stress. Users of nearby facilities could benefit from improved access due to reduced journey times and could also see a marginal benefit from increased fuel efficiencies due to reliability improvements.

Harfreys Roundabout

Economic Impacts

The enlargement and signalisation of the current Harfreys Roundabout will result in peak journey time benefits to business users. During the inter peak and off peak period business users could experience a journey time increase due to the signalisation. Reliability is improved for business users as journey times are reduced in the peak hours. The journey time benefits resulting from the scheme could help facilitate planned residential and employment regeneration, particularly with regards to employment within the Great Yarmouth and Lowestoft Enterprise Zone.

Environmental Impacts

Looking at the anticipated environmental impacts of the scheme, there could be an a very small increase in greenhouse gases due to increases in traffic speed resulting from improved flow through the roundabout. In terms of townscape, the footprint of the roundabout could be enlarged and this could involve increasing landscape planting in the centre of the roundabout. The enlarged footprint could

have an impact on biodiversity as a grass verge and hedge line trees are impacted upon. The water environment may also be impacted due to the close proximity of the proposed works to existing drains.

Social Impacts

Considering the social impacts of the scheme, commuters and other road users could accrue larger benefits due to journey time savings than business users, but there may be journey time increases for inter peak and off peak journeys. Commuters and other users could also benefit from improved reliability with the introduction of signals and improvements to traffic flows. There could be benefits with regards to journey quality for road users, largely associated with improvements to reliability and resilience which impact on stress levels of users. There may be a slight improvement in fuel efficiencies for road users whilst in terms of severance the provision of signals may benefit pedestrians.

A12 Lowestoft Road / Bridge Road Junction

Economic Impacts

Business users could see journey time saving benefits as a result of the addition of a left turn lane and the introduction of a MOVA control system to optimise the existing signals. These improvements could lead to a reduction in queue length at the junction and this should improve reliability for business users. There could be some benefit to planned regeneration in South Bradwell and Beacon Park as the journey time savings could support this growth and this could be considered a wider benefit.

Environmental Impact

The proposed solution could move the carriageway closer to a nursery and residential properties which could be adversely impacted by noise and air quality changes. A reduction in queuing and improvements to traffic flow could have a slight benefit in terms of reducing greenhouse gases. The scheme

could have a detrimental effect on biodiversity as it could involve the loss of roadside vegetation and hedgerow.

Social Impact

Similar to business users, commuters and other road users could see a journey time benefit as a result of the proposed scheme due to a reduction in queueing at the junction and improved traffic flows. This could also lead to an improvement in terms of reliability to commuters and other users whilst all users could benefit from improvements to journey quality related to traveller stress.

A12 Lowestoft Road / James Paget Hospital Access Junction

Economic Impacts

Business users could see journey time benefits as a result of this scheme which involves providing an additional left turn lane, shortening a right turn lane and improving signalisation at an existing junction. The improvements could lead to improved traffic flow for left turns and traffic going straight on at the junction and could also reduce queue lengths, which could lead to improved reliability for business users. Planned regeneration including residential and employment developments in South Bradwell and Beacon Park could be supported by the reduction in journey times and this constitutes a wider benefit.

Environmental Impact

The proposed solution could move the carriageway closer to a nursery and residential properties which could be adversely impacted by noise and air quality changes. A reduction in queuing and improvements to traffic flow could have a slight benefit in terms of reducing greenhouse gases. The scheme could have a detrimental effect on biodiversity as it could involve the loss of roadside vegetation and hedgerow.

Social Impact

Commuters and other users will also benefit from journey time savings similar to those associated with business users. The improvement in junction movements and traffic flow through the junction could also improve reliability for commuters and other users. Road users could benefit with regards to journey quality, with reliability and resilience improvements having a positive impact on traveller stress levels. The public transport system may see a marginal impact as a result of journey time reductions.

The monetised costs and benefits are presented below:

Table 5.1 Monetised Costs and benefits table for Great Yarmouth Package Schemes

Analysis of Monetised Costs and Benefits	Great Yarmouth Package 1	Great Yarmouth Package 2
Travel Time Benefits	£212,194,000	£153,060,000
VOC Benefits	£9,639,000	£6,561,000
Indirect Tax Benefits	-£2,981,000	-£2,230,000
Accident Benefits	-	-
Greenhouse Gases	£1,175,000	£904,000
Present Value Benefits (£ 000's, 2010 Prices)	£220,027,000	£158,295,000
Present Value of Costs (£ 000's, 2010 Prices)	£17,185,000	£9,837,000
Net Present Value (£ 000's, 2010 Prices)	£202,841,000	£148,458,000
Benefit Cost Ratio	12.8	16.1
Estimated Cost ranges	£20m to £29m	£11m to £15m

HIGH AND LOW GROWTH ASSUMPTIONS – SENSITIVITY TEST

High and low growth assumptions for the link based proposals have also been completed to provide an indication of the possible range of results. High and low growth scenarios have not been considered for the junction schemes because the modelling applied a capping approach, whereby throughput is capped to 110% of the Ratio of Flow to Capacity. This capping has been applied in order to prevent unrealistic junction queues, and hence very high travel time benefits being carried through into the economic appraisal.

Table 5.2 High and low growth assumptions for link based proposals

	Growth Scenario	PVB (£ 000's, 2010 Prices)	PVC (£ 000's, 2010 Prices)	BCR
A1 Wansford to Sutton	Low Growth	£58,335,000	£50,803,000	1.2
	Core	£80,888,000		1.6
	High Growth	£108,993,000		2.2
Easton to North Tuddenham	Low Growth	£156,423,000	£92,344,000	1.7
	Core	£224,802,000		2.4
	High Growth	£335,417,000		3.6
Blofield to North Burlingham	Low Growth	£83,044,000	£44,184,000	1.9
	Core	£122,483,000		2.8
	High Growth	£186,748,000		4.2

6 NEXT STAGES

INTRODUCTION

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

PROJECT PLANNING

If the proposals are taken forward they could enter the next stage of assessment and could be managed in accordance with the Highways Agency's Project Control Framework (PCF), the Agency's approach to managing major projects. The safety measures on Acle Straight could be delivered as part of the Highways Agency's small scale improvement programme.

The seven stages of the PCF delivery process are shown below:

Stage
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

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.

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

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.

The proposals could potentially be placed in PCF Stage 1 (Option Identification) of the Options Phase.

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.

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.

GOVERNANCE STRUCTURE

Any project could be governed by a Project Board. The Project Board includes the 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 could be appointed as part of starting up the project.

Assurance for the project could 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 could be subject to peer reviews and audits such as Office of Government Commerce Gateway Reviews and Stage Gate Assessment Reviews.

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

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.

RISK MANAGEMENT

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

The key risks are:

- The findings of the feasibility study are indicative; therefore there is a risk that the value for money 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 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.
- Lands 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.

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

COMMUNICATIONS AND STAKEHOLDER MANAGEMENT

A detailed communications and stakeholder management strategy could be developed.

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

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

7 CONCLUSION

The study has been completed in three stages guided by the WebTAG Transport Analysis Guidance. This report constitutes report three of the three stage process. This is the final suite of reports for this study and has thus achieved the objectives as set out for the study.

The main aim of the A47/A12 Corridor Feasibility Study was to identify and assess future options for investment in solutions along the A47/A12 corridor that are deliverable, affordable and offer value for money.

The first stage of the study reviewed evidence from other relevant studies and analysis to form a view as to the nature and scale of current and future

performance on the A47 route and the problems associated with the route.

The second stage of the study was to document the identification and sifting of a range of infrastructure proposals likely to achieve the intervention specific objectives agreed in the previous stage of work. This included the consideration of interventions that had been developed in the past and interventions suggested by stakeholders.

22 locations were identified as having either current or imminent problems and these were considered further at a high level. At this stage a range of possible measures were developed for comparison. The options were then assessed using criteria from the DfT's Early Assessment and Sifting Tool

(EAST). In total approximately 66 options (22 challenges) were assessed in this way. Only those which met most of the defined objectives and high level deliverability and feasibility criteria were taken forward. The 12 prioritised options were then assessed against the DfT's Option Assessment Framework, with evidence presented against the best practice Treasury five case model (which assesses the strategic, economic, financial, management/ delivery and commercial cases).

On the basis of the evidence provided by the study including inputs from stakeholders, this study has concluded that there is a Case for Investment in the A47/A12 corridor.

The following options have been identified as having the potential to provide solutions that address the intervention specific objectives and are affordable, deliverable and offer the potential for value for money. The following should therefore be progressed to the next stage of the process:

- A47 Wansford to Sutton – dualling of the A47 between the A1 and the dual carriageway section running through Peterborough;
- A47 Guyhirn Junction – creation of a new, larger junction linking the A47 and A141, allowing safer and swifter movement of traffic;
- A47 North Tuddenham to Easton – dualling of the single carriageway section of the A47 between Norwich and Dereham, linking together two existing sections of dual carriageway;
- A47 Blofield to North Burlingham – dualling of the A47 to fill a gap in the dual carriageway section between Norwich and the Acle Straight;
- A47/A11 Thickthorn Junction – work at the option development stage of the HA’s PCF process should be progressed;
- A47 & A12 junction enhancements – improvements to junctions throughout Great Yarmouth, including reconstruction of the Vauxhall roundabout with a dedicated left-turn lane for traffic heading north on the current A12;
- Acle Straight – safety improvements at key hotspots and joint working with Natural England to establish environmental impacts and mitigation of the potential relocation of the dykes; and
- A12 Re-numbering - to re-designate the A12 trunk road as an extension of the A47 trunk road in recognition of the strategic nature of the route.