
Strategic Outline Business Case

A47 Dualling Study

July 2019

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Cambridgeshire and Peterborough Combined Authority

July 2019

This document and its contents have been prepared and are intended solely for Cambridgeshire and Peterborough Combined Authority's information and use in relation to the A47 Dualling Study.

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Executive Summary

This document presents a Strategic Outline Business Case for the dualling of the remaining sections of A47 between Peterborough and Kings Lynn.

Purpose of the Strategic Outline Business Case

The Strategic Outline Business Case is in line with Department for Transport three-phase approach (and as adopted by the Combined Authority Assurance Framework) to be followed when making major investment decisions:

- Phase 1 – Strategic Outline Business Case
- Phase 2 – Outline Business Case
- Phase 3 – Full Business Case

Each Business Case builds on the last, but the phased approach enables appropriate investment decisions to be made.

Business Cases are developed in line with the Treasury's Green Book five case model:

- The **case for change** – the 'strategic case'
- **Value for Money** – the 'economic case'
- **Commercially viable** – the 'commercial case'
- **Financially affordable** – the 'financial case'
- **Achievable** – the 'management case'

A Strategic Outline Business Case sets out the case of intervention which would further the aims and objectives of the relevant business plan of the sponsoring organisation. It then outlines potential options and considers whether such interventions could ultimately be deliverable and prove Value for Money.

A47 Dualling - Need for intervention and associated challenges

The need for intervention and the associated challenges can be summarised as follows:

- The A47 is of inconsistent standard, comprising a mix of dual, older and modern single carriageway standard.
- The A47 is a strategic route linking both the A1 and Peterborough with Kings Lynn, Norwich and beyond and also provides a key link for communities along the corridor and in particular Wisbech.
- The route offers slow, inconsistent and relatively slow journey times between the key centres of population.
- Wisbech has poor transport links to the region and the rest of the country, arguably contributing to its isolation and deprivation.
- The Combined Authority has set a bold vision to double the GVA of the local authority whilst accelerating the growth of local housing, which is hindered by infrastructure constraints.

Dualling the remaining sections of the A47 is key to:

- **Improving journey times along the A47:** To address current congestion and delay, reduce journey times and improve reliability on the A47 and on local routes impacted by the A47
- **Providing increased capacity:** To cater for future travel demand between Kings Lynn, Wisbech and Peterborough
- **Rebalancing the economic growth across Cambridgeshire and Peterborough.** To provide conditions that encourage inward investment in higher value employment sectors in the north of Cambridgeshire, Peterborough and in Norfolk
- **Contributing to the growth of Cambridgeshire and Peterborough.** To ensure employment and housing growth along the A47 corridor can be accommodated

Initial Option generation and assessment

The A47 has been split into four individual route sections for the purpose of assessing the potential dualling of the A47:

- Section 1 (A16 to Thorney Bypass)
- Section 2 (Thorney Bypass to Guyhirn)
- Section 3 (Guyhirn to Wisbech)
- Section 4 (Wisbech Bypass)

Twenty separate Options (Routes) for dualling the A47 were subsequently generated and initially considered using the Combined Authority’s methodology for prioritising infrastructure investment shown below:

Case	Criteria
Strategic	<ul style="list-style-type: none"> • Reduce congestion • Unlock housing and jobs
Economic	<ul style="list-style-type: none"> • Scale of impact • Value for money
Financial	<ul style="list-style-type: none"> • Other funding sources / contributors
Management	<ul style="list-style-type: none"> • Delivery certainty • Project risks • Stakeholder support

The initial assessment has shown that twelve of the routes fit the Combined Authority’s criteria, including:

- Three Options between the A16 and Thorney Bypass
- Two Options between Thorney Bypass and Guyhirn
- One Option between Thorney Bypass and Wisbech
- Three Options between Guyhirn and Wisbech
- One Option for online dualling of the Wisbech Bypass
- Two alternative Options between Thorney Bypass and Walton Highway running to the north of Wisbech; one as a single carriageway rather than dual

An initial economic assessment has shown that some of these routes could offer value for money, particularly when wider economic benefits are added. Indeed, the impact of increasing congestion nor phasing has not been considered as part of the Strategic Outline Business Case but both of which would be expected to increase the Value for Money. For example, delaying a phase until congestion occurs in the Base Scenario is expected to increase the overall BCR.

Dualling the remaining sections of the A47 would meet the Government’s 5 case business case test of:

- Making the **Case for Change** - Addressing the Sponsor’s (in this case the Combined Authority’s) business case objectives, in this instance of unlocking houses and jobs as well as reducing traffic congestion along the A47 corridor.
- Would deliver **Value for Money** – the ‘economic case’
- Would be **Commercially Viable** – the ‘commercial case’
- Would be **Financially Affordable** – the ‘financial case’
- Would be **Achievable** – the ‘management case’

Recommendation

Dualling the remaining section of the A47 between Peterborough and Kings Lynn is key to

- Improving journey times along the A47
- Providing increased capacity
- Rebalancing the economic growth across Cambridgeshire and Peterborough.
- Contributing to the growth of Cambridgeshire and Peterborough

The A47 Strategic Outline Business Case has shown:

- Dualling of the A47 would offer Value for Money and pass the Government’s 5-case business case test
- Identified twelve potential A47 Options for dualling the A47 that meet the Combined Authority assessment strategic criteria of unlocking houses and jobs along the A47 corridor

The next stage of the project will be to determine the Preferred Option from the mix of 12 potential Options that together would enable completion of dualling of the A47 between Peterborough and Kings Lynn. The twelve potential Options have been identified as:

Option	Section	Route	Route Description
1	Section 1 (A16 to Thorney Bypass)	Route 1.1	Dual carriageway immediately to the north of the existing A47
2		Route 1.2	Part online and offline dual carriageway to the north of the existing A47 (predominantly following path of disused railway)
3		Route 1.4	As Route 1.1 as one way single carriageway for eastbound traffic, utilising existing carriageway for westbound traffic
4	Section 2 (Thorney Bypass to Guyhirn)	Route 2.2	Dualling of the A47 to the south of the existing A47
5		Route 2.3	Dualling of the A47 to the north of the existing A47
6		Route 2.4	Offline dualling Thorney to Wisbech north of Guyhirn village

Option	Section	Route	Route Description
7	Section 2 to 4 (Thorney Bypass to Walton Highway)	Route 2.5	Offline single carriageway Thorney to Walton Highway running to the north of Wisbech
8		Route 2.6	Offline dualling Thorney to Walton Highway running to the north of Wisbech
9	Section 3 (Guyhirn to Wisbech)	Route 3.2	Dualling of the A47 south / east of the existing alignment
10		Route 3.3	Dualling of the A47 south / east of the existing alignment, tying in east of Redmoor Roundabout (B198)
11		Route 3.4	Hybrid of Routes 3.2 and 3.3
12	Section 4 (Wisbech Bypass)	Route 4.1	Online dualling of the A47

Selection of the Preferred Option would enable an Outline Business Case for the dualling of the A47 to be produced in line with the Department for Transport’s guidance on major investment decisions.

It is therefore recommended:

- A detailed Option Assessment is undertaken on the twelve short listed Options, and the results published in an **Option Appraisal Report**
- Subsequent **Public Consultation** is undertaken using the outputs of the Option Assessment to enable a Preferred Option to be determined, and then
- An **Outline Business Case** be produced based on the Preferred Option.

1 Introduction

1.1 Scope

1.1.1 The overall aim of the A47 Dualling Study is to develop a Business Case for dualling of the entire length of the A47 between the A16 to the east of Peterborough and Walton Highway to the east of Wisbech (see Figure 1.1 below). This report is the first stage of the decision making process which is to prepare the Strategic Outline Business Case (SOBC) using the format as set out in “The Transport Business Cases” document published by the DfT January 2013.

1.1.2 The assessment of the transport business case is consistent with Treasury and Department for Transport guidance.

1.2 Scheme Objectives

1.2.1 The aims of the dualling improvements are:

- To address current congestion and delay, reduce journey times and improve reliability along the A47 and on local routes impacted by congestion on the A47.
- To provide a strategic transport corridor linking both the A1 and Peterborough with Kings Lynn, Norwich and beyond that can encourage inward investment to grow the existing agricultural industry base and attract higher value employment sectors in the north of Cambridgeshire, Peterborough and in Norfolk.
- To rebalance economic growth across Cambridgeshire and Peterborough to combat isolation and deprivation by ensuring the infrastructure is in place to support regeneration and support the Combined Authorities bold vision to double GVA.
- Provide increased capacity for future travel demand between Kings Lynn, Wisbech and Peterborough.

1.2.2 The assessment of the transport business case will be consistent with Treasury and Department for Transport guidance.

1.3 Area Wide Context

1.3.1 Over recent years, the wider Cambridgeshire/ Peterborough area has been one of the fastest growing areas of the UK. Between 2001 and 2011, Peterborough’s population grew by approximately 17%, more than double the average for England. This growth and development is expected to continue over the next few decades with extensive economic growth and new housing provision forecast.

1.3.2 Cambridgeshire is the fastest growing county in the country with over 77,000 new houses planned to 2031. This in turn will drive further economic growth and demand to travel.

1.3.3 The driver for this growth is Cambridge which is now a world centre for high technology, biomedical research and knowledge based industries. This in turn is creating extreme housing pressures and lack of affordability in Cambridge, so that the majority of the new housing to supply the workers for the Cambridge economy will be outside of the City itself.

1.4 Fenland Context

1.4.1 Fenland is relatively isolated, with relatively poor transport links to the rest of the region and country. This isolation is considered to contribute to the areas around Fenland being amongst the 10% and 20% most deprived areas of England.

Railway network

- 1.4.2 The only railway stations within Fenland are March, Manea and Whittlesea:
- **March:** served by 2-hourly frequency train service primarily linking Peterborough and Ipswich via March and Ely and an hourly service linking Birmingham with Stansted via Peterborough and Cambridge
 - **Manea:** served by a 2-hourly frequency train service primarily linking Peterborough and Ipswich via March and Ely, with passengers to Cambridge changing at Ely
 - **Whittlesey:** served by a 2-hourly frequency train service primarily linking Peterborough and Ipswich via March and Ely, with passengers to Cambridge changing at Ely
- 1.4.3 There are no passenger trains serving Wisbech despite having a population of over 31,000 people.

Road network

- 1.4.4 The road network within Fenland is equally poor, with the key route being the A47 itself, a road of mixed standard linking Wisbech with Peterborough, Kings Lynn and beyond. The other major route within Fenland is the A141 which forms part of the primary route network linking the A47 with the rest of Cambridgeshire via March and Chatteris.

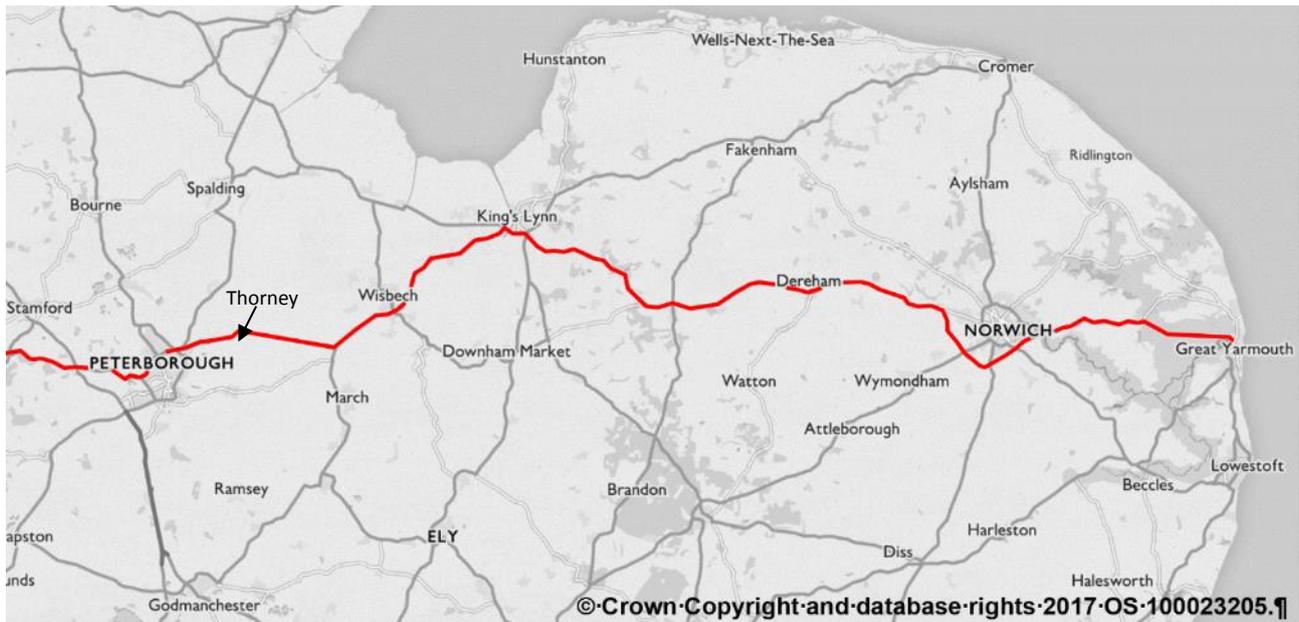
Wisbech Garden Town

- 1.4.5 Proposals for Wisbech Garden Town involve the construction of an additional 10,000 to 12,000 dwellings and supporting community and retail facilities, in addition to those proposed in the Fenland District Council Local Plan. It is hoped the high levels of deprivation in the area will be reversed through the provision of housing, access to jobs and training, generated by investment and economic growth.

1.5 A47 Highway Context

- 1.5.1 The strategic route sections of the A47 runs across the East Midlands and East of England forms part of the Strategic Route Network (SRN) between its junction with the A1 west of Peterborough, running eastwards through Kings Lynn, Norwich, and Great Yarmouth before terminating at Lowestoft. In England, the highway authority for the SRN is Highways England (HE), acting on behalf of the Secretary of State for Transport.
- 1.5.2 The A47 between A1 Peterborough and Walton Highways also connects smaller communities such as Thorney and Wisbech, as shown in Figure 1.1 below.

Figure 1.1: The A47 Route between Peterborough and Great Yarmouth



1.5.3 The A47 has been periodically diverted and upgraded to accommodate traffic growth and development along its route. The Wisbech Bypass was completed in 1984, running between the B198 Cromwell Road Junction to the south and the Lynn Road Junction to the north east, diverting the A47 route to the south and east of Wisbech town centre. The Walpole Highway/ Tilney High End Bypass opened in 1996, diverting the A47 and creating a 6-mile section of dual carriageway between Wisbech and Kings Lynn. Additionally, Thorney Bypass opened in 2005 creating a 3-mile section of dual carriageway around Thorney Village to relieve local congestion.

1.5.4 As a result of these and other interventions, the A47 between the A1 in the west and its junction with the A17 in the east is of variable standard, comprising a mixture of single and dual carriageway roads, with both at grade and grade-separated junctions at a number of locations along its route. The route can be broken down into a number of links as shown below:

- A1 Wansford – Sutton: Older style S2 AP
- Sutton – A16: Dual Carriageway
- A16 to Former A1073: Modern WS2 AP
- Former A1073 – Thorney Bypass: Older style S2 AP
- Thorney Bypass: Dual Carriageway
- Thorney Bypass to Guyhirn: Older style S2 AP
- Guyhirn to Wisbech: Older style S2 AP
- Wisbech Bypass: Modern S2 AP
- Wisbech to Walton Highway: Older style S2 AP
- Walton Highway to Tilney All Saints: Dual Carriageway
- Tilney All Saints to A17 Kings Lynn: Older style S2 AP

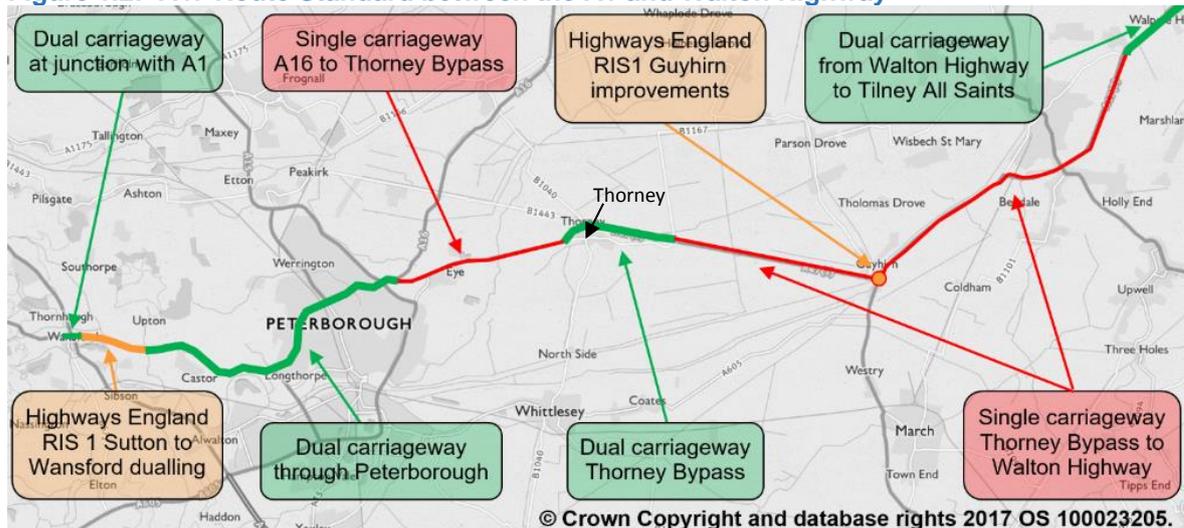
Key:

S2 AP – Normal 2 lane all-purpose carriageway (~7.3 metre width)

WS2 AP – Wide Single all-purpose carriageway (~10 metre width)

1.5.5 The variable standard of the A47 is shown in Figure 1.2 below.

Figure 1.2: A47 Route Standard between the A1 and Walton Highway



1.5.6 For the urban centres and areas around Peterborough, Wisbech and Kings Lynn, as well as villages along the A47 corridor, the A47 provides the most direct and practical route for travel between these locations. The majority of the local highway network surrounding these areas consists of local access routes between rural villages linking to the A47. This means longer distance journeys and journeys between Peterborough, Fenland and Kings Lynn are likely to require vehicles to travel via the A47. Whilst there is currently no direct train line linking these locations, there is a reasonably high quality X1 Bus services linking these communities via the A47.

1.6 Historical Studies of the A47 Route

1.6.1 A number of strategic transport and highway studies have been undertaken of the A47 within the defined study area and the wider A47 route over recent years. These include but not limited to the following:

- Norwich to Peterborough Multi-Modal Study (2003)
- A47 Alliance, A47 Peterborough and Cambridgeshire, Case for Improvement Evidence and Wider Economic Benefits (2014)
- A47 Alliance Route Strategy (2014)
- A47 Thorney to Walton Highway – Initial Option Assessment (2015)

<https://www.cambridgeshire.gov.uk/transport-funding-bids-and-studies/transport-studies/>

A47/ A12 Corridor Feasibility Study, Phase 1, 2 and 3 Reports (2015).

1.6.2 These studies and the conclusions and recommendations of each were considered when reviewing baseline conditions of the Peterborough to Kings Lynn section of the A47.

1.7 Report Structure

1.7.1 Based on the context outlined above, the remainder of this report will consist of the following sections, with the aim of providing a thorough picture of baseline traffic, and transport and development conditions across the study area:

- Chapter 1: Introduction
- Chapter 2: The Strategic Case
- Chapter 3: Initial Option Development
- Chapter 4: Outline Option Appraisal
- Chapter 3: The Economic Case
- Chapter 4: The Financial Case
- Chapter 5: The Commercial Case
- Chapter 6: The Management Case

2 The Strategic Case

2.1 Introduction

2.1.1 This chapter discusses the strategic case for dualling the A47 between Peterborough and Walton Highway, and demonstrates how the scheme will fit with local, regional and national policy and enable local growth aspirations.

2.2 Business Strategy

Department for Transport Investment Strategy

2.2.1 The four main objectives which the Department for Transport (DfT) and Highways England (HE) investment decisions focus on are:

- Create a transport network that works for users, wherever they live
- Improve productivity and rebalance growth across the UK
- Enhance our global competitiveness by making Britain a more attractive place to invest
- Support the creation of new housing

The Combined Authority

2.2.2 The **Cambridgeshire and Peterborough Combined Authority** (CPCA) has set out a bold 2030 vision for the Cambridgeshire and Peterborough area:

- Doubling the size of the local economy
- Accelerating house building rates to meet local and UK need
- Delivering outstanding and much needed connectivity in terms of transport and digital links
- Providing the UK's most technically skilled workforce
- Transforming public service delivery to be much more seamless and responsive to local need
- Growing international recognition for our knowledge based economy
- Improving the quality of life by tackling areas of deprivation

2.2.3 This 2030 vision is complemented by the visions for Cambridgeshire County Council and Peterborough City Council.

Cambridgeshire County Council's Vision

2.2.4 The vision for **Cambridgeshire County Council** is 'making Cambridgeshire a great place to call home'. The key priorities that Cambridgeshire County Council will undertake to deliver this vision are:

- Supporting and protecting people when they need it most
- Helping people to live independent and healthy lives in their communities
- Developing our local economy for the benefit of all

Peterborough City Council's Vision

2.2.5 **Peterborough City Council's** overarching vision is to create a bigger and better Peterborough that grows the right way, and through truly sustainable development and growth, in order to:

- Improve the quality of life of all its people and communities, and ensure that all communities benefit from growth and the opportunities it brings, and
- Create a truly sustainable Peterborough, the urban centre of a thriving sub-regional community of villages and market towns, a healthy, safe and exciting place to live, work and visit, famous as the environment capital of the UK.

2.3 Fit with the Wider Policy Context

The National Planning Policy Framework (NPPF)

2.3.1 **The National Planning Policy Framework (NPPF)** sets out the Government's planning policies for England and they are expected to be taken into account in the preparation of development plans. The NPPF does not change the statutory status of the development plan as the starting point for decision making. Proposed development that accords with an up-to-date Local Plan should be approved unless other material considerations indicate otherwise. The currency of the development plan is an important factor.

2.3.2 All plans are expected to be based upon and to reflect the presumption in favour of sustainable development, with clear policies that will guide how the presumption should be applied locally. Sustainable development performs an economic, social and environmental role and involves seeking positive improvements in the quality of the built, natural and historic environment, as well as in people's quality of life, including (but not limited to):

- Making it easier for jobs to be created in cities, towns and villages
- Moving from a net loss of bio-diversity to achieving net gains for nature
- Replacing poor design with better design
- Improving the conditions in which people live, work, travel and take leisure
- Widening the choice of high quality homes

National Transport Policy – Highways England

2.3.3 Highways England (HE) manages, maintains and improves England's motorways and major A roads. Although this only represents 2 percent of all roads in England, this strategic road network carries a third of all traffic by mileages and two thirds of all heavy goods traffic.

2.3.4 HE summaries the importance of England's major road network as:

- The core of the nation's transport system, forming the economic backbone of the country which connects all major towns and cities
- Relied on by communities and businesses across the country, 24 hours a day
- Enabling communities to access employment, services, education and training
- Providing businesses with the means to get products and services to customers access to labour markets and suppliers
- Encourages trade and new investment

- Essential for the growth, wellbeing and balance of the nation's economy.

2.3.5 HE's policies aim to ensure England's motorways and major road networks are:

- Reliable and free flowing – minimising routine delays and improving journey reliability
- Safer and serviceable – improving safety of travelling on and maintaining the network
- Accessible and integrated – providing safe access onto and across the network
- Supporting economic growth with a modern and reliable road network that reduces delays, creates jobs, helps business and opens up new areas for development resulting in long term and sustainable benefit to the environment

Highways England Roads Investment Strategy

2.3.6 In 2014 the Government published **Highways England Road's Investment Strategy (RIS)** setting out a £15.1 billion investment for 2015-2020 to improve journeys on England's motorways and major A roads. Schemes were identified to tackle congestion, support economic growth, provide better connections and journey times.

2.3.7 Each funded scheme has been identified to deliver the objectives set out in HE's Strategic Business Plan, as follows:

- Supporting economic growth by supporting employment and residential development opportunities
- A safe and serviceable network for all road users, designed to modern standards appropriate for a strategic road
- A more free-flowing network, increasing the resilience of the road in coping with incidents such as collisions, breakdowns, maintenance and extreme weather
- Improved environment by minimising the impact of the scheme on the natural and built environment
- An accessible and integrated network, providing for local community accessibility.
- Value for Money, ensuring that the scheme is affordable and delivers good value for money
- Smart motorways modernisation programme, helping to improve journey reliability, reduce congestion and cut stop-start traffic flows

2.3.8 The RIS included a package of 6 schemes to improve journeys on the 115 mile section of the A47 between Peterborough and Great Yarmouth. The schemes involve converting almost 8 miles of single carriageway to dual carriageway and making improvements to junctions across the route to relieve congestion, improve capacity and the reliability of journey times for drivers.

2.3.9 The A47 is a Trunk Road of national importance managed by HE on behalf of the DfT, and forms a key route between the A1 and the East Coast, linking the cities of Norwich and Peterborough, the towns of Wisbech, Kings Lynn, Dereham, Great Yarmouth and Lowestoft and a succession of villages in what is largely a rural area.

Regional Transport Policy

- 2.3.10 In 2015 the Conservative / Liberal Democrat coalition government announced a six point long term economic plan for East of England aiming to facilitate economic growth and prosperity across the region, and not just confined to the thriving economies of Cambridge and Peterborough.
- 2.3.11 One of key actions from the economic plan focused on a £4.2 billion investment in transport, including strategic road network improvements for the A47.
- 2.3.12 This investment is reflected within the economic and transport strategies of the regional and local Government Authorities and the Local Enterprise partnerships, as follows.

Greater Cambridgeshire, Greater Peterborough Local Enterprise Partnership (LEP)

- 2.3.13 The LEP played a key role in shaping development and funding decisions across the authority area. The vision and priorities of the LEP are set out in their **Strategic Economic Plan** (SEP) which contains several ambitions to removal barriers to economic growth including provision of ‘a transport network, fit for an economically high growth area that helps to facilitate sustainable growth and enhance prosperity.’
- 2.3.14 The Greater Cambridge Greater Peterborough (GCGP) LEP area is one of the UK’s fastest growing and most dynamic areas and makes a strong contribution to the UK, in the form of £30 billion gross value added (GVA) per annum. However, transport constraints represent a key challenge to supporting housing and employment growth and continued economic prosperity.
- 2.3.15 Many of the constraints on business and housing growth concern transport including:
- Road and rail ‘bottlenecks’ causing congestion and unreliable journey times
 - Limitations on the capacity of the rail network
 - Barriers to the delivery of housing for local workers
 - Limited public transport in rural areas
 - East-west connectivity across the LEP area, and beyond
 - Potential for mode shift towards sustainable travel modes which are not fully realised
 - Access issues in relation to Stansted and Luton Airports as well as Heathrow and Gatwick airports
- 2.3.16 With sections of the region’s transport network already operating at capacity, the SEP identified the importance of investment in selected pinch point improvements on the highway network, which are key to unlocking housing and economic growth.

Cambridgeshire and Peterborough Local Transport Plan

- 2.3.17 As part of the Cambridgeshire and Peterborough Devolution Deal, the Mayor and CPCA is responsible for managing the local transport funding in the area, including the Local Transport Plan. This plan can include details of how transport will support local housing and jobs, and how the Mayor and the CPCA will tackle problems like congestion and air pollution.

2.3.18 The CPCA has recently started producing a new Local Transport Plan. The CPCA Board agreed to adopt the previous Local Transport Plans of Cambridgeshire County Council and Peterborough City Council as a single Local Transport Plan. This is an interim measure until a comprehensive statutory process can be undertaken to review the CPCA’s strategic transport planning role and to produce a long term, new Local Transport Plan for the Cambridgeshire and Peterborough area.

2.3.19 As the CPCA’s new Local Plan is produced there will be changes to existing local plan policies which will need to be taken account of in subsequent phases of the A47 Study.

Cambridgeshire Local Transport Plan 2011-2031 (LTP)

2.3.20 The Cambridgeshire LTP suite of documents set the overarching policy context for transport in Cambridgeshire to 2031, providing detailed transport strategies, programmes and delivery plans. The LTP Policy and Strategy document was updated in 2014 and focuses on measures identified to ease traffic congestion, improve accessibility and support planned development, which maintains and enhances economic growth. The A47 dualling and junction improvement proposals support the County Council’s priority to develop the local economy and will contribute to the following LTP policy objectives:

- Managing and delivering the growth and development of sustainable communities
- Promoting improved skill levels and economic prosperity across the county, by helping people into jobs and encouraging enterprise.

2.3.21 The LTP identifies the following challenges and policy approaches which support the delivery of A47 capacity improvement schemes.

Table 2-1 – Cambridgeshire LTP Challenges and Policies to support the A47

LTP Challenge	LTP policy approach supported by A47 proposals
Improving the reliability of journey times by managing demand for road space, where appropriate and maximising the capacity and efficiency of the existing network.	Enhancing capacity and reducing congestion along the A47 will facilitate the efficient and safe movement of traffic and reduce journey times. Accessibility on the strategic road network will be improved with key barriers and capacity constraints addressed. Bottlenecks on the A14, A428, A10 and A47 will be prioritised for improvements to facilitate growth and continued economic prosperity. The Local Investment Plan (LIP) identifies the need for capacity improvements in the form of dualling and junction enhancements along the A47.
Making sustainable modes of transport a viable and attractive alternative to the private car	Improve the environment and safety of pedestrians, cyclists and public transport users, through provision of accessibility improvements on approaches to the A47.
Future-proofing new transport infrastructure to cope with the effects of climate change	Build new infrastructure to the latest standards for withstanding the impacts of climate change. Especially in regard to local flood risk.
Addressing the main causes of road accidents in Cambridgeshire	Programme of measures aimed at reducing casualties at A47 accident hotspots.

LTP Challenge	LTP policy approach supported by A47 proposals
Protecting and enhancing the natural environment by minimising the environmental impact of transport	Environmental issues such as biodiversity, noise, historic environment and impacts on the landscape will be considered at every stage of the A47 improvement proposals, to protect, mitigate and where possible enhance the nature surroundings. Reducing congestion and improving traffic flow will reduce vehicle emissions and improve local air quality.
Influencing national and local decisions on land-use and transport planning that impact on routes through Cambridgeshire	Delivering necessary improvements on the regions Motorway and Trunk Road networks where they are necessary to meet local objectives and to support growth and access to jobs in Cambridgeshire.

Cambridgeshire County Council's (CCC) Long Term Transport Strategy (LTTS)

- 2.3.22 The LTTS forms part of Cambridgeshire County Council's LTP and identifies the major infrastructure requirements and investment needed to address existing problems and capacity constraints on Cambridgeshire's transport network. The LTTS also details the infrastructure requirements necessary to cater for the transport demand associated with planned growth up to 2031. The strategy seeks an improved integrated network to enable efficient and reliable travel between key destinations across the county. As well as improvements to rail, bus, walking and cycling, a key ambition is to improve accessibility on the strategic network and address constraints on the A14, A428, A10 and A47.
- 2.3.23 The Strategy identifies the critical need to invest in capacity and traffic flow improvements on the A47 to maintain the ongoing economic success of Cambridgeshire. The A47 is identified as a critical link for supporting the development of Wisbech, with major scheme investment required for capacity and junction improvements to the A47 / A1101 junction, the Guyhirn junction and along the other unimproved sections of the route between Thorney in Peterborough and Walton Highway in Norfolk.

Peterborough City Council's Long Term and Local Transport Strategies

- 2.3.24 Peterborough City Council's **Long Term Transport Strategy 2011-2026**, and shorter term **Local Transport Strategy 2016-2021** provide the policy content and measures to support Peterborough's vision to deliver sustainable growth, regeneration and economic development.
- 2.3.25 The A47 provides the strategic road network which connects East Anglia to employment opportunities in and around Peterborough and is recognised as the most important east-west route in the north of the city area.
- 2.3.26 The strategy states that a fully dualled A47 would significantly improve safety and journey reliability. The significant levels of housing development and employment growth designated require capacity and junction improvements along the A47 to bring these developments forward and support the delivery of Peterborough's sustainable growth. Reference is made to the dualling of the A47 from Wansford (A1 junction) to Sutton, as identified in HE's RIS up to 2021.

Summary of Regional and Local Transport Policy context for the A47 scheme

- 2.3.27 The Local Transport Plans for Cambridgeshire and Peterborough are consistent in their policy approach for supporting sustainable economic growth.
- 2.3.28 Strategies aim to deliver sustainable growth, through increasing the capacity and performance of the transport network. Policies focus on delivering measures identified to ease traffic congestion, improve accessibility and reduce car dependency, through provision of sustainable transport alternatives and land use planning to reduce the need to drive.
- 2.3.29 The strategic importance of the A47 for supporting the regional economy and for unlocking further growth is recognised. All strategies identify the need to improve the A47's capacity, accessibility and journey time reliability to support the delivery of planned and proposed growth along the A47 corridor. Without the A47 improvements, much of the potential economic growth, new homes sites and job creation cannot be unlocked.

2.4 Problems Identified

Importance of the A47

- 2.4.1 The A47 is a trunk road linking Peterborough to Kings Lynn and beyond as well as communities along the corridor. It provides a crucial East-West link between the East Coast ports and the East Anglian economy and the wider UK economy. Despite this importance it is a relatively slow route and suffers from a lack of capacity, compounded by slow moving HGVs and agricultural vehicles, and little opportunity for overtaking.

Constraining Economic Growth

- 2.4.2 The majority of the region's main transport corridors are experiencing high traffic growth and capacity is constrained, with regular peak time congestion on key routes and especially close to key employment or service centres found in Cambridge, Peterborough and the market towns. Travel demand is expected to grow by 23% across the Combined Authority area to 2031, with increases of 28% in Cambridge and 30% in Peterborough forecast.
- 2.4.3 The A47 is the most important east-west route in the north of the Combined Authority area, and carries up to 42,000 vehicles a day around Peterborough, and around 22,000 vehicles a day on the single carriageway stretch around Wisbech. The mix of functions and the varying quality of the route leads to delays and to unreliable journey times. Significant levels of growth along the route, especially the housing and employment developments at Wisbech, will be delayed without improvements to the A47.

Capacity Issues

2.4.4 Remaining single carriageway sections of the A47 are forecast to provide a significant constraint on traffic flow capacity in future years. A stress factor defining the ratio of flow to capacity for key link sections in future forecast years can be found in Table 2-2 below. Values highlighted yellow are either at or above 75% capacity. Values highlighted red are shown to be above capacity. As is shown, traffic flows through almost all single carriageway link sections are forecast to be at or approaching their theoretical capacity by 2031. This is under TEMPro central 'core' growth forecast conditions, and includes no allowance for the additional growth ambitions along the A47 corridor such as the additional 10,000 houses that would emerge with the development of Wisbech Garden Town.

Table 2-2: A47 Link Stress Factors

Section	Standard	2017	2021	2026	2031
A15 to A16	D2	0.55	0.61	0.68	0.72
A16 to A1139	S2	0.47	0.52	0.58	0.62
A1139 to Eye Green	S2	0.66	0.72	0.81	0.86
Eye Green to Thorney Bypass	S2	0.81	0.89	1.00	1.06
Thorney Bypass: The Causeway to B1040	D2	0.26	0.29	0.32	0.34
Thorney Bypass: B1040 to B1167	D2	0.24	0.26	0.29	0.31
Thorney Bypass to Gull Road	S2	0.75	0.82	0.92	0.98
Gull Road to A141 Guyhirn Roundabout	S2	0.86	0.93	1.04	1.10
A141 Guyhirn Roundabout to B198 Cromwell Road	S2	0.77	0.83	0.92	0.98
Wisbech Bypass: B198 Cromwell Road to A1101 Elm High Road	S2	0.61	0.66	0.74	0.78
Wisbech Bypass: A1101 Elm High Road to Broadend Road	S2	0.60	0.66	0.73	0.78
Wisbech Bypass: Broadend Road to Walton Highway	S2	0.58	0.63	0.70	0.75

Traffic flow speeds and overall link capacity on single carriageway sections are heavily constrained by a high proportion of Heavy Goods Vehicles (HGVs) utilising the A47. Traffic flow data for five link sections within the study area detailed in Table 2-3 highlight HGV proportions between 13% and 21% during the AM and IP periods. The rural setting of the A47 also results in a high number of slow moving agricultural vehicles traversing specific sections, with limited opportunities for safe overtaking on single carriageway. Table 2-3 also shows a significantly reduced average speed on single carriageway sections, as compared to the existing dual carriageway section at Thorney Bypass for a similar overall level of traffic flow. Upgrading single carriageway sections to dual carriageway would improve traffic flow speed and road safety, allowing traffic to overtake slow moving vehicles, reduce end to end journey times, and increase overall link capacity.

Table 2-3: A47 AM, PM and IP Speeds and HGV%

Link Description		Thorney Bypass: B1040 - B1167		B1167 - Guyhirn Junction		Guyhirn Junction - B198		Wisbech Bypass: B198 - A1101		Wisbech Bypass: Broadend Road - Walton Highway	
		Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound
Carriageway		Dual		Single		Single		Single		Single	
AM (08:00 – 09:00)	Avg. Flow (Veh/hr)	631	806	668	774	970	840	531	644	619	712
	HGV %	19%	9%	16%	15%	16%	17%	20%	14%	16%	13%
	Avg. Speed (Mph)	68	68	41	47	45	46	47	47	52	53
IP (10:00 – 16:00)	Avg. Flow (Veh/hr)	594	618	598	619	737	796	616	628	567	590
	HGV %	21%	12%	19%	21%	21%	20%	18%	17%	16%	18%
	Avg. Speed (Mph)	67	66	48	50	46	47	45	47	51	53
PM (17:00 – 18:00)	Avg. Flow (Veh/hr)	958	782	974	811	1051	975	765	658	758	681
	HGV %	8%	6%	7%	10%	8%	9%	6%	9%	7%	8%
	Avg. Speed (Mph)	70	69	44	49	45	48	41	47	53	55

2.4.5 Further details of the baseline traffic and travel conditions and identified issues along the A47 corridor can be found in the Baseline Conditions Report submitted in conjunction with the SOBC document. This also identified a lack of alternative travel modes to the A47 available between key destinations along the corridor and beyond, with no railway station currently located in Wisbech and no direct rail link between Peterborough, Kings Lynn and north Norfolk.

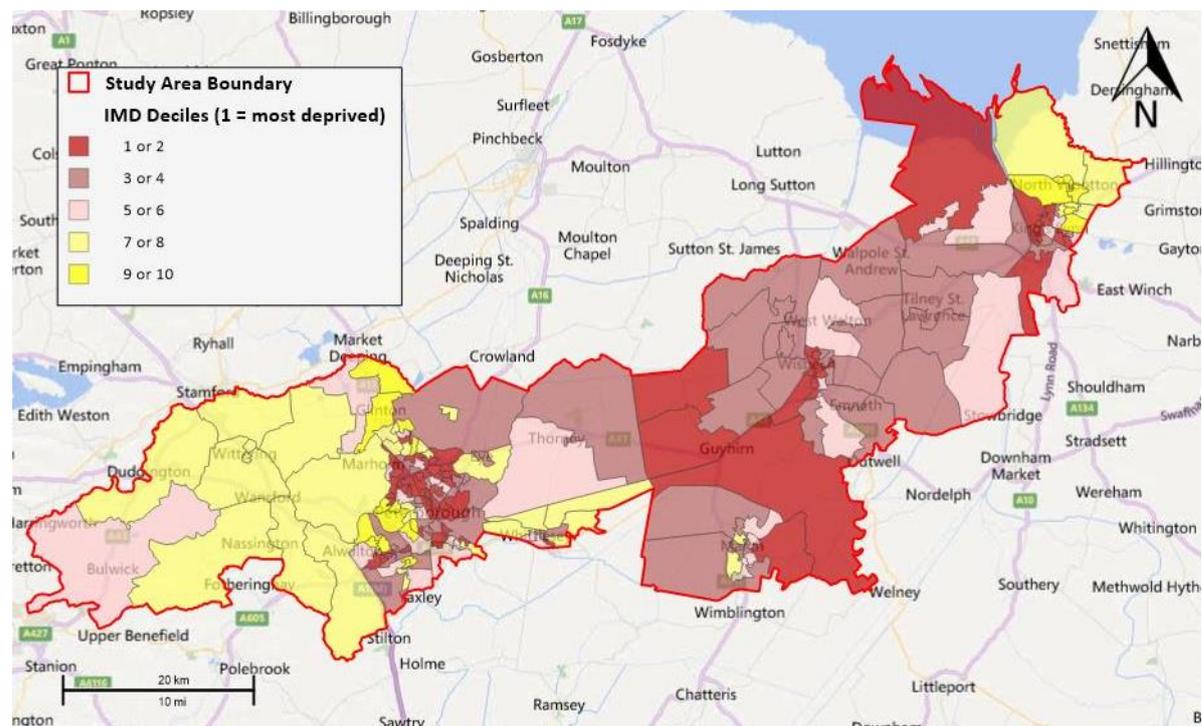
2.4.6 The A47 and A12 corridor feasibility study completed in 2015¹ by AECOM on behalf of the Highways Agency also identified similar existing issues along current A47 study corridor, with potential future link capacity issues, high HGV proportions and road safety concerns along specific route sections.

Index of Multiple Deprivation Data

2.4.7 Levels of economic deprivation across the study area have been estimated using 2015 Index of Multiple Deprivation (IMD) data obtained from the Department for Communities and Local Government (DCLG). This data is available at LSOA² level across England. LSOAs are ranked from 1 (most deprived) to 32,844 (least deprived). IMD data is also split into deciles (1 to 10), representing the most deprived 10%, 20% or 30% (and so on) of areas across England.

2.4.8 Within the study area, relative levels of deprivation are estimated using IMD deciles as shown in Figure 3 below. As can be seen, many LSOAs towards the centre of Peterborough are amongst the 10% and 20% most deprived nationally as defined by deciles 1 and 2. Other areas considered amongst the most deprived nationally are shown across rural Fenland around Guyhirn and towards the east of the study area south and west of Kings Lynn.

Figure 2.1: Relative Study Area Distribution of IMD Deciles across each LSOA



Summary

2.4.9 The problems along the A47 can be summarised as:

¹ <https://www.gov.uk/government/publications/a47-and-a12-corridor-feasibility-study-technical-report>

² A Lower Layer Super Output Area (**LSOA**) is a geographic area. Lower Layer Super Output Areas are a geographic hierarchy designed to improve the reporting of small area statistics in England and Wales.

- **Communities reliant on the A47:** The A47 is an important trunk road linking Peterborough to Kings Lynn and beyond as well as the communities along its route
- **Poor transport links:** The A47 is a mix of dual and single carriageway standards, with slow overall journey times and reaching capacity in parts. Slow journey times are compounded by slow moving HGV and agricultural vehicles
- **Lack of diversion routes:** The A47 has is a lack of adequate diversion routes, which compounds traffic delay following closures due to incidents
- **Communities:** Some of the communities along the A47 between Peterborough and Kings Lynn are some of the most economically deprived areas within the county, compounded by the isolation caused by poor transport links

2.5 Driver for Change

Growth

- 2.5.1 The Greater Cambridgeshire area is forecast to experience significant job and population growth over the next twenty years. For large parts of the area this represents a continuation of past trends.
- 2.5.2 Cambridgeshire is the fastest growing county in the country with over 77,000 new houses planned to 2031. This in turn will drive further economic growth and demand to travel.
- 2.5.3 The driver for this growth is Cambridge, which is now a world centre for high technology, biomedical research and knowledge based industries. This in turn is creating extreme housing pressures in Cambridge and so the majority of the new housing to supply the workers for the Cambridge economy will be outside of the City itself, particularly to the north of Cambridgeshire.
- 2.5.4 The A47 scheme will be a vital contributor to the economic health of Wisbech and indeed the Cambridge economy and so its contribution to wider government objectives on economic growth should not be underestimated.

Wisbech Garden Town Proposals

- 2.5.5 The **Wisbech Garden Town** proposal has the potential to provide an additional 10,000-12,000 new homes into the area, in addition to the 3,000 already identified in the Fenland Local Plan. This investment would be supported by improved transport links, including accessibility and capacity improvements on the A47 around Wisbech. It is hoped the high levels of deprivation in the area will be reversed through the provision of housing, access to jobs and training, generated by investment and economic growth.

2.6 Impact of Not Changing

- 2.6.1 The impacts of no intervention can be summarised as follows:
- There will be increasing journey time delays for vehicles travelling along the A47
 - Wisbech and the Fens becoming a less attractive place to live and work
 - There is a significant risk that the Combined Authority's housing and job growth aspirations for the corridor will not be realised

2.7 Internal Drivers for Change

- 2.7.1 With Government policy and the Combined Authority focusing on job creation and economic growth, there is an increasing need to improve the well-being of the local economy, to make the Fens a more attractive place to live and work.
- 2.7.2 There are major aspirations to grow the population and jobs along the A47 corridor, particularly focused on Wisbech.
- 2.7.3 A lack of a consistent dual carriageway standard road between Peterborough and Kings Lynn will undermine this aspiration through a mixture of:
- Lack of highway capacity to accommodate the planned growth
 - Making the corridor an unattractive place to live, work and ultimately inwardly invest

2.8 External Drivers for Change

- 2.8.1 The A47 between the A1 and Great Yarmouth is of mixed standard, with some sections dualled, some built to modern single carriageway standards and other stretches remaining unimproved. HE are committed to dualling further sections of the A47 between the A1 and Great Yarmouth, which will further emphasise the discontinuous nature of the A47, particularly between Peterborough and Wisbech (Walton Highway).

2.9 The Need for Intervention

- 2.9.1 The key challenges and opportunities to be addressed by the A47 improvements are:
- **To address current congestion and delay**, reduce journey times and improve reliability on the A47 and on local routes impacted by the traffic and congestion on the A47
 - **To provide conditions that facilitates economic growth and prosperity** by encouraging inward investment in higher value employment sectors in the north of Cambridgeshire, Peterborough and in Norfolk
 - **To ensure sufficient highway capacity** to accommodate employment and housing growth along the A47 corridor
 - **To address the increasing travel demands of a growing population**, by creating a modern, technologically advanced road network that is smoother, smarter and sustainable and continues to enable the region's economy to grow and remain competitive
- 2.9.2 These challenges and opportunities can only be realistically addressed by dualling the remaining sections of the A47 between Peterborough and Kings Lynn, ensuring a dual carriageway standard throughout its length. These improvements would improve:
- **Regional Economic Wellbeing:** The UK economy relies on key strategic links. The A47 has vital links with the A11 trunk road which has been developed as an important Norwich Cambridge Technology Corridor along with the A140, A10, A17, A16, A15, A12 and the A1; A47 improvements will support quicker and more reliable journeys providing crucial infrastructure linkages to the rest of the UK.

- **Local Economic Wellbeing:** Dualling the A47 will improve the economic wellbeing of those communities along the A47 and enable them to enjoy some of the Cambridge centric economic prosperity.
- **Road Safety:** Dualling will contribute to HE's goal of a 40% reduction in accidents while improving resilience and response times for the emergency services.
- **Connectivity:** Improved connections between key towns and cities including Lowestoft, Great Yarmouth, Norwich, Dereham, Swaffham, King's Lynn, Wisbech and Peterborough ensuring a thriving local economy and improved quality.

2.9.3 Dualling of the A47 will support the growth of logistics, technology and agri-tech industries and other major businesses along the route and encourage further inward investment.

Summary

2.9.4 Dualling the remaining sections of the A47 is key to:

- **Improving journey times along the A47** to address current congestion and delay, reduce journey times and improve reliability on the A47 and on local routes impacted by the traffic and congestion on A47
- **To provide for future travel demand** between Kings Lynn, Wisbech and Peterborough
- **Rebalancing the economic growth across Cambridgeshire and Peterborough.** To provide conditions that encourage inward investment in higher value employment sectors in the north of Cambridgeshire, Peterborough and in Norfolk
- **Contributing to the growth of Cambridgeshire and Peterborough.** To ensure employment and housing growth along the A47 corridor can be accommodated

2.10 Objectives

Cambridgeshire and Peterborough Combined Authority Objectives

2.10.1 The CPCA has set the following objectives:

- Doubling the size of the local economy
- Accelerating house building rates to meet local and UK need
- Delivering outstanding and much needed connectivity in terms of transport and digital links
- Providing the UK's most technically skilled workforce
- Transforming public service delivery to be much more seamless and responsive to local need
- Growing international recognition for our knowledge based economy
- Improving the quality of life by tackling areas of deprivation

2.10.2 It recognises that transport investment will play a critical role in meeting these objectives through:

- Increasing network capacity (both road and rail)
- Improving connectivity, particularly around access to employment and housing

- Unlocking new developments
- Improving journey time and/or journey time reliability
- Providing greater mode choices such as walking and cycling, private car and public transport

2.10.3 The Combined Authority has subsequently agreed a methodology for prioritising infrastructure investment based on the criteria and which aligns with the key principles of a 5-case Business Case model (strategic, economic, financial, management) as set out below:

Table 2-4 – Combined Authority Criteria to Prioritise Infrastructure Investment

Case	Criteria
Strategic	<ul style="list-style-type: none"> • Reduce congestion • Unlock housing and jobs
Economic	<ul style="list-style-type: none"> • Scale of impact • Value for money
Financial	<ul style="list-style-type: none"> • Other funding sources / contributors
Management	<ul style="list-style-type: none"> • Delivery certainty • Project risks • Stakeholder support

2.10.4 The Combined Authority’s Strategic Case assessment criteria can be considered its Core Objectives behind delivering infrastructure investment.

Scheme Objectives

2.10.5 A transport scheme can have both primary and secondary objectives. The primary objectives are the fundamental outputs of why the scheme is being promoted and therefore must be achieved whereas secondary objectives are other outputs that are achieved along the way, but are not necessary to the success of the scheme. The secondary objectives tend to be delivered as a consequence of delivering the primary objectives, as a causal chain effect.

2.10.6 The primary objectives therefore represent the transport outcomes required by the scheme:

Primary Objectives

2.10.7 The Primary Objectives of dualling the A47 are:

- **Wider economic benefits:** Provide conditions that encourage inward investment in higher value employment sectors in the north of Cambridgeshire and in Norfolk;
- **Improve connectivity:** Improve connectivity between the north of Cambridgeshire and Norfolk to Peterborough, the strategic road and rail networks and to national markets;
- **Encourage homes and jobs:** Ensure that the planned employment and housing growth along the A47 corridor is promoted, whilst providing for future travel demand between Kings Lynn, Wisbech and Peterborough; and

- **Tackle congestion and improve journey time reliability:** Tackle congestion and address journey time reliability on the A47 and on local routes through an improved road standard and network resilience.

2.10.8 The Table below shows how the A47 scheme objectives map across the Combined Authorities objectives.

Table 2-5 – A47 Scheme Objectives compared to Combined Authority Objectives

A47 Scheme Objective	Combined Authority Objective
<ul style="list-style-type: none"> • Improve connectivity 	<ul style="list-style-type: none"> • Improve connectivity
<ul style="list-style-type: none"> • Encourage jobs and homes • Wider economic benefits 	<ul style="list-style-type: none"> • Unlock new developments , particularly around access to employment and housing
<ul style="list-style-type: none"> • Tackle congestion and improve journey time reliability 	<ul style="list-style-type: none"> • Increase network capacity • Improving journey time and/or journey time reliability

Secondary Objectives

2.10.9 The Secondary Objectives include:

- **Improve road safety:** Reduce personal injury accidents and improve personal security amongst all travellers
- **Improve community health:** by increasing cycling and walking and reducing transport related pollution
- **Sustainable travel:** Increase opportunities for travel, both local and inter-regional, by sustainable transport modes
- **Protect and enhance the environment:** maintain local distinctiveness and conserve natural resources
- **Promote social inclusion:** by ensuring that members of the community can access facilities

2.11 Measures of Success

2.11.1 The outcomes from the scheme can be assessed and monitored in a number of ways against the primary objectives, as identified in the table below:

Table 2-6 – A47 Dualling: Measures of Success

Objective	Outcome	Method of Assessment
Wider economic benefits	<ul style="list-style-type: none"> • Reduced congestion along the A47 and at key junctions between Peterborough and Kings Lynn and • Continued/ increased level of investment in Peterborough, Cambridgeshire and West Norfolk. 	<ul style="list-style-type: none"> • Traffic and travel surveys along the A47 corridor • Census and journey to work statistics for 2021 and 2031 • Employment and salary statistics • Employment sector surveys
Improve Connectivity	<ul style="list-style-type: none"> • Reduced congestion and delay along the A47 corridor and at key junctions 	<ul style="list-style-type: none"> • Traffic and travel surveys along the A47 corridor

Objective	Outcome	Method of Assessment
	<ul style="list-style-type: none"> • Improved journey times and journey time reliability along the A47 corridor between Peterborough and Wisbech • Maintain and improve accessibility by all modes to key destinations and local settlements along the A47 corridor between Peterborough and Kings Lynn 	<ul style="list-style-type: none"> • Residents survey undertaken by the relevant Local Authority • Census and journey to work statistics for 2021 and 2031
Encourage homes and jobs	<ul style="list-style-type: none"> • Ensure successful delivery of committed and statutory development across Peterborough, Cambridgeshire and West Norfolk • Improved job and employment prospects along the A47 corridor and in surrounding areas 	<ul style="list-style-type: none"> • Traffic and travel surveys along the A47 corridor • Local authority housing monitoring reports • Residents survey undertaken by the relevant Local Authority • Census and journey to work statistics for 2021 and 2031 • Employment and salary statistics • Employment sector surveys
Tackle congestion and improve journey time reliability	<ul style="list-style-type: none"> • Reduced congestion and delay along the A47 corridor and at key junctions • Improved journey times and journey time reliability along the A47 corridor between Peterborough and Wisbech 	<ul style="list-style-type: none"> • Traffic and Travel Surveys along the A47 corridor

2.12 Scope

2.12.1 The scope of the project is to dual the remaining sections of the A47 to ensure a continuous dual carriageway between the A1 and Kings Lynn, with the primary objective of

- Increasing wider economic benefits
- Improving connectivity
- Encouraging houses and jobs
- Reducing Traffic delay and congestion

2.13 Constraints

2.13.1 A desktop study has revealed that the key constraints to the dualling of the A47 can be summarised as:

- **Funding:** the cost of the scheme will probably exceed the Combined Authority's core budget allocation, necessitating a combination of direct Government, HE and Developer contributions. Other funding mechanisms would also need to be explored, such as Private Finance Initiatives (PFI)
- **Environmental:** the key environmental constraints are considered to be:
 - Noise – potential impact on residential properties
 - Air quality
 - Visual intrusion

- Flooding – significant tracts of land around Wisbech are potentially subject to flooding
- **Land owners:** land necessary for the dualling of the A47 will need to be acquired from third parties, requiring negotiation and potential Compulsory Purchase if such negotiations fail

2.13.2 Other potential route constraints include:

- Crossing of the River Nene on any route to the North of Wisbech, due to the need to allow for shipping

2.14 Inter-dependencies

2.14.1 There are no known inter dependencies.

2.15 Stakeholders

2.15.1 The key stakeholders are:

- The Combined Authority
- Cambridgeshire County Council (CCC)
- Norfolk County Council
- Peterborough City Council (PCC)
- Fenland District Council
- The A47 Alliance
- Highways England

3 Outline Options Development

3.1 Low Cost Options

3.1.1 A Low Cost Options Technical Note and Early Assessment Sifting Tool (EAST) have been submitted as an addendum to the Options Appraisal Report which covers a number of potential low cost options to dualling the A47 along the study area corridor. None of these identified low cost options met the primary objectives of the scheme or fully addressed the identified issues. None provided sufficient network capacity to meet housing growth and development aspirations along the A47 corridor, including proposals for Wisbech Garden Town. The Low Cost Option Technical Note can be found in Appendix A.

3.2 Junction Strategy

3.2.1 An early assessment on junction capacity has shown that the junction strategy for dualling of the A47 could be that all junctions be at-grade though with key junctions formed as roundabouts. Nevertheless the strategic and economic benefits for grade separated junctions will be sensitivity tested at the detailed Option Appraisal stage of the project.

3.3 Route Description and Key Constraints

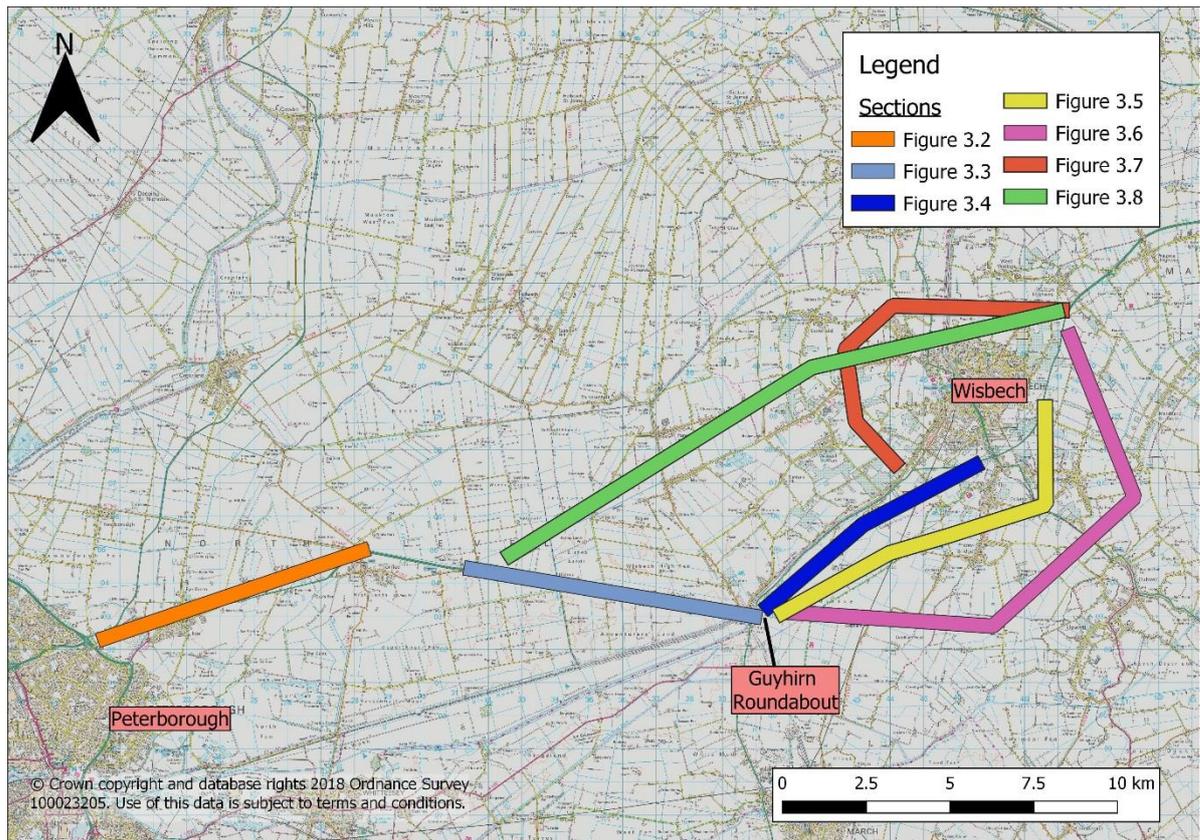
3.3.1 The existing route of the A47 carriageway between the A47 / A16 junction in the west (near Peterborough) and the A47/ Lynn Road junction in the east (north east of Wisbech) has been broken down into four individual route sections for which engineering options will be considered for the proposed dualling of the A47.

- Section 1 (A16 to Thorney Bypass)
- Section 2 (Thorney Bypass to Guyhirn)
- Section 3 (Guyhirn to Wisbech)
- Section 4 (Wisbech Bypass)

3.4 Potential Route Alignment Options

3.4.1 Potential route alignment options for the various A47 route sections are summarised in Figure 3.1.

Figure 3.1: A47 Dualling Scheme Route Options



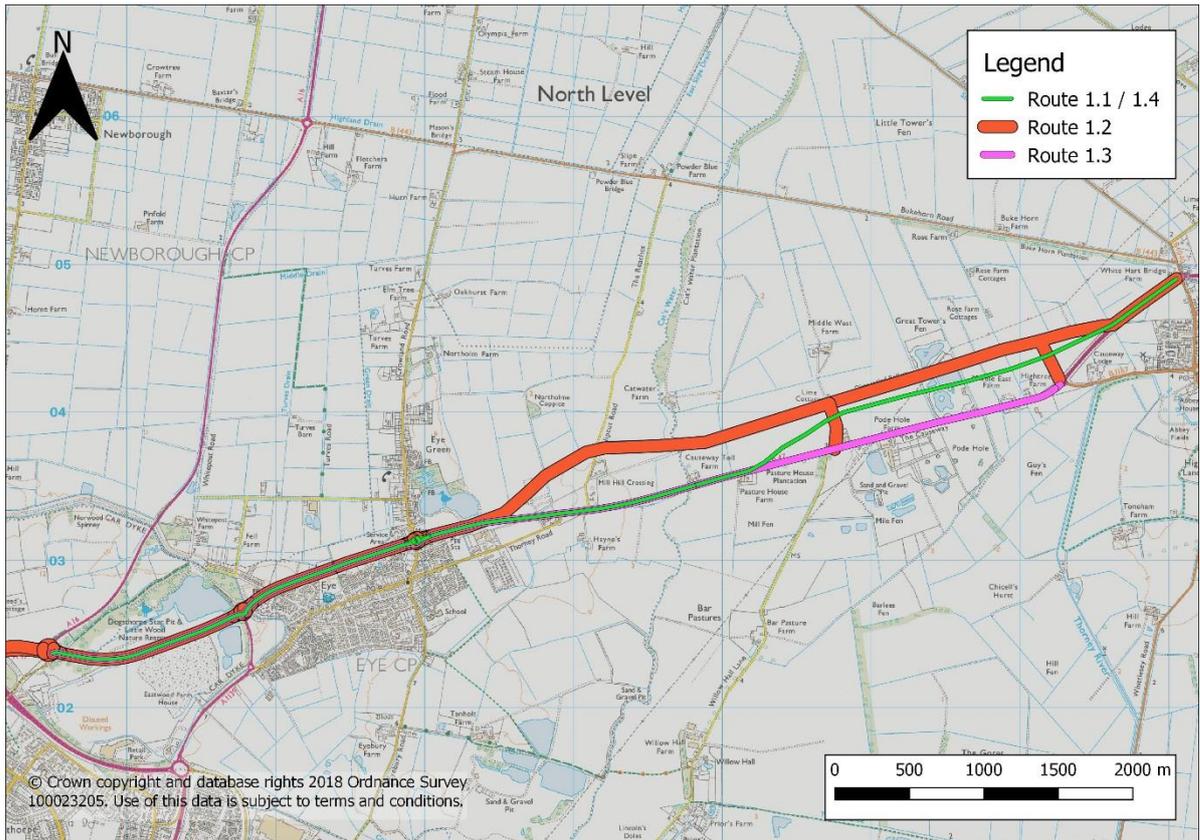
Section 1 (A16 to Thorney Bypass)

3.4.2 Four potential route options have been identified:

- **Route 1.1:** Dual Carriageway immediately to the north of the existing A47
- **Route 1.2:** Part online and offline Dual Carriageway to the north of the existing A47 (predominantly following path of disused railway)
- **Route 1.3:** Fully online Dual Carriageway to the north of the existing A47
- **Route 1.4:** As Route 1.1 as one way single carriageway for eastbound traffic, utilising existing carriageway for westbound traffic

3.4.3 These Routes are shown on Figure 3.2 below.

Figure 3.2: Section 1 (A16 to Thorney Bypass)



3.4.4 Route 1.3 utilises the existing carriageway, and therefore represents a lower cost option. However, due to the proximity to existing residential, industrial and agricultural premises, stakeholder support is likely to be low. Working on the existing line and maintaining traffic during construction would impose constraints on the construction phase.

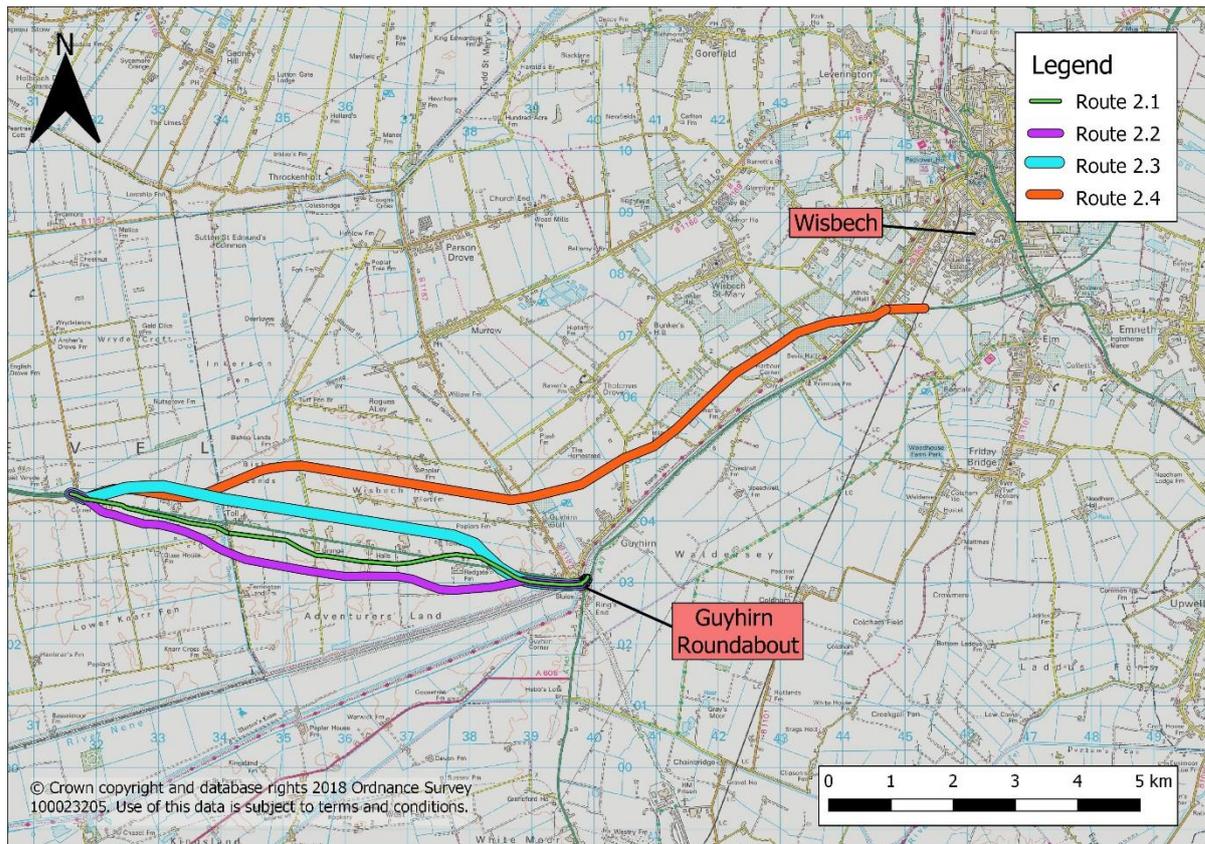
Section 2 (Thorney Bypass to Guyhirn)

3.4.5 Four potential route options have been identified:

- **Route 2.1:** Online dualling of the A47
- **Route 2.2:** Dualling of the A47 south of the existing A47
- **Route 2.3:** Dualling of the A47 north of the existing A47
- **Route 2.4:** Offline dualling Thorney to Wisbech north of Guyhirn village

3.4.6 These Routes are shown on Figure 3.3

Figure 3.3: Section 2 (Thorney Bypass to Guyhirn)



3.4.7 Routes 2.1 to 2.3 are dual carriageway alternatives for the A47 between Thorney and Guyhirn whilst Option 2.4 would dual the A47 directly between Thorney and Wisbech.

Section 3 (Guyhirn to Wisbech)

3.4.8 Eight potential route options have been identified shown across three separate Figures.

Figure 3.4

- **Route 3.1:** Online dualling of the A47
- **Route 3.2:** Dualling of the A47 south / east of the existing alignment
- **Route 3.3:** Dualling of the A47 south / east of the existing alignment, tying in east of Redmoor Roundabout

Figure 3.5

- **Route 3.4:** Hybrid of Routes 3.1, 3.2 and 3.3
- **Route 3.5:** Offline dualling of the A47 between Guyhirn and Walton Highway running south of Elm but north of Emneth and Friday Bridge

Figure 3.6

- **Route 3.6:** Offline dualling of the A47 between Guyhirn and Walton Highway running south of Emneth and Friday Bridge
- **Route 3.7:** Similar to Route 3.6

3.4.9 These Routes are shown on Figure 3.4 to 3.6 below.

Figure 3.4: Section 3 (Guyhirn to Wisbech)

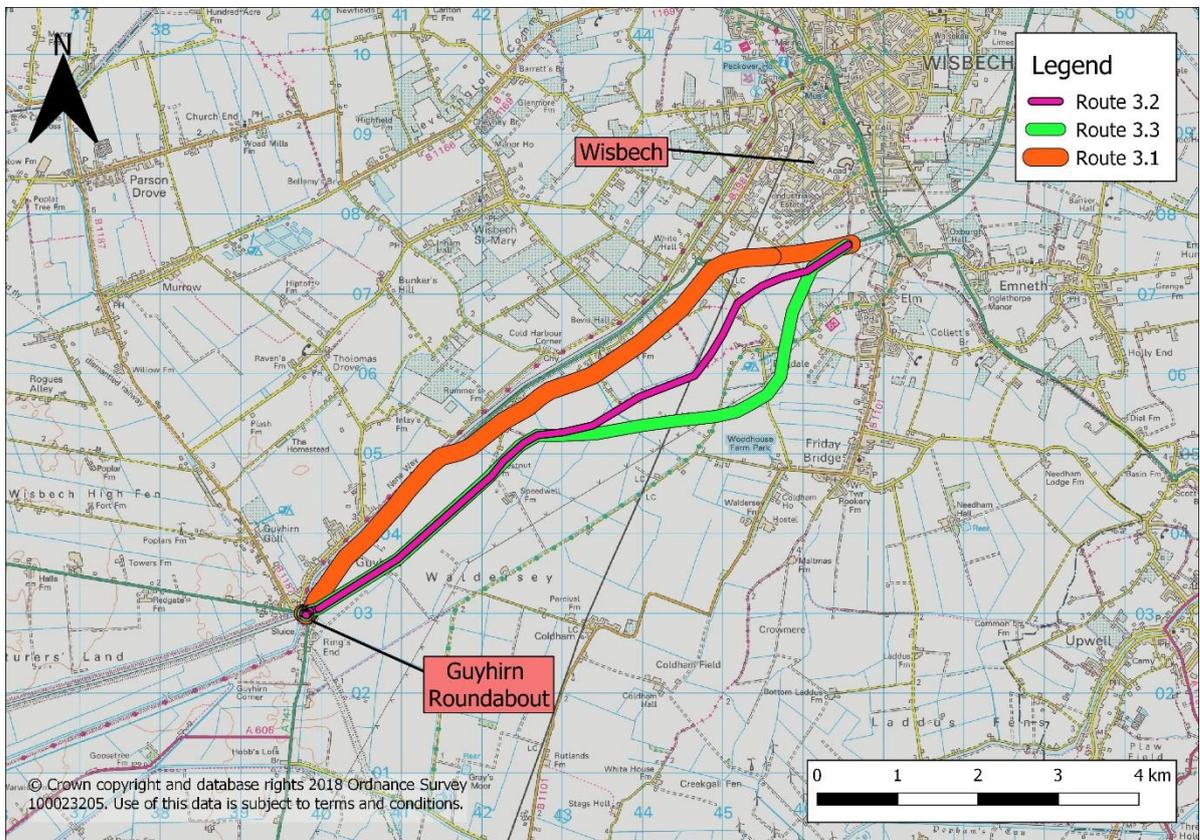
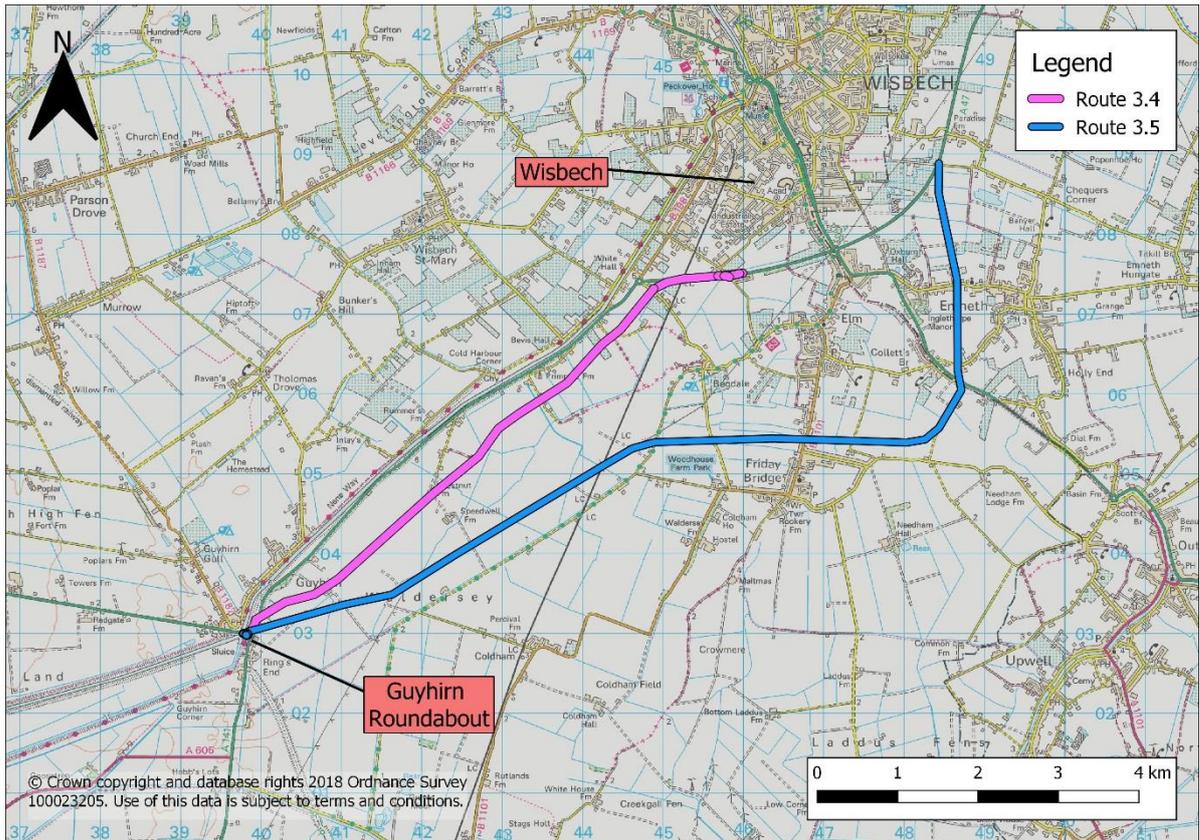
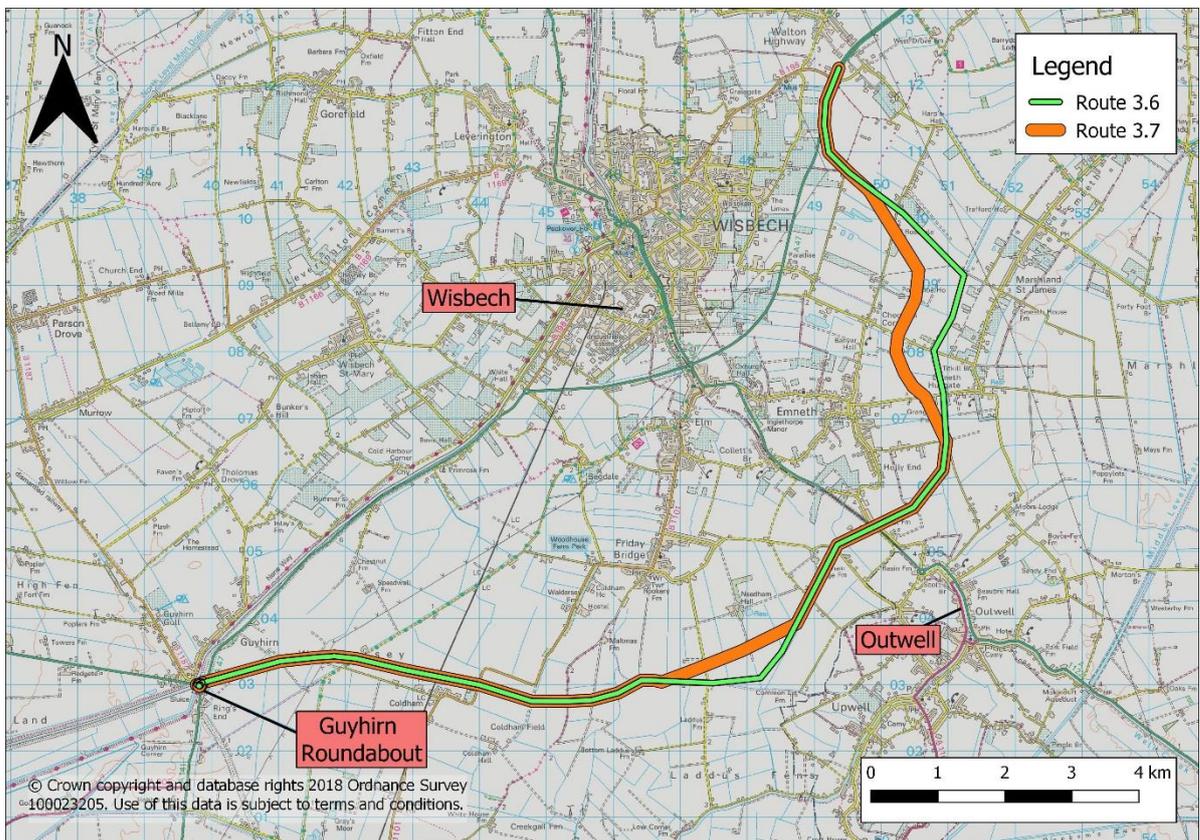


Figure 3.5: Section 3 (Guyhirn to Wisbech)



3.4.10 Route 3.4 is a hybrid of Routes 3.1, 3.2 and 3.3 shown in Figure 3.2, whilst Route 3.5 would run offline between Guyhirn and Walton Highway.

Figure 3.6: Section 3 (Guyhirn to Wisbech)



3.4.11 Routes 3.6 and 3.7 would run offline between Guyhirn and Walton Highway to the south of Emneth.

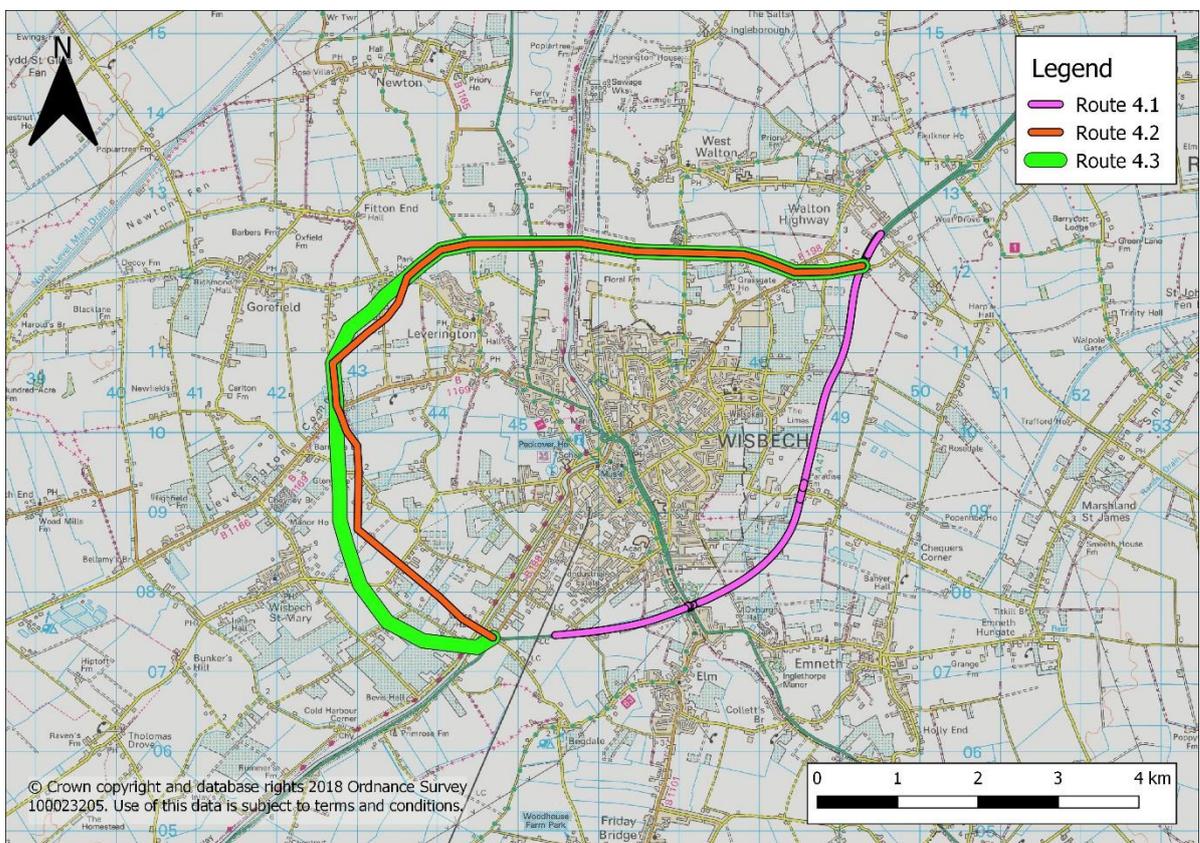
Section 4 (Wisbech Bypass)

3.4.12 Three potential route options have been identified:

- **Route 4.1:** Online dualling of the A47
- **Route 4.2:** Northern Orbital of Wisbech, tying in with the A47 at its junctions with the B198 (Redmoor and Lynn Road junctions)
- **Route 4.3:** Variation on Route 4.2

3.4.13 These Routes are shown on Figure 3.7 below.

Figure 3.7: Section 4 (Wisbech Bypass)



3.4.14 Routes 4.2 and 4.3 would require two new crossings of the River Nene and are some 4 to 5km longer than the online option 4.1. The additional river crossing would adversely affect the buildability of the routes, whilst the longer route around the town would mean it would be less attractive to A47 through-traffic and thus have limited impact at reducing congestion along the existing A47.

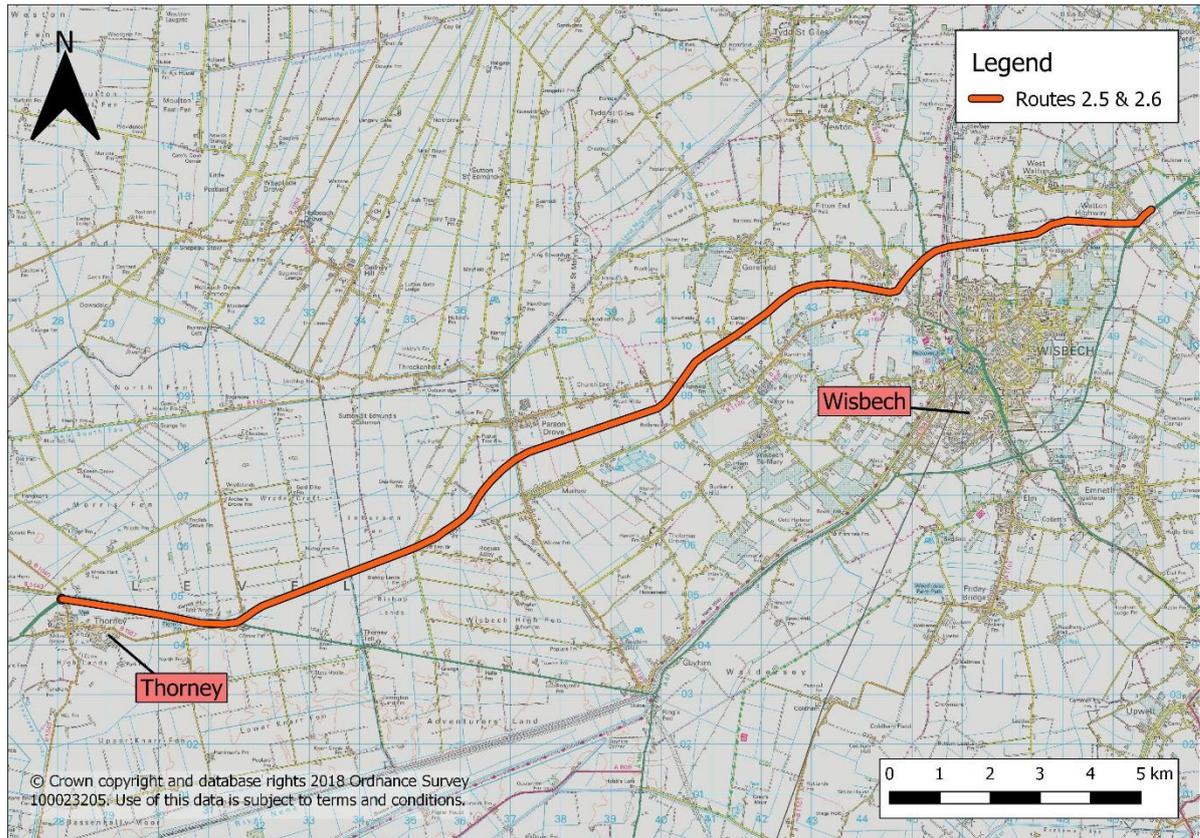
Section 2 to 4 (Thorney Bypass to Walton Highway)

3.4.15 Two potential route options have been identified:

- **Route 2.5:** Offline single carriageway Thorney to Walton Highway running to the north of Wisbech
- **Route 2.6:** Offline dualling Thorney to Walton Highway running to the north of Wisbech

3.4.16 These Routes are shown on Figure 3.8.

Figure 3.8: Section 2 to 4 (Thorney Bypass to Walton Highway)



3.4.17 Routes 2.4 and 2.5 are would be a totally offline route between Thorney and Walton Highway running to the north of Wisbech, with Option 2.5 built as a single carriageway route. These Routes would better serve the Wisbech Garden Town, but would be difficult to phase and would require a new river crossings of the River Nene to the north of Wisbech.

4 Initial Option Appraisal

4.1 Introduction

4.1.1 The long list of options have been initially appraised against the Combined Authority's Strategic Case assessment (Table 2.2), whose Core Objectives are closely aligned to the A47 scheme primary objectives. Each Option was scored against each of the objectives on a seven-point scale from +3 to -3, as follows:

- +3 major benefit at a regional level
- +2 major benefit at a more local level or more minor benefit at a regional level
- +1 minor benefit at a local level
- 0 neutral: no impact
- -1 minor disbenefit or negative impact at a local level
- -2 major disbenefit at a more local level or more minor benefit at a regional level
- -3 major disbenefit at a regional level

4.1.2 The approach to this work was to undertake the scoring and analysis and then to identify those options that did not “perform” well. The objective of this process was not to rank these measures but to identify the measures that should be taken forward and those that are unlikely to meet the objectives for the A47 study.

4.1.3 The results of the Assessment shown in Appendix C show that all the routes would be equally viable except for:

- **Routes 1.3:** Should be rejected as it is unlikely to receive stakeholder support due to its impact on existing properties as well as traffic disruption during its construction
- **Routes 2.1 and 3.1:** Should be rejected as it is unlikely to receive stakeholder support due to its impact on existing properties as well as traffic disruption during its construction
- **Routes 3.5, 3.6 and 3.7:** Should be rejected as they would fail to deliver housing growth around Wisbech, due to their routing to the south of the town
- **Routes 4.2 and 4.3:** Should be rejected as they will not reduce existing congestion on the A47 Wisbech bypass (being a longer and therefore unattractive route) and likely to offer poor value for money

4.1.4 It is also note that:

- Routes 2.4, 2.5 and 2.6 cannot be readily phased. The whole length route would have to be built in one go (at significant cost) before any benefits could be realised, rather than (say) Thorney to Guyhirn as Phase 1 (Routes 2.2 or 2.3) and Guyhirn to Wisbech as Phase 2 (Routes 3.2, 3.3 or 3.4):
- Route 2.6 has the biggest potential to unlock Wisbech Garden Town and maximise wider economic benefits

4.2 Summary

4.2.1 Table 4.6 summarises the schemes that should be taken through to a more detailed assessment within a separate Option Appraisal report.

Table 4-1 – Summary of Routes to be Assessed in Further Detail

Section	Route	Route Description
Section 1 (A16 to Thorney Bypass)	Route 1.1	Dual carriageway immediately to the north of the existing A47
	Route 1.2	Part online and offline dual carriageway to the north of the existing A47 (predominantly following path of disused railway)
	Route 1.4	As Route 1.1 as a one-way single carriageway for eastbound traffic, utilising existing carriageway for westbound traffic
Section 2 (Thorney Bypass to Guyhirn)	Route 2.2	Dualling of the A47 to the south of the existing A47
	Route 2.3	Dualling of the A47 to the north of the existing A47
	Route 2.4	Offline dualling Thorney to Wisbech north of Guyhirn village
Section 2 to 4 (Thorney Bypass to Walton Highway)	Route 2.5	Offline single carriageway Thorney to Walton Highway running to the north of Wisbech
	Route 2.6	Offline dualling Thorney to Walton Highway running to the north of Wisbech
Section 3 (Guyhirn to Wisbech)	Route 3.2	Dualling of the A47 south / east of the existing alignment
	Route 3.3	Dualling of the A47 south / east of the existing alignment, tying in east of Redmoor Roundabout (B198).
	Route 3.4	Hybrid of Routes 3.2 and 3.3
Section 4 (Wisbech Bypass)	Route 4.1	Online dualling of the A47

5 The Economic Case

5.1 Introduction

- 5.1.1 The Economic Case provides evidence of how the scheme is predicted to perform, in relation to its stated objectives, identified problems and targeted outcomes. The Economic Case determines if the proposed scheme is a viable investment, whose strengths outweigh its weaknesses and which provides good value for money.
- 5.1.2 The potential value for money of the A47 improvement scheme has been initially assessed using a spreadsheet model by calculating and then comparing the likely journey time benefits 'with' and 'without' the scheme scenarios. The monetary benefits of travel time savings for vehicle user classes has been calculated to enable initial BCRs (Benefit Cost Ratios) to be produced for each Option.
- 5.1.3 The purpose of the initial assessment is to determine whether it is likely such a scheme would offer a positive value for money and to enable a qualitative assessment of the potential benefits between Routes.

5.2 Assumptions

- 5.2.1 The Economic Case has been developed based on the comparison of a 'without scheme' and the 'with scheme' (proposed dualling improvements options).
- 5.2.2 The following assumptions have been made in the development of the Economic Case:
- Scheme journey times applied to the 'with scheme' options are based on observed speeds for existing dualled sections of the A47
 - Journey time savings for weekday AM and PM peak hours, have been annualised over 253 days (the standard number of working weekdays per annum). There is potential for benefits beyond the peak hours but these have not been accounted for
 - Value of time per vehicle and journey purpose proportions are taken from the WebTAG DataBook (December 2017)
 - Maintenance costs are included and are based on values taken from the QUADRO user manual
 - Scheme opening year has been taken as 2026 and a horizon year assessment based on 2041
 - Transport user benefits have been calculated for a 60-year appraisal period in line with WebTAG
 - Optimism Bias has been applied at 44%, as recommended by WebTAG for this stage of assessment
 - A risk allowance of 15% has been made on top of construction cost estimates
 - Potential benefits for Public Transport users have not been included in the assessments

- Land costs for offline options have been taken as £10,000 per acre whilst widening options have been based on a land cost of £100,000 per acre as offline options are more likely to require agricultural land with no development “hope” value
- Preparation costs are based on 9% of construction costs, as used by the HE for its initial appraisals of schemes
- Supervision costs are based on 5% of construction costs, as used by the HE for its initial appraisals of schemes

5.3 Traffic Forecasting and Economic Appraisal

5.3.1 The economic case for this scheme is focussed on:

- Assessing the direct, localised, economic efficiency benefit of the scheme
- Qualitative appraisal of wider scheme benefits, and
- Assessing the scheme benefits against the direct scheme costs as an individual package.

5.3.2 The appraisal criteria and overall approach to the assessment of options at this stage is based on a direct appraisal of journey time saving benefits as compared to the direct scheme costs.

5.4 Environment

5.4.1 The economic benefits of a scheme in relation to carbon reduction and other environmental impacts are often monetised as part of scheme appraisal, particularly for large schemes where congestion reduction is a specific objective of the scheme.

5.4.2 At this stage the appraisal of multiple options has been undertaken and whilst it is evident that some options are shown to result in travel time savings by reducing congestion and assessment of the potential impacts of this on carbon reduction have not yet been undertaken. It is usual to undertake such assessments at the Option Appraisal and Outline Business Case stage.

5.5 Social

5.5.1 It is noted that highway schemes are often assessed with both travel time savings and accident benefits. Accident benefits normally come from a change of junction or link types or of flow volume. Scheme accident benefits have not been directly assessed at this stage because the proposed scheme does not include sufficient detail at this stage as regards the form of junction to be proposed in each location. In addition, the accident rate in the area is not above what might be expected and the scheme is not being promoted as an accident reduction measure.

5.5.2 However, analysis of this data will become part of the design process; and accident monitoring will be part of the post-opening evaluation.

5.6 Quantified Costs

- 5.6.1 An indicative cost estimate for each of the options has been provided based on applying standard cost rates to the route length and the number of junctions and structures required, as is normally undertaken at Strategic Outline Business Case stage. For the purposes of the economic appraisal these have been converted to 2010 market prices. The construction costs presented below are inclusive of land, supervision, preparations, risk and adjustment for optimism bias.
- 5.6.2 As the A47 dualling improvements are likely to result in the creation of new road space an initial estimate of the future maintenance costs has also been made. These are based on values provided within the QUADRO manual. For the purposes of the economic appraisal these have been converted to 2010 market prices.
- 5.6.3 Quantified costs for each of the route options is provided in Table 5-1 below.

Table 5-1 – A47 Dualling Options: Quantified Costs (2010 Market Prices)

Section	Route	CONSTRUCTION	MAINTENANCE	TOTAL
Section 1 (A16 to Thorney Bypass)	1.1	£71,280,846	£1,467,039	£72,747,885
	1.2	£64,208,314	£1,425,724	£65,634,038
	1.4	£51,504,621	£607,336	£52,111,957
Section 2 (Thorney Bypass to Guyhirn)	2.2	£125,960,300	£1,535,535	£127,495,835
	2.3	£133,009,908	£1,533,360	£134,543,269
	2.4	£170,611,981	£2,644,331	£173,256,311
Section 2 to 4 (Thorney Bypass to Walton Highway)	2.5	£163,204,711	£1,629,441	£164,834,152
	2.6	£240,037,679	£3,935,963	£243,973,641
Section 3 (Guyhirn to Wisbech)	3.2	£97,768,075	£1,556,011	£99,324,086
	3.3	£94,274,027	£1,615,446	£95,889,473
	3.4	£88,858,638	£1,373,899	£90,232,537
Section 4 (Wisbech Bypass)	4.1	£57,982,121	£524,443	£58,506,564

5.7 Quantified Benefits

1. The user benefits are set out in

- 5.7.1 Table 5-2 below and are based on vehicle time savings across the following vehicle/user classes:

- Car Employers Business
- Car Commute
- Car Other
- LGV Employer Business
- LGV Commute
- LGV Other
- OGV1
- OGV2

5.8 Benefit Cost Ratio

5.8.1 Table 5-2 below summarises the analysis of monetised costs and benefits (AMCB). The costs and benefits are calculated based on the following:

- Scheme cost (2018 prices)
- Risk and optimism bias adjusted cost (2018 prices excl. VAT)
- Risk and optimism bias adjusted cost in 2010 prices
- Discounted Risk and optimism bias adjusted cost in 2010 prices
- Discounted Risk and optimism bias adjusted cost in 2010 market prices

5.8.2 User Benefits (PVB) for the initial BCR are based on vehicle user time savings (excluding passenger service vehicles), and include two tests:

2. **Core test:** based on TEMPRO 7.2 Government Forecast
3. **Sensitivity test:** based on 50% increase in growth (houses and job) and which resulting increase in traffic delay.

Table 5-2 – A47 Dualling Options: Benefit to Cost Ratios

Section	Route	PVC (£,000)	Core Test		Sensitivity Test	
			PVB (£,000)	BCR	PVB (£,000)	BCR
Section 1 (A16 to Thorney Bypass)	1.1	£72,748	£86,411	1.19	£134,643	1.85
	1.2	£65,634	£89,697	1.37	£138,677	2.11
	1.4	£52,112	£81,421	1.56	£128,655	2.47
Section 2 (Thorney Bypass to Guyhirn)	2.2	£127,496	£117,734	0.92	£181,911	1.43
	2.3	£134,543	£117,694	0.87	£181,827	1.35
	2.4	£173,256	£248,979	1.44	£376,066	2.17
Section 2 to 4 (Thorney Bypass to Walton Highway)	2.5	£164,834	£316,253	1.92	£487,357	2.96
	2.6	£243,974	£330,741	1.36	£504,806	2.07
Section 3 (Guyhirn to Wisbech)	3.2	£99,324	£45,414	0.46	£81,232	0.82
	3.3	£95,889	£39,916	0.42	£74,472	0.78
	3.4	£90,233	£62,261	0.69	£101,945	1.13
Section 4 (Wisbech Bypass)	4.1	£58,507	£125,716	2.15	£189,697	3.24

PVC = Present Value of Costs (2010 Market Prices)

PVB = Present Value of Benefits (2010 Market Prices)

BCR – Benefit to Cost Ratio

5.8.3 It should be noted that whilst TEMPRO 7.2 is the latest Government Forecast for traffic growth but does not necessarily reflect the latest Local Plan growth, and the sensitivity testing shows the BCR is very much dependent on the assumed growth in land use (housing and jobs).

5.9 Qualitative assessment of benefits

5.9.1 The appraisal of the identified options for dualling the A47 indicates a range of BCRs which suggest that the options identified could be shortlisted to include only those options which offer medium or high value for money based on the Department for Transport value for money categories:

- Very High: BCR greater than or equal to 4
- High: BCR between 2 and 4
- Medium: BCR between 1.5 and 2
- Low: BCR between 1 and 1.5
- Poor: BCR between 0 and 1
- Very Poor: BCR less than or equal to 0

5.9.2 Note that the BCRs shown in Table 5.2 are ONLY shown for comparative purposes (between Routes), and do not take account of Wider Economic Benefits, the impact of increasing congestion, potential impact of a Wisbech Garden Town nor phasing of the routes: a BCR might be improved by delaying a scheme until the congestion would otherwise occur in the Base Scenario. The key issue to conclude is that initial BCR shown indicate a more detailed assessment is justified (as part of an Option Appraisal Report).

5.10 Social and Distributional Impacts

5.10.1 The social and distributional impacts of the A47 scheme are likely to have a positive impact on the populations within the Cambridge and Peterborough Combined Authority area. A summary of the socio-economic profile for the Combined Authority area is provided in Appendix D.

5.11 Appraisal Summary Table

5.11.1 A summary appraisal of the benefits and dis-benefits of each of the options is presented within the assessment provided in Appendix C. A more detailed Appraisal Summary Table for each option has not been completed at this stage.

5.12 Value for Money Statement

5.12.1 A range of BCR values has been presented for the various options identified for dualling of the A47. It is evident from the initial BCR values presented that, whilst some options do not currently offer very good value for money, there are options which would represent medium or high value for money.

5.12.2 Given the simplicity of the approach taken to assessing the value for money ratings of these options, it should be noted that a low level of certainty should be applied to the BCR values presented. It is considered that for the stage of the appraisal that the BCR presented provide a useful barometer for the comparison of options and should only be deemed as a rough indicator of the potential scheme BCR. Following the identification of a shortlisted set of options these shall be subject to a more detailed highways modelling, forecasting and economic appraisal exercise.

6 Financial Case

6.1 Introduction

6.1.1 The Financial Case for A47 Dualling Study gives a breakdown of the expected project cost components for the transport investment. It considers if these capital costs are affordable from public accounts at the times when the costs will arise. It also identifies where contributions of anticipated funding will be obtained; and assesses the breakdown of funds between available sources and by year; and considers how secure these funds are likely to be. Finally, it reviews the risks associated with the scheme investment and examines possible mitigation.

6.2 Budgets and Funding Cover

Project Costs

6.2.1 The breakdown of the wider project cost estimates for the A47 Dualling Study options are summarised in Table 6-1 below.

Table 6-1 – Breakdown of Costs (2018 prices)

Section	Route	Total (£'000s)
Section 1 (A16 to Thorney Bypass)	1.1	46,100
	1.2	41,526
	1.4	33,310
Section 2 (Thorney Bypass to Guyhirn)	2.2	81,463
	2.3	86,023
	2.4	110,341
Section 2 to 4 (Thorney Bypass to Walton Highway)	2.5	105,551
	2.6	155,242
Section 3 (Guyhirn to Wisbech)	3.2	63,230
	3.3	60,971
	3.4	57,468
Section 4 (Wisbech Bypass)	4.1	37,499

6.2.2 The costs presented in Table 6-1 are based on standard unit prices per square metre of carriageway construction in the UK. The land costs are based on values per acre of £10,000 for farmland where the route is offline and £100,000 per acre where widening is to be achieved online or involves property demolition (as an average length over the route option).

6.2.3 Preparation and supervision costs have been based on standard values applied to Highways England schemes through the Project Appraisal Report process for a scheme at concept stage of 9% and 5% respectively.

6.3 Risks / Leverage

- 6.3.1 The A47 Dualling Study is likely to be dependent on CPCA funding supplemented by funding from other local sources such as capital grant budgets and developer contributions.
- 6.3.2 Potential cost escalations would reduce the overall benefits of the scheme. The economic appraisal of the A47 Dualling scheme has therefore included a 44% Optimism Bias not shown in Table 6-1.

7 The Commercial Case

7.1 Introduction

7.1.1 This chapter sets out the Commercial Case for the scheme including the potential procurement strategy, contract arrangements, risk management strategy and financial arrangements.

7.2 Output Based Specification

7.2.1 Dualling of the A47 will support a range of local and national objectives, including the potential for growth of Wisbech Garden Town. The key drivers for the scheme are to:

- Promote wider economic investment
- Improve connectivity
- Encourage homes and jobs
- Tackle congestion and reliability

7.3 Commercial Viability

7.3.1 The options for procurement and commercial viability of the scheme have not yet been fully considered. Experience will be drawn from previous contracts along with independent advice from industry experts to decide on an appropriate procurement route, which will provide a robust and well tested mechanism for the delivery of the scheme. A high level of interest from the industry is considered likely due to the scale of the proposals and it is considered that this will drive the commercial case for the scheme.

7.4 Procurement Strategy

7.4.1 An initial set of procurement options which have been considered include:

- a **traditional arrangement**, where one contract secures a detailed design and specification for the construction, which is then tendered as a separate contract
- a **single stage Design and Build contract**, where the design and construction are tendered as one package, with the successful contractor providing the detailed design, and
- an **ECI Two Stage Design and Build contract**, where the design and build are again tendered as one package as in a single stage contract. However, this differs from a single stage Design and Build contract as there is potential to review the contractor's performance and construction target cost and stop the process at the end of the design phase if necessary.

7.4.2 Each of these arrangements has advantages and disadvantages, as outlined below.

Traditional separate contracts for design and construction

- 7.4.3 The traditional arrangement allows close control of the design process by the client. However, as the construction contract is awarded on the basis of the completed design, there is limited opportunity for the successful contractor to influence into the design to reduce risks and cost. Although contractor input can be brought in during the design stage, it may not be relevant as the same contractor may not undertake construction.
- 7.4.4 This form of contract can also limit the contractor's ability to use innovative construction methods which could result in savings and increased performance of the finished scheme. Separate contracts between the client and the parties providing the design and construction results in risks from any issues arising from the design resting, at least initially, with the client. This arrangement is more suitable for schemes that are well developed and hold lower or easily identified risks.

Single Stage Design and Construct

- 7.4.5 A single stage Design and Build contract places the design and construction in one package. The contract is awarded on the basis of a target cost for the design and construction of the works, based on an outline or reference design. This arrangement does offer an incentive for the contractor to ensure that the design is buildable and can facilitate a quicker start on construction as work can commence before the design is complete, so long as it is sufficiently advanced. However, as the contractor must estimate the cost at tender stage based on preliminary design information, there is a risk that the actual cost for construction is significantly different with the potential for contractual claims and disputes.

ECI Two stage Design and Construct

- 7.4.6 An Early Contractor Involvement (ECI) Two-Stage Design and Build Contract would typically use the New Engineering Contract 3rd Edition (NEC3). The design phase of the scheme would be undertaken using the NEC3 Professional Services Contract. The construction phase would be undertaken using the NEC3 Engineering and Construction Contract, Option D Target Price with Bill of Quantities. The NEC contract is the most widely used form of contract in construction and encourages good management and cooperation between the parties to the contract.
- 7.4.7 ECI Two stage Design and Construct is a collaborative form of contract, which brings the contractor into the project team early, with the team working together through the design and construction phases. This provides benefits of ensuring that the contractor can use his experience in the design phase to reduce overall project risk and ensure buildability. There are some significant differences compared with the single stage approach however, that provide a greater level of cost control and certainty.

- 7.4.8 Although the contract is awarded for design and construction, the process is divided into two parts, the first phase covering the detailed design and consents process, with construction as a second phase. There is a presumption that the scheme would be delivered as a single package, but there is no guarantee that the contractor would move directly from detailed design to construction. This is conditional on satisfactory performance and agreement of a construction target price. The contract would give ownership of the design to the scheme sponsor, so that in the rare event that a target price cannot be agreed, it may be used to re-tender the construction.
- 7.4.9 The ECI two stage approach also mitigates against cost and programme overruns as there is much greater certainty over the design and understanding of the risks at the point the construction target price is agreed (when the detailed design is sufficiently advanced). Developing this understanding can result in a longer contract period, but one that is likely to be more realistic as to cost and risk. A situation where construction commences before a design is sufficiently advanced would also be avoided.

Summary

- 7.4.10 In deciding on the form of contract, a number of arrangements for the delivery of the scheme will be considered. Specific factors pertaining to the scheme, including process and construction risks, the stage of development of the project, and the appetite to accept or transfer risk to a contractor should be considered. The importance of understanding the risks in delivery and ensuring that the contractual arrangement places risks with the party best placed to deal with them was a key consideration.
- 7.4.11 The form of contract will be based on lessons learned from previous projects, and subsequent construction projects.

8 The Management Case

8.1 Evidence of Similar Projects

- 8.1.1 Addenbrooke’s Access Road in Cambridge, a project of similar scope including a road and rail bridge was delivered using early contractor involvement in the design phase to eliminate and reduce risk in delivery by ensuring that construction methodology, programming and logistics were achievable.
- 8.1.2 Huntingdon West of Town centre link road was delivered using contractor designed elements. It involved difficult ground conditions and unforeseen amounts of contaminated land which was successfully managed without delay to the programme. Like Ely, a primary driver was facilitating the growth and economic development and areas made accessible are now being developed for both residential and commercial use.
- 8.1.3 The delivery of the Cambridgeshire Guided Busway was reviewed by an independent consultant and a report included a number of “lessons learned” which have been incorporated into subsequent project, especially in respect of the form of contract and contractual arrangements being used.

8.2 Project and Programme Dependencies

- 8.2.1 The dualling of the A47 will help the Combined Authority to support agricultural industry growth across East Anglia, regenerate Wisbech and deliver significant housing growth along the corridor.

Programme / Project Reporting

- 8.2.2 It is envisaged that dualling of the A47 could be conservatively phased over a 15-year programme, with, with each phase (section of route) taking some 5 to 7 years. Nevertheless it is recognised that the project could be accelerated depending on funding availability.
- 8.2.3 The following stages are the normal requirements within each phase.
 - 1. Outline Design
 - 2. Permissions (planning consent etc).
 - 3. Detailed Design
 - 4. Mobilisation
 - 5. Construction
- 8.2.4 It is envisaged that phasing would be dependent on prioritising sections of the A47 for dualling first (dependant on need and value for money), and the programme could be accelerated dependent on resourcing, funding availability and benefits to be gained.

Table 8-1 – A47 Dualling Programme

Year	Phase (section of the A47)				
	Phase 1	Phase 2	Phase 3	Phase 4	
1	Outline Design				
2	Permissions				
3		Outline Design			
4	Detailed Design	Permissions			
5			Outline Design		
6	Mobilisation	Detailed Design	Permissions		
7	Construction				Outline Design
8			Mobilisation	Detailed Design	Permissions
9		Construction			
10				Mobilisation	Detailed Design
11			Construction		
12					
13					Construction
14					
15	Full Scheme Opening				

8.2.5 The scheme is also under the Planning Act 2008 rather than the Highways Act 1980 therefore the scheme gets submitted for Development Consent Order (DCO) in Stage 4.

8.3 Governance, Organisational Structure and Roles

8.3.1 The following Governance is proposed:

- Senior Responsible Owner
- Programme Manager

8.3.2 Key decisions relating to the project are the responsibility of the Combined Authority, who would establish a **Project Board** to oversee the continued development and delivery of the scheme, and provide a forum for delivery issues to be considered and resolved and risk to be reviewed.

8.3.3 **The Project Board** should be supported by technical specialists and would invite other key stakeholders to attend as necessary.

8.3.4 **A Project Team** would be identified and be responsible for the delivery and day to day management of consultants and contractors.

8.3.5 The governance arrangement would be maintained throughout the duration of the scheme.

8.4 Programme / Project Plan

8.4.1 The current key programme milestones are outlined below:

Business Case

- Strategic Outline Business Case – May 2018

- Option Appraisal Report – August 2018
- Consultation - November 2018
- Outline Business Case - February 2019

Funding agreed in Principle

- Full Business case - June 2019

Funding Decision

Construction

- Tender preparation
- PQQ issued
- Tender period
- Award contract
- Detailed design
- Agree construction price
- Construction

8.5 Assurance and Approvals Plan

- 8.5.1 Assurance reviews will be undertaken by an Independent Technical Advisor to determine whether the scheme provides good value for money.

8.6 Communications and Stakeholder Management

- 8.6.1 In order to maintain confidence with the community and stakeholders the following plan will be carried out:
- Provide regular updates on delivery progress and key activities for the local community, businesses and key stakeholders.
 - Engage with the local community, businesses and key stakeholders about the delivery to ensure local needs are taken into account throughout the duration of the project, and in particular the early development of the project
 - Ensuring information is shared using appropriate methods of communication to all sectors of the community, businesses and key stakeholders

Target Audience

- Residents and businesses in and around the A47 study area
- Homeowners and tenants next to the road that will be affected by the construction
- Landowners
- Cycling groups
- Interest and action groups
- Pedestrians
- Parish/Town Councils in the area
- Neighbourhood and community organizations
- Schools in the area

- Cambridgeshire County, Peterborough CC, Norfolk CC, Fenland CC and Kings Lynn and West Norfolk Councillors
- Relevant Council Officers
- Network Rail
- Road users
- Historic England
- MPs

8.7 Risk Management Strategy

- 8.7.1 In accordance with Government advice a project risk register was developed when the project was initiated. The aim of the register is to develop a clear view of risks associated with the scheme and to evaluate the factors that could have a detrimental effect.
- 8.7.2 The risk register was based on the following documents:
- Department for Transport: Transport Analysis Guidance (TAG) Unit 3.9.3
 - Treasury Taskforce Private Finance Technical Note No 5: How to construct a Public Sector Comparator.
- 8.7.3 A Risk Register and Quantified Risk Assessment will be undertaken. It is envisaged that the risks will reduce further during the life of the project and as more information becomes available and risks are understood. This will give more certainty as far as costs are concerned.
- 8.7.4 The key areas that were identified in relation to the project are:
- Permissions and Policy
 - Economic and Procurement
 - Design
 - Construction
 - Performance
 - Environmental and Integration.

Permission and Policy Risk

- 8.7.5 The Combined Authority and its partners will work closely with the Planning Authority, Environment Agency and other statutory bodies to ensure the scheme meets their aspirations for the area. Consultation with stakeholders and feedback from the public will be reflected in the design to ensure that the scheme reflects the needs of the local community.
- 8.7.6 A planning application has yet to be submitted for the scheme.
- 8.7.7 The possibility of protestor action is considered to be low risk.

Economic / Procurement

- 8.7.8 It is considered that Early Contractor Involvement (ECI) would reduce the risk of cost overrun by selection of appropriate design and construction methods. The risk in appointing a suitable contractor to deliver the scheme is low, based on the current position in the procurement timetable.

Design:

- 8.7.9 The scheme would adopt a PRINCE 2 Process Model method to ensure sound project management procedures are applied. The use of this process will reduce the risk of programme over-run during the design stage.
- 8.7.10 The scheme carries a full CDM requirement and appropriate Registers will be maintained to document the design and approval process.

Construction

- 8.7.11 There is a risk of damage to plant and injury to personnel. Contact would be established with the necessary Statutory Authorities and maintained through the design and construction stages. Full design details would be supplied to affected organisations in order that appropriate and necessary measures are taken to divert or protect plant and highway users and the contractor would be required to undertake the necessary liaison and processes.
- 8.7.12 Unforeseen ground conditions represent a considerable risk to major construction schemes in rural locations. Ground Investigations would be undertaken and results provided to tenderers. The successful contractor would be required to undertake further comprehensive ground investigations and analysis of data to verify any information provided and to secure additional information required for the final design.

Performance

- 8.7.13 There is a risk that operating and maintenance costs will be higher than expected. Existing costs have been considered for highways with similar attributes.
- 8.7.14 The design considers appropriate safety measures to mitigate potential concerns highlighted through safety advice and staged safety audits.

Environmental and Integration

- 8.7.15 Preliminary environmental, ecological and archaeological studies have been undertaken. Further investigations and findings will form a key part of the design process.
- 8.7.16 Borehole studies will be undertaken to monitor groundwater trends. The risk of pollution to groundwater is considered low and full co-operation with the Environment Agency will be maintained.

8.8 Monitoring and Evaluation

- 8.8.1 A Monitoring and Evaluation Plan will be produced to ensure the scheme is fully evaluated against scheme objectives. The scheme “Before” and “After (1 year and 5-year post opening)” surveys will be undertaken to monitor changes in:
- Traffic Flow
 - Accidents
 - Journey Time
- 8.8.2 Implementation of the scheme would also be monitored against time and budget

8.9 Project Management

8.9.1 Overall project management for the dualling of the A47 has not been considered at this stage.

8.10 Contingency Plan

8.10.1 A contingency plan for the dualling of the A47 has not been considered at this stage.

9 Design Development

9.1 Preferred route options design

Following the initial route options considered at the start of the stage, design development has narrowed down 3 preferred routes that align with the objectives and desired outcomes of the scheme.

The length of options A-C are common between the A16/A47 roundabout and the B1167/A47 roundabout. Routes B and C are also common between B198/A47 roundabout and A47/Lynn road roundabout. All 3 options include a new structure crossing the River Nene

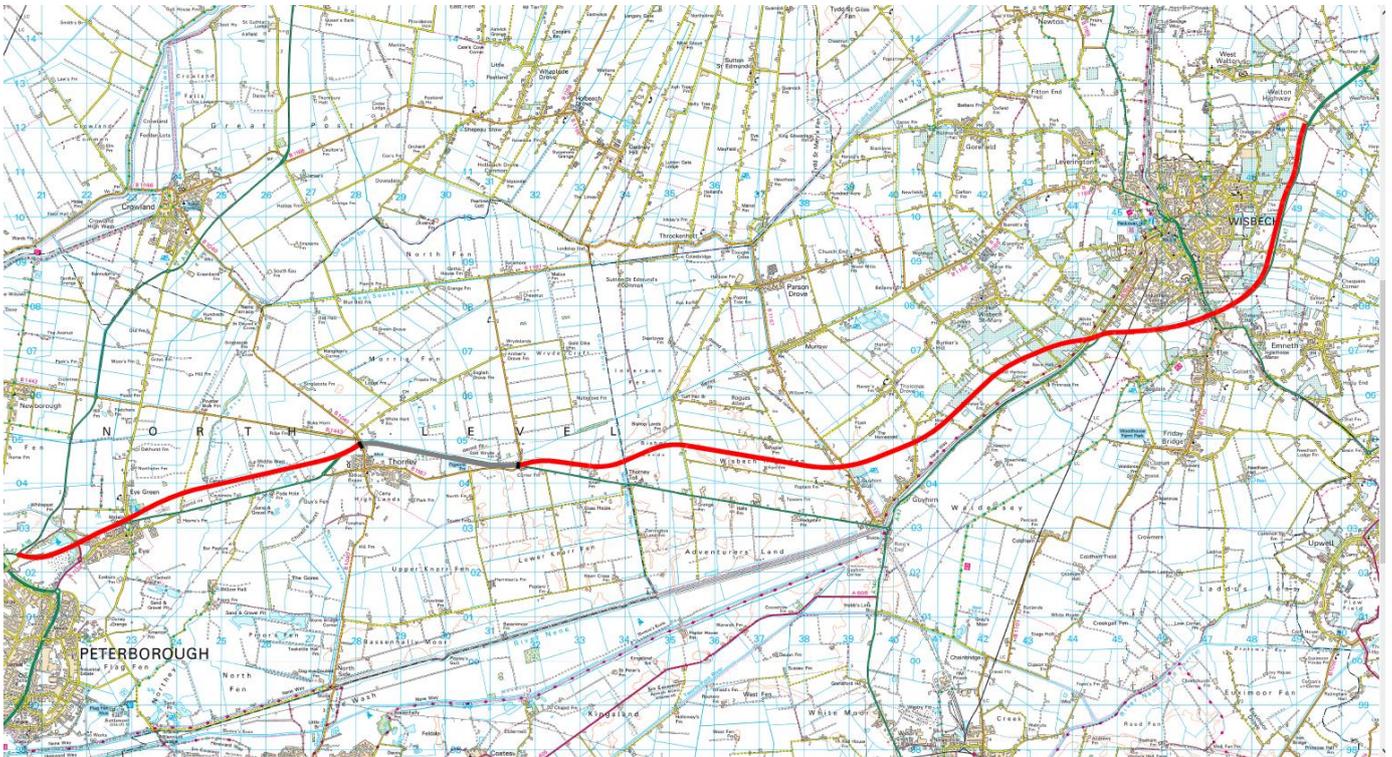
Route A:

The length of Route A would total over 33km with approximately 27km to be constructed offline.



Route B:

The length of Route B would total over 33km with approximately 20km to be constructed offline.



Route C:

The length of Route C would total over 34km with approximately 20.5km to be constructed offline.



9.2 Preferred Route Options Cost Estimate

Route options A-C have all been internally costed comprising; preparation, supervision, works, land, project risk and inflation. With the assumption that Inflation will go up 2% each year to 2025 and risk is 10% of total cost after inflation is added. The designs have developed through this stage as such, the costing figures below relate to each route option at the finalisation of PCF Stage 0.

Route A:

Preparation	£43,691,311.44
Supervision	£6,241,615.92
Works	£549,262,201
Lands	£24,966,463.68
Project Risk	£47,772,000
TOTAL	£671,933,592

Route B:

Preparation	£39,239,604.97
Supervision	£5,605,657.85
Works	£493,297,891
Lands	£22,422,631.41
Project Risk	£56,056,578.52
TOTAL	£616,622,364

Route C:

Preparation	£38,500,061.57
Supervision	£5,500,008.80
Works	£484,000,774
Lands	£22,000,035.18
Project Risk	£55,000,087.95
TOTAL	£605,000,968

Appendices

Appendix A: Low Cost Options Technical Note

9.3 Introduction

9.3.1 A Strategic Outline Business Case (SOBC) and subsequent Option Appraisal Report (OAR) were issued in August 2018 in support of the business case for the dualling of the remaining single carriageway sections of the A47 between the A16 to the east of Peterborough and Walton Highway to the east of Wisbech. Single carriageway sections are detail in red in Figure A.9 below. From this, three broad route options (A-C) have been proposed for offline dualling of the A47 between Peterborough and Walton Highway. These proposals are now to be progressed through each stage of the Highways England (HE) Project Control Framework (PCF).

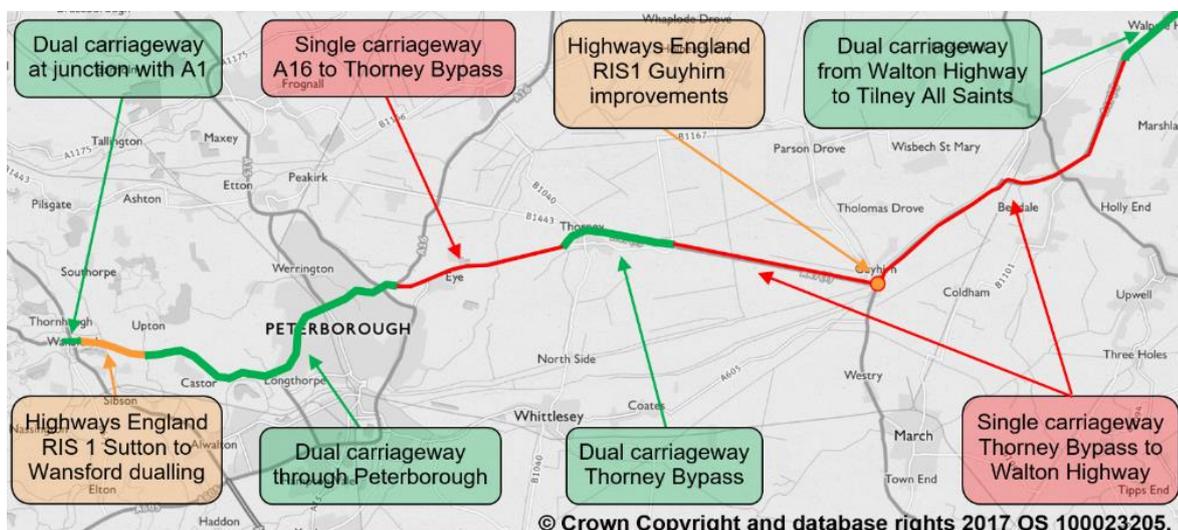
9.3.2 This Technical Note (TN) has been produced to support scheme development through PCF Stage 0 of technical modelling and appraisal of the A47 dualling scheme. This TN aims to identify and address whether potential low-cost alternative options to dualling the A47 would provide viable options to meet the strategic objectives of the scheme as well as deliver aspirational levels of housing and economic growth across the study area.

9.3.3 The following low-cost options have been identified by HE for consideration:

1. Junction Improvements along the existing A47 route
2. Wide Single 2 + 1
3. Online dualling where possible without property acquisition
4. Online dualling with property acquisition
5. Online dualling with discrete offline sections to avoid property acquisition
6. An offline S2 route

9.3.4 A short discussion around each of these options is provided in subsequent sections, as well as model output summary statistics for each option relative to the forecast Do-Minimum. Modelling results have been presented for comparative purposes to assess how each low-cost option performs relative to the proposed dualling options.

Figure A.9: Extent of Proposed A47 Dualling



9.4 Low Cost Option 1 - Junction Only Improvements

9.4.1 Junction only improvements have the potential to provide a low-cost option for delivering capacity and traffic flow improvements along the A47 corridor between Peterborough and Walton Highway. Key junctions running west to east between Peterborough and Walton Highway are details as follows:

1. A47/ A16 Junction
2. A47/ A1139 Junction
3. A47/ Crowland Road Junction (Eye Green)
4. A47/ The Causeway Junction (Thorney Bypass)
5. A47/ B1040 Crowland Road Junction (Thorney Bypass)
6. A47/ B1167 Wisbech Road Junction (Thorney Bypass)
7. Guyhirn Roundabout Junction
8. A47 B198 Cromwell Road Junction (Wisbech Bypass)
9. A47/ A1101 Elm High Road Junction (Wisbech Bypass)
10. A47/ Broadend Road Junction (Wisbech Bypass)
11. A47/ Lynn Road Junction (Walton Highway)

9.4.2 As part of previous work undertaken during completion of the SOBC and OAR, core scenario traffic forecasting was undertaken for 2026 and 2041 for Do-Nothing (DN) and Do-Minimum (DM) scenarios. The DM scenario included transport infrastructure supply improvements to the following junctions proposed as part of both Highways England (HE) improvements schemes and the Wisbech Access Study (WAS):

- Guyhirn Roundabout (HE Scheme);
- A47/ B198 Cromwell Road junction (WAS Scheme);
- A47/ A1101 Elm High Road junction - existing junction widening (WAS Scheme); and
- A47/ Broadend Road junction (WAS Scheme).

9.4.3 The WAS represents a number of junction interventions around Wisbech to improve capacity at and reduce congestion both along the A47 and in Wisbech town centre, designed to support housing aspirations and specific development site allocations identified in the Fenland Local Plan. The short term package of measures is due to be completed by 2021, with £10.5m funding to pursue scheme detailed design and scheme construction approved following a combined authority board meeting in November 2018³.

9.4.4 The proposed intervention at Guyhirn Roundabout forms a £16 million HE scheme, put forward as one of number of interventions along the A47 across Cambridgeshire and Norfolk. These are funded through the Road Investment Strategy (RIS) 2 funding package, with a proposed completion date of 2022.

³ <http://cambridgeshirepeterborough-ca.gov.uk/meetings/cambridgeshire-and-peterborough-combined-authority-board-5/>

9.4.5 The results presented in Table A.2 overleaf compare DN (as existing transport infrastructure) and DM scenarios with core scenario forecasts applied to opening (2026) and horizon (2041) modelled years.

Table A.2: DN/ DM Junction Average V/C

Junction Description	2017 - As Existing			2026			2041		
	V/C (%) - Do Nothing								
	AM	IP	PM	AM	IP	PM	AM	IP	PM
A47/ A16	62	35	49	68	41	55	78	50	67
A47/ A1139	62	49	68	69	59	77	76	73	91
A47/ Crowland Road	70	50	74	78	60	82	87	73	95
A47/ The Causeway	49	35	47	53	42	50	57	48	54
A47/ B1040	47	29	43	52	35	47	58	41	53
A47/ B1167	32	23	31	35	28	34	38	33	38
Guyhirn Roundabout	84	59	76	94	70	84	109	84	94
A47/ Cromwell Road	65	49	65	74	59	74	94	73	86
A47/ Elm High Road	68	58	67	76	67	75	82	81	90
A47/ Broadend Road	56	41	55	61	46	60	70	53	61
A47/ Lynn Road	43	32	43	52	37	50	69	49	66
	V/C (%) - Do Minimum								
A47/ A16	62	35	49	68	41	55	78	50	68
A47/ A1139	62	49	68	69	59	77	76	73	92
A47/ Crowland Road	70	50	74	79	60	82	90	73	97
A47/ The Causeway	49	35	47	55	42	50	63	48	56
A47/ B1040	47	29	43	53	35	48	63	41	55
A47/ B1167	32	23	31	36	28	34	42	33	39
Guyhirn Roundabout	84	59	76	75	60	71	88	70	81
A47/ Cromwell Road	65	49	65	30	23	28	36	29	34
A47/ Elm High Road	68	58	67	53	47	55	67	61	69
A47/ Broadend Road	56	41	55	37	27	36	44	34	42
A47/ Lynn Road	43	32	43	49	35	47	64	45	61

9.4.6 Table A.2 indicates that the proposed WAS schemes at A47 junctions with Crowell Road, Elm High Road and Broadened Road improve V/C values at each location, taking them within capacity in future forecast years. Improved V/C values are also observed at Guyhirn roundabout between DN and DM scenarios. Identified options at each location are considered to be the best performing/ most cost-effective option for improving these junctions without wider improvements to A47 link sections.

9.4.7 The following junctions within the study area are shown to be operating within capacity in both DN and DM scenarios:

- A47/ The Causeway junction (Thorney Bypass);
- A47/ B1040 junction (Thorney Bypass);
- A47/ B1167 junction (Thorney Bypass); and
- A47/ Lynn Road junction (Walton Highway).

- 9.4.8 The Causeway, B1040 and B1167 junctions with the A47 are located along Thorney Bypass. Each has two-lane approaches on A47 approach arms, with increased junction capacity added during construction of the bypass itself. Table A.2 indicates that these junctions operate well within capacity in both DN and DM scenarios, with minimal delay to traffic on A47 approaches. Similarly, the A47/ Lynn road junction to the east of Wisbech presents no capacity issues without a proposed intervention, operating within capacity in both DN and DM scenarios. It is, therefore, considered that any proposed junction only intervention at these locations would have a minimal effect of traffic flow efficiency and user delay, and likely to provide low or poor Value for Money (VfM) during economic appraisal.
- 9.4.9 The remaining three junctions within the study area corridor, located between Peterborough and Thorney Bypass, are detailed as follows:
- A47/ A16 junction;
 - A47/ A1139 junction; and
 - A47/ Crowland Road junction (Eye Green).
- 9.4.10 These represent the only A47 junctions within the study area where an intervention is not already proposed in the DM scenario or would generate significant user benefits. In order to test the likely impact of providing junction only improvements at these three junctions, capacity increases at each junction were applied in line with increases applied during modelling of dualling route options A-C. Modelling Results are presented in Table A.4 and discussed in subsequent sections.
- 9.4.11 Isolated junction only improvements are unlikely to meet the wider aims of the overall A47 dualling scheme, and would not provide sufficient network capacity to encourage aspirational levels of housing growth proposed for the study area corridor. While providing localised capacity increases and reduced delay, isolated junction improvements would not provide significant benefits to strategic traffic utilising the A47 for longer distance journeys or improve overall journey time reliability.

9.5 Low Cost Option 2A and 2B - Wide Single 2+1

- 9.5.1 A low-cost option to provide Wide Single (WS) 2+1 carriageway along the existing alignment has been considered to provide additional link capacity along the existing A47 alignment in line with guidance provided in TD70/08. WS2+1 carriageway provides short stretches of overtaking lanes to reduce link delay and improve journey time reliability.
- 9.5.2 Low cost option 2A relates to provision of WS2+1 carriageway along the current A47 alignment without the requirement for property acquisition. Low cost option 2B relates to provision of WS2+1 carriageway along the current A47 alignment with property acquisition.
- 9.5.3 WS2 widening would be considered unacceptable for Cambridgeshire County Council (CCC) if it were the Highway Authority for the A47, as evidenced at a public inquiry for a proposed housing development off the A10 when a similar WS2 scheme was proposed for that road. CCC, as Highway Authority for the A10, objected on the grounds of road safety. This view was subsequently endorsed by the planning inspector. It is also noted that the A47 between the A16 and Eye was built and marked as WS2, but has been hatched out to a standard S2 because of consequential road safety issues.

- 9.5.4 WS2 would marginally increase the capacity of the A47 as evidenced by TA 46/97, which indicates a maximum design capacity of 21,000 vehicles Annual Average Daily Traffic (AADT) for that type of road, however this is already equal to the current observed flow along some single carriageway sections of the A47. As a result, the overall level of benefit realised from this propose option is expected to be low. Enhancement of the existing carriageway alignment to WS2 would also involve disruption to traffic flows during construction phases, incurring both additional costs and increased user delay during construction (see low cost options 3 and 4 below in relation to online dualling).
- 9.5.5 In addition, TD70/08 states that *“To promote journey time reliability on long distance single carriageway roads, provision of a WS2+1 road can be a more effective solution than other single carriageway road options at flows of up to 25,000 Annual Average Daily Traffic (AADT)”*. Current core scenario estimates predict AADT flows to increase beyond 25,000 by 2031, indicating WS2+1 would not provide a sufficient long-term solution to relieve link congestion. As a result, this option is unlikely to fulfil the main objectives of the A47 dualling scheme to relieve congestion, improve journey time reliability and provide sufficient network infrastructure to support housing and economic growth aspirations.

9.6 Low Cost Option 3 and 4 - Online Dualling

- 9.6.1 Low cost options 3 and 4 relate to dualling the A47 along its existing alignment between Peterborough and Walton Highway. Low cost option 3 relates to dualling along the current A47 alignment without the need for property acquisition. Low cost option 4 relates to dualling along the current A47 alignment with property acquisition. Low cost option 3 is identical to low cost option 4 aside from the section of carriageway between the A47/B1167 junction (Thorney bypass) to the west and Guyhirn Roundabout to the west. This section remains S2 carriageway in low cost option 3.
- 9.6.2 Both online dualling options would not be considered low cost due to:
- The additional cost of acquiring and demolishing the necessary properties and businesses along the route; and
 - The additional costs of construction caused by necessary traffic management measures having an adverse impact on the efficiency of construction. It would be expected that costs will increase from current initial estimates.
- 9.6.3 In addition, an online dualling option would likely see increased user delay during construction phases and provide a dis-benefit to users during this period. Construction of an online dualling option is likely to affect a large number of vehicles, with a lack of alternative routes available to users between Peterborough and Wisbech. Offline options are likely to cause less disruption (dis-benefits) to existing users during the construction phase.
- 9.6.4 Both the requirement for traffic management and increased user delay during construction have not been considered in initial option cost estimates and appraisals. Online dualling will, therefore, reduce the level of benefit from A47 dualling once user delay during construction are considered within the overall Present Value of Benefits calculation.

9.7 Low Cost Option 5 - Online Dualling with Discrete Offline Sections

9.7.1 An option for online dualling with discrete offline dualled sections to avoid the need for property acquisition and demolition is considered to be broadly in line with the proposed Route Option C for Dualling of the A47 between Peterborough and Walton Highway. Route Option C predominantly follows the existing A47 alignment around Peterborough and Wisbech, with offline sections around Thorney Toll and Guyhirn to avoid the need for property acquisition. As a result, modelling results for dualling route option C have been presented for low cost option 5 and is not considered as an independent low-cost option.

9.8 Low Cost Option 6 - A new Off-line S2

9.8.1 A new offline S2 alignment for the A47 would not be considered a low-cost option due to engineering feasibility constraints along the corridor between Peterborough and Walton Highway. The low-lying topography, the location of proposed off-line route alignments across a floodplain and the requirement to futureproof any scheme against the impacts of climate change require any new highway to be constructed on raised embankment, with extensive foundations and groundworks required during construction.

9.8.2 It is expected that construction of new offline carriageway would incur significant cost from construction of raised embankments irrespective of the standard of carriageway ultimately constructed. The level of benefit realised from construction of a new S2 carriageway alignment would be notably less than that for a D2 carriageway, for a relatively similar construction cost. As a result, it would be expected that estimated BCR values for a new D2 carriageway would be far greater than those resulting from a proposed S2 carriageway.

9.9 Early Assessment Sifting Tool

9.9.1 The Early Assessment Sifting Tool (EAST) is a decision support tool that has been developed by the DfT to quickly summarise and present evidence on options in a clear and consistent format. This has been completed for each of the identified low cost options, as well as an offline dualling option, and can be found in Appendix A. A summary table of key metrics from the EAST assessment can be found in Table A.13 below. This indicates that a new offline dual carriageway route provides the best fit with transport and government objectives, and is most likely to deliver changes of sufficient scale to provide the required level of benefit and achieve the schemes main objectives.

Table A.13: East Assessment Summary

Assessment Option	Scale of Impact (1-5)	Fit with Transport and Gov. Objectives (1-5)	Economic Growth	Carbon Emissions	Socio-distributional Impacts	Local Environment	Well Being	Expected VfM Category
Junction Only Improvements	1	3	Red/amber	Amber	Amber	Amber	No Impact	Medium 1.5-2
Online WS2+1 Improvements	2	2	Red/amber	Amber	Amber	Amber	Red/amber	Poor <1
Online Dualling WO Demolition	2	2	Red/amber	Amber	Amber	Amber	No Impact	Low 1-1.5
Online Dualling with Demolition	4	3	Amber/green	Amber	Amber	Red/amber	Amber	Low 1-1.5
New Offline S2 Route	3	2	Red/amber	Amber	Amber	Amber	No Impact	Low 1-1.5
New Offline D2 Route (Routes A-C)	5	4	Green	Amber	Amber/green	Amber	No Impact	High 2-4

9.10 Summary and Modelling Results

9.10.1 The results in Table A.4 overleaf present network summary statistics for all low-cost options as well as each of the three offline dualling route options. Total model travel time expressed in PCU hours is compared to the forecast DM scenario. Results are present for both the scheme opening (2026) and horizon (2041) years across AM, Inter-Peak (IP) and PM time periods.

9.10.2 The results presented indicate that all of the identified low-cost options offer relatively minor user benefits and journey time savings relative to the DM as the three proposed offline dualling options. Offline dualling route options A to C all provide a relative model total travel time saving of between 13% and 16% in AM and PM time periods relative to the DM by 2041.

9.11 Low cost option 1

9.11.1 Junction only improvements are shown to provide some travel time savings in the PM time period, with a 9% reduction in total model travel time by 2041 relative to the DM. However, a low travel time reduction during the AM (1.9%) and no travel time savings during the IP indicate this option does not deliver the required increase in network capacity and travel time saving to achieve each of the main objectives of the scheme. These travel time reductions are relatively small compared to those provided by offline dualling options A to C.

9.11.2 The scope of junction improvements has also been limited to junctions close to Peterborough, with improvements already proposed to Guyhirn roundabout and junctions around Wisbech in the DM scenario. As a result, this option will not assist in delivering aspirational housing growth and development ambitions around Wisbech and in the Fenland area.

9.12 Low cost options 2A and 2B

- 9.12.1 Provision of WS2+1 both with and without property acquisition is shown to provide a low travel time saving compared to each of the three offline dualling options relative to the DM scenario. Low cost option 2A provides a modelled travel time savings of 2.2% (AM) and 1.8% (PM) in 2041 relative to the DM. Low cost option 2B provides a slightly increased travel time saving of 3.2% (AM) and 2.8% (PM) in 2041 relative to the DM. Both options provide significantly reduced journey time savings as compared to offline dualling route options A to C.
- 9.12.2 As mentioned previously, core scenario traffic flows are forecast to rise above the maximum flow ranges and design capacity of WS2+1 carriageway in provide journey time savings and reliability benefits. As a result, WS2+1 carriageway is not considered to provide sufficient capacity improvements to meet the main scheme objectives and deliver wider housing and economic growth ambitions.

9.13 Low cost options 3 and 4

- 9.13.1 Online dualling both with and without property acquisition is shown to deliver significantly less travel time savings compared to each of the three offline dualling options relative to the DM scenario. Low cost option 3 (without property acquisition) provides a modelled travel time savings of 3.5% (AM) and 3.0% (PM) in 2041 relative to the DM. Low cost option 4 (with property acquisition) provides a slightly increased travel time saving of 5.7% (AM) and 5.8% (PM) in 2041 relative to the DM.
- 9.13.2 Similar to WS2+1 options, online dualling is shown to provide significantly reduced journey time savings as compared to offline dualling route options A to C. It is also noted that these options would not necessarily be considered low cost, with a requirement for traffic management during construction phases increasing scheme costs and providing disbenefit to existing road users.

9.14 Low Cost Option 5

- 9.14.1 Low cost option 5 for online dualling with discrete offline dualling sections is considered to be broadly in line with proposals offline dualling route option C. As a result, modelling result presented are identical to for route option C.

9.15 Low cost option 6

- 9.15.1 Provision of a new offline S2 carriageway alignment of the A47 is shown to provide significantly lower travel time savings across each of the future forecast time periods as compared to offline dualling options. Low cost option 6 provides a modelled travel time savings of 9.1% (AM) and 3.7% (PM) in 2041 relative to the DM. These travel time savings are significantly less than those provided by offline dualling route option A, which follows an identical alignment, and gives reductions of 15.3% (AM) and 13.3% (PM) by 2041 relative to the DM.
- 9.15.2 Significant construction costs are likely to be incurred with development of a new offline carriageway regardless of the standard of carriageway constructed, and likely to give a reduced BCR value as compared to and offline D2 scheme.

Table A.4: Low Cost Option Modelling Summary Statistics

Scenario	Year	Time Period	Total Travel Time (PCU hrs)				
			Current Time Period	Next Time Period	Total	Change from DM	% Change from DM
DM	2026	AM	2825	254	3079	-	
		IP	1862	118	1980	-	
		PM	2461	159	2620	-	
	2041	AM	4132	799	4931	-	
		IP	2374	203	2577	-	
		PM	3454	712	4166	-	
Low Cost Option 1 – Junction Only Improvements	2026	AM	2797	251	3048	-31	-1.0%
		IP	1862	118	1980	0	0.0%
		PM	2399	93	2492	-128	-4.9%
	2041	AM	4060	777	4837	-94	-1.9%
		IP	2372	204	2576	-1	0.0%
		PM	3364	425	3789	-377	-9.0%
Low Cost Option 2A – WS2+1 WO Demolition	2026	AM	2791	257	3048	-31	-1.0%
		IP	1833	118	1951	-29	-1.5%
		PM	2419	156	2575	-45	-1.7%
	2041	AM	3994	829	4823	-108	-2.2%
		IP	2331	203	2534	-43	-1.7%
		PM	3390	701	4091	-75	-1.8%
Low Cost Option 2B – WS2+1 with Demolition	2026	AM	2771	257	3028	-51	-1.7%
		IP	1820	117	1937	-43	-2.2%
		PM	2400	155	2555	-65	-2.5%
	2041	AM	3952	821	4773	-158	-3.2%
		IP	2314	203	2517	-60	-2.3%
		PM	3351	699	4050	-116	-2.8%
Low Cost Option 3 – Online Dualling WO Demolition	2026	AM	2698	255	2953	-126	-4.1%
		IP	1771	116	1887	-93	-4.7%
		PM	2355	154	2509	-111	-4.2%
	2041	AM	3894	866	4760	-171	-3.5%
		IP	2248	200	2448	-129	-5.0%
		PM	3357	684	4041	-125	-3.0%
Low Cost Option 4 – Online Dualling with Demolition	2026	AM	2634	253	2887	-192	-6.2%
		IP	1725	115	1840	-140	-7.1%
		PM	2284	149	2433	-187	-7.1%
	2041	AM	3798	851	4649	-282	-5.7%
		IP	2190	199	2389	-188	-7.3%
		PM	3246	679	3925	-241	-5.8%
Low Cost Option 5 (as Route Option C)	2026	AM	2425	178	2603	-476	-15.5%
		IP	1615	113	1728	-252	-12.7%
		PM	2107	119	2226	-394	-15.0%
	2041	AM	3472	670	4142	-789	-16.0%
		IP	2064	200	2264	-313	-12.1%
		PM	2996	550	3546	-620	-14.9%
Low Cost Option 6 – Offline S2 Route	2026	AM	2613	184	2797	-282	-9.2%
		IP	1761	117	1878	-102	-5.2%
		PM	2337	185	2522	-98	-3.7%
	2041	AM	3809	672	4481	-450	-9.1%
		IP	2237	206	2443	-134	-5.2%
		PM	3243	768	4011	-155	-3.7%
Offline Dualling - Route Option A	2026	AM	2457	181	2638	-441	-14.3%
		IP	1665	115	1780	-200	-10.1%
		PM	2159	123	2282	-338	-12.9%
	2041	AM	3490	687	4177	-754	-15.3%
		IP	2118	203	2321	-256	-9.9%
		PM	3049	562	3611	-555	-13.3%
Offline Dualling - Route Option B	2026	AM	2442	179	2621	-458	-14.9%
		IP	1633	113	1746	-234	-11.8%
		PM	2127	119	2246	-374	-14.3%
	2041	AM	3486	684	4170	-761	-15.4%
		IP	2085	201	2286	-291	-11.3%
		PM	3017	551	3568	-598	-14.4%
Offline Dualling - Route Option C	2026	AM	2425	178	2603	-476	-15.5%
		IP	1615	113	1728	-252	-12.7%
		PM	2107	119	2226	-394	-15.0%
	2041	AM	3472	670	4142	-789	-16.0%
		IP	2064	200	2264	-313	-12.1%
		PM	2996	550	3546	-620	-14.9%

9.16 Conclusions

9.16.1 Each of the identified low-cost options is not considered significant enough in scale to achieve the main objectives of the dualling scheme or provide sufficient network capacity to deliver the levels of economic growth and development proposed for the study area corridor in future years. Monetised benefits in addition to travel time savings are also likely to be realised from a dualling scheme as compared to each of the identified low cost options during later stages of scheme appraisal, including a reduction in traffic collisions, journey time reliability benefits and increased economic development unlocked by additional network capacity.

Appendix B: Outline Options Development

A.1 Junction Strategy

An early assessment on junction capacity has shown that the junction strategy for the dualling of the A47 is for all junctions to be at-grade, with key junctions formed as roundabouts. There appears to be no justification for grade separated junctions, although passive designs could be made for future-grade separation if considered appropriate.

Most at-grade junction can be designed to accommodate a maximum one-way entry flow of up to 2,000 vehicles and hour, which is within the forecast flow of the A47 expected in the next 20 years.

A.2 Route Description and Key Constraints

The existing route of the A47 carriageway between the A47 / A16 junction in the west (near Peterborough) and the A47/ Lynn Road junction in the east (north east of Wisbech) has been broken down into four individual route sections for which engineering options will be considered for the proposed dualling of the A47.

- Section 1 (A16 to Thorney Bypass)
- Section 2 (Thorney Bypass to Guyhirn)
- Section 3 (Guyhirn to Wisbech)
- Section 4 (Wisbech Bypass)

A general description of each section as well as the key design constraints and considerations within each can be found below.

Section 1 (A16 to Thorney Bypass)

Section 1 runs between the A47/ A16 roundabout at Peterborough in the west and Thorney Bypass (existing dual carriageway) in the east. The existing A47 alignment takes an almost straight line between these two locations. There are two existing roundabouts positioned along this route providing access to the village of Eye and for the A1139. In addition, there are a small number of residential and agricultural premises fronting onto the existing highway between Eye Green and Thorney Bypass, as well as Pode Hole Quarry which has direct access onto the A47. Thorney Road to the east of Eye Village also forms a minor arm at a priority junction with the A47 leading directly into the centre of Eye Village.

Overhead electric cables supported by pylons cross the existing A47 at one location along this section. Most of this section lies outside of the flood zone with only a short length of the A47 at the eastern extent lying within the flood zone. Due to the proximity of the area to flood zone 3, it is anticipated that road levels will need to be maintained and possibly raised to account for future climate change projections.

All route options within this section involve upgrading the westernmost 2.5km of existing carriageway from single to dual carriageway along its current alignment. This section of carriageway is currently 10m wide single carriageway, and extends between the A47/A16 roundabout at Peterborough and the A47/ Crowland Road roundabout at Eye. There are no existing premises along this section, meaning that construction would require little demolition.

Two shared footway bridges cross Section 1, one located near the A47/ A1139 Junction near Eye, and a second located near Eye Green. Neither bridge is currently wide enough to accommodate a 2-lane dual carriageway along the existing alignment and will need to be accommodated or replaced in the development of route options.

Section 2 (Thorney Bypass to Guyhirn)

Section 2 runs between Thorney Bypass (existing dual carriageway) to the west and Guyhirn roundabout between the A47 and A141 to the east. The existing A47 carriageway takes a direct straight line between these two locations and has a number of residential, agricultural and industrial premises fronting onto the highway, particularly around Thorney Toll located approximately half way long Section 2.

Immediately to the west of Guyhirn roundabout, the A47 crosses the River Nene. A SSSI runs in a south westerly direction along the River Nene to the south of the existing A47 carriageway, forming a major constraint on route options at this location. All routes have been designed to avoid encroachment onto this SSSI. Highways England have developed a scheme to upgrade the existing Guyhirn roundabout to increase capacity⁴. All proposed route options in this section are considered to tie into this Highways England scheme.

The whole of Section 2 is located within flood zone 3, and based on advice given in Royal Haskoning's Flood Risk Report, the existing carriageway levels along this section should as a minimum be maintained. It is however anticipated that the road levels will need to be increased to satisfy climate change projections.

Section 3 (Guyhirn to Wisbech)

Section 3 runs between the Guyhirn roundabout junction to the south and the A47/ A198 Cromwell Road roundabout junction to the north. The B198 Cromwell Road forms one of three main access roads into Wisbech town centre. As was the case for Section 2, Route options within Section 3 are considered to tie into the proposed Highways England scheme at Guyhirn roundabout.

⁴ <https://highwaysengland.citizenspace.com/he/a47-guyhirn-junction-improvement/>

The existing A47 alignment runs parallel to the River Nene along the entirety of Section 3. There are a number of side roads from the existing alignment serving residential and agricultural premises. There are environmental constraints along the river to the west; therefore all options along this section do not encroach any land to the west of the existing A47 alignment. Other major constraints along this section are located to the east of the existing alignment include electricity pylons and the abandoned rail line between Wisbech and March. In July 2017 Fenland District Council (FDC) secured £3.2m funding to peruse a GRIP-3 study to test engineering options to reopen the abandoned line between March and Wisbech⁵. All options crossing the rail line will include a structure to meet Network Rail clearance standards.

The whole of Section 3 is located within flood zone 3, and based on advice given in Royal Haskoning's Flood Risk Report, as a minimum the road will require embankments, and it is anticipated that the embankment heights will require raising to ensure that future climate change projections are met and ensure that the road is not at risk of flooding from any source. In addition, it is recommended that the proposed route does not cross the Waldersey Main Drain which is located to the east of the existing A47 alignment.

Section 4 (Wisbech Bypass)

Section 4 runs between the A47/ A198 Cromwell Road roundabout junction to the south-west and the A47/ Lynn Road roundabout junction to the north-east. This section of the A47 along its existing alignment forms Wisbech Bypass. From the A47/ Lynn Road junction northwards, the A47 is dual carriageway until the A47/ Pullover Road junction approaching Kings Lynn. The existing A47 runs around the perimeter of Wisbech. Within this section there are a number of existing and proposed junctions linking into the town of Wisbech.

All land between Wisbech and the existing A47 alignment has been earmarked development, with a number of FDC Local Plan site allocations to the east, south and west of the town. In addition, wider development proposals for Wisbech Garden Town (WGT) have emerged since the adoption of the FDC Local Plan, with an estimated 10,000 to 12,000 dwellings and associated amenities planned. These development proposals form a major constraint through Section 4.

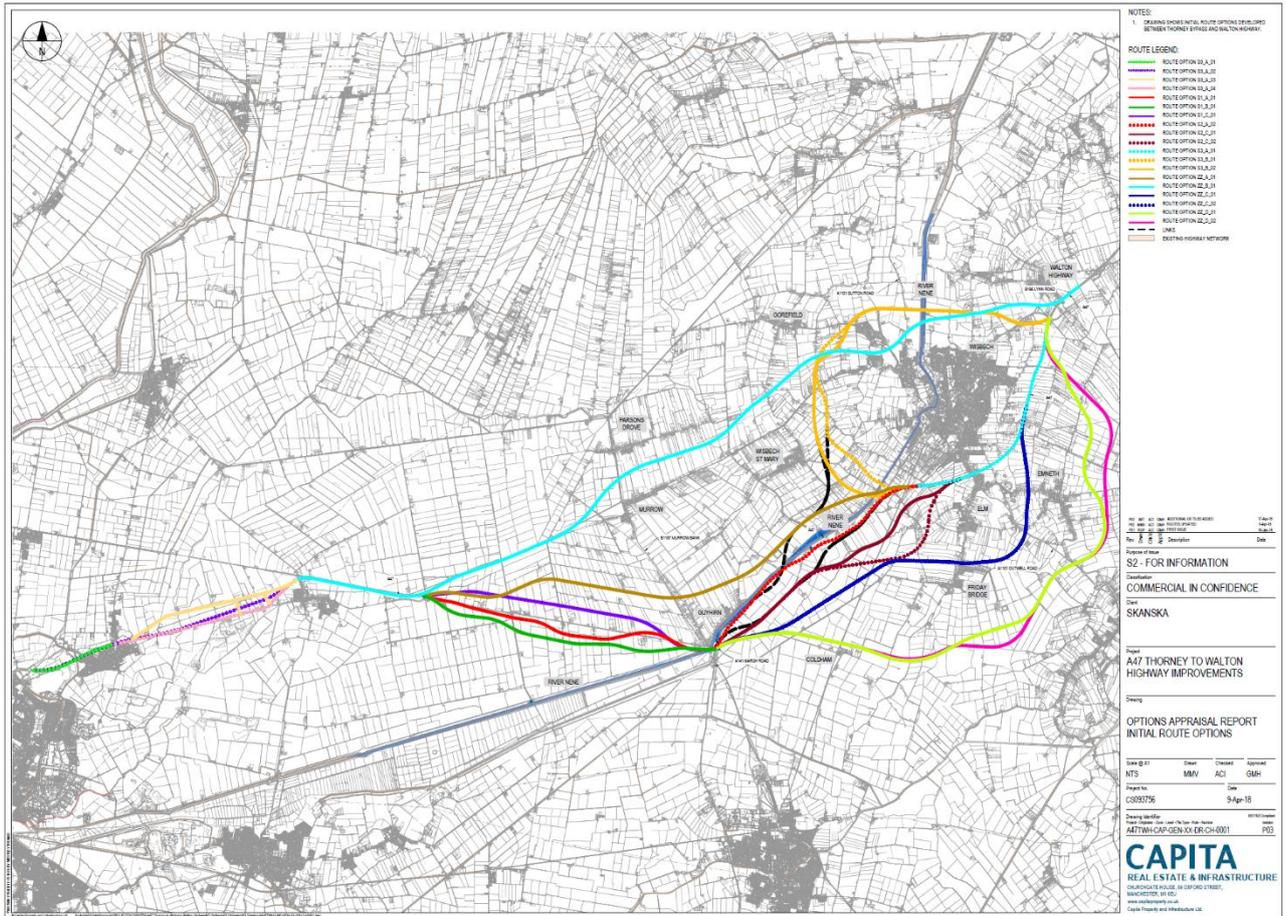
Overhead electric cables supported by pylons cross the existing A47 at three separate locations along this section. Over 50% of this section is located within flood zone 3, and based on recommendations made in the Royal Haskoning Flood Risk Report, embankments will need to be maintained and possibly increased to account for future climate change projections.

A.3 Proposed Route Alignment Options

Proposed route alignment options for the various A47 route sections can be found below and are presented in Figure B.10. A number of options extend across multiple sections and are detailed as appropriate.

⁵ <https://wisbechrail.org.uk/2017/07/11/wisbechrail-update-grip-3-funded/>

Figure B.10: A47 Dualling Scheme Route Options



Section 1 (A16 to Thorney Bypass)

Route 1.1 and Route 1.4: Option S0 A 03 (Section 1)

- **Route 1.1:** Dual Carriageway immediately to the north of the existing A47
- **Route 1.4:** As Route 1.1 as one way single carriageway for eastbound traffic, utilising existing carriageway for westbound traffic

Routes 1.1 and 1.4 are proposed for Section 1 of the A47 corridor. Route 1.1 is considered as a dual carriageway arrangement, while Route 1.4 is considered as a single carriageway arrangement. Both route options take an alignment that runs neatly along field boundaries to the north, taking the A47 away from properties fronting directly onto the existing highway. However, the alignment does run close to agricultural premises set back from the A47.

The route ties in along Thorney bypass to the north of the A47/ B1167 roundabout. The proposal also offers two links back to the existing alignment, one serving Podge Hole Quarry, and the other back to the B1167 roundabout. Both route options are predominantly offline after the A47/ Eye Green junction with good buildability. There is an area of pond land close to the proposed alignment for this option, so environmental constraints and localised issues with construction may be encountered.

Route 1.1 Summary:

- Length: 8,096m
- Indicative Cost: £40m
- No of junctions: 6
- No of bridges: 2
- No of culverts: 15

Route 1.4 Summary:

- Length: 8,096m
- Cost: £29m
- No of junctions: 6
- No of bridges: 2
- No of culverts: 15

Route 1.2: Option S0_A_02 (Section 1)

- **Route 1.2:** Part online and offline Dual Carriageway to the north of the existing A47 (predominantly following path of disused railway)

This route option is proposed for Section 1 of the A47 corridor. It involves widening an additional 1km of the existing A47 from the A47/ Crowland Road roundabout, moving eastwards. The remainder of the route then involves constructing a new dual carriageway to the north of the existing alignment and south of Option S0_A_03, tying in along Thorney Bypass to the north of the A47/ B1167 roundabout.

This route also takes the A47 away from properties fronting directly onto the existing highway, whilst the existing road can remain open to provide access. However, this option will have greater impact on agricultural premises that are set-back from the existing alignment and will cause land severance, leading to low stakeholder support. The route also crosses through an area of pond land to the north of the existing route which may impose environmental constraints, as well as pose difficulties during construction.

Route 1.2 Summary:

- Length: 7,868m
- Cost: £36m
- No of junctions: 5
- No of bridges: 2
- No of culverts: 7

[Route 1.3: Option S0 A 04 \(Section 1\)](#)

- **Route 1.3:** Fully online Dual Carriageway to the north of the existing A47.

This route option is proposed for Section 1 of the A47 corridor. This option is considered as a fully online option between the A16 and B1167 junctions, and utilises the full extent of the existing dual carriageway along Thorney bypass. There are a number of properties fronting directly onto the existing A47, meaning localised accommodation works will be required to maintain access, particularly to the quarry. As this option utilises the existing carriageway, it represents a lower cost option. However, due to the proximity to existing residential, industrial and agricultural premises, stakeholder support is likely to be low. Working on the existing line and maintaining traffic during construction will impose constraints on the construction phase.

[Route 1.3 Summary:](#)

- Length: 7,022m
- Cost: £18m
- No of junctions: 4
- No of bridges: 2
- No of culverts: 5

[Section 2 \(Thorney Bypass to Guyhirn\)](#)

[Route 2.1: Option S1 A 01 \(Section 2\)](#)

- **Route 2.1:** Online dualling of the A47

Route 2.1 is proposed for Section 2 of the A47 corridor. An option between Thorney and Guyhirn that utilises as much of the existing carriageway as possible has been considered. A fully on-line option along this section was not feasible due to properties fronting onto the existing A47, particularly around Thorney Toll. This route generally stays south of the existing A47 alignment, running close to Thorney Toll and other agricultural properties along the existing route. The route crosses the existing alignment to the west of Guyhirn to provide a link back to existing local infrastructure. A number of accommodation bridges are required to provide access to isolated properties to the south of the route, where access is currently only provided from the existing A47. Whilst this route could be constructed in phases and offer better value for money by utilising the existing carriageway in places, the proximity to existing residential, agricultural and industrial premises will negatively impact on buildability and stakeholder support.

[Route 2.1 Summary:](#)

- Length: 8,464m
- Cost: £70m
- No of junctions: 5
- No of bridges: 6
- No of culverts: 17

[Route 2.2: Option S1 B 01 \(Section 2\)](#)

- **Route 2.2:** Dualling of the A47 south of the existing A47

This route option is proposed for Section 2 of the A47 corridor. Route Option S1_B_01 has been considered as an alternative to route 2.1 and is located further south of the existing A47 alignment. This route utilises less of the existing carriageway, but imposes less impact on existing properties along the existing route. The route also runs more neatly along existing field boundaries, reducing land severance. A number of accommodation bridges are required to provide access to isolated properties to the south of the route, where access is currently only provided from the existing A47. This route doesn't offer the opportunity to utilise any of the existing carriageway and consequentially has a higher cost than route 2.1. However, due to the location away from existing residential, agricultural and industrial premises this option will benefit from improved buildability and better stakeholder support. The alignment running to the south of the A47 will also have low communal severance between the existing alignment and population centres located to the north.

[Route 2.2 Summary:](#)

- Length: 8,474m
- Cost: £71m
- No of junctions: 4
- No of bridges: 6
- No of culverts: 16

[Route 2.3: Option S1 C 01 \(Section 2\)](#)

- **Route 2.3:** Dualling of the A47 north of the existing A47

This route option is proposed for Section 2 of the A47 corridor. Route Option S1_C_01 has been considered as an option running to the north of the existing A47 alignment. This option utilises none of the existing carriageway, which will remain open to provide access to properties along the existing A47 and isolated properties to the south. The route is able to neatly follow the field boundaries along the alignment, reducing land severance. The route does impact on residential, agricultural and industrial premises to the north of the A47, whilst also impacting on the wider highway network. For these reasons, the stakeholder support will not be as high with this route when compared to route 2.2. In addition, the proposed alignment will segregate properties along the existing A47 from villages to the north. Due to the impact on the wider highway network and the proximity to residents, phasing potential and general buildability is not as good as route 2.2.

[Route 2.3 Summary:](#)

- Length: 8,462m
- Cost: £75m
- No of junctions: 3
- No of bridges: 6
- No of culverts: 26

[Route 2.4: Option ZZ A 01 \(Sections 2 and 3\)](#)

- **Route 2.4:** Offline dualling Thorney to Wisbech north of Guyhirn village

Route 2.4 extends over Section 2 and Section 3 of the A47 corridor, tying into the A47/B1167 Wisbech Road junction to the west, and the A47/B198 Cromwell Road junction to the east. The route runs through the north end of Guyhirn village, and remains to the west of the River Nene. A new structure over the Nene is required where the route crosses adjacent to the A47/B198 Cromwell Road junction tie in. As the route bypasses the Guyhirn roundabout, a junction is proposed with the B1187 at Guyhirn which would provide a link through to the A141 road to March, whilst the existing A47 remaining open will also provide a link.

Due to the isolated nature of much of the route, the buildability is good, however there is limited scope to phase the build. In addition, much of the route avoids impacting on existing properties and half of the route to the west of Guyhirn runs neatly along field boundaries, avoiding land severance. However, the route does cut through the north end of Guyhirn which will result in communal severance. Due to the offline nature and the new river crossing, this route does represent an expensive option.

[Route 2.4 Summary:](#)

- Length: 14,593m
- Cost: £96m
- No of junctions: 3
- No of bridges: 7
- No of culverts: 24

[Route 2.5 and Route 2.6: Option ZZ B 01 \(Sections 2, 3 and 4\)](#)

- **Route 2.5:** Offline single carriageway Thorney to Walton Highway running to the north of Wisbech
- **Route 2.6:** Offline dualling Thorney to Walton Highway running to the north of Wisbech

Both Routes 2.5 and 2.6 follow the same alignment and encompass sections 2, 3 and 4. The route ties into the A47/ B1167 Wisbech Road junction to the south west and ties back into the A47 to the north of the A47/Lynn Road roundabout where the existing carriageway is already dual carriageway. The route alignment takes the most direct route between these two points, and is therefore the shortest end to end route on the scheme. However, this option is located furthest away from the existing A47 alignment, and therefore does not utilise any of the existing carriageway.

This route provides the opportunity to keep the existing A47 route open from start to finish, and therefore presents an opportunity to provide a single carriageway along this alignment. Therefore, Route 2.5 is presented as a single carriageway option, and Route 2.6 as a dual carriageway option. The single carriageway option provides a lower cost alternative whilst still providing good links for development and improving journey times. The dual carriageway option, whilst being more expensive, offers even further growth potential. Whilst not easily able to phase this route due to the isolated nature of the alignment, the buildability is good due to the lack of interference from surrounding infrastructure.

The alignment runs between the villages of Parsons Drove and Murrow and remains north of Wisbech St Mary, where junction links with the B1187 and the B1166 are suggested respectively. The route runs north of Wisbech and is ideally located to provide a link into the area allocated for future growth to the West of Wisbech. A junction is suggested to the south of Leverington village, which would provide this link. A new structure over the Nene is required where the route crosses the river to the north of Wisbech.

[Route 2.5 Summary:](#)

- Length: 21,721m
- Cost: £92m
- No of junctions: 5
- No of bridges: 14

[Route 2.6 Summary:](#)

- Length: 21,721m
- Cost: £135m
- No of junctions: 5
- No of bridges: 14

Section 3 (Guyhirn to Wisbech)

Route 3.1: Option S2 A 02 (Section 3)

- **Route 3.1:** Online dualling of the A47

This route option is proposed for Section 3 of the A47 corridor. Route 3.1 has been considered to realise an option between Guyhirn and Wisbech that utilises as much of the existing A47 carriageway as possible. Due to the number of side roads, residential and agricultural premises connecting onto the existing carriageway, this route runs to the east of the existing carriageway along the northern section of the route. The southernmost portion of this route remains along the line of the existing carriageway, whilst eliminating the sub-standard horizontal curvature immediately north of Guyhirn roundabout.

Whilst this route could be constructed in phases and offer better value for money by utilising the existing carriageway in places, the proximity to existing residential, agricultural and industrial premises has negative impacts on the buildability as well as the stakeholder support.

Route 3.1 Summary:

- Length: 7,545m
- Cost: £43m
- No of junctions: 3
- No of bridges: 5
- No of culverts: 7

Route 3.2 (Option S2 C 01) and Route 3.3 (Option S2 C 02)

- **Route 3.2:** Dualling of the A47 south / east of the existing alignment
- **Route 3.3:** Dualling of the A47 south / east of the existing alignment, tying in east of Redmoor Roundabout.

Routes 3.2 and 3.3 also cover Section 3 of the A47 corridor and have been considered as alternative options to Route 3.1 and are located further east of the existing A47 alignment. Both routes run neatly along field boundaries and existing watercourses along the first half of the route, minimising land severance. A number of accommodation bridges will however be required.

The two routes take alternative alignments around the village of Begdale. Route 3.2 remains west of the village, and is consequentially able to form a junction linking to Wisbech in closer proximity to the existing A47/B198 roundabout. However, to maintain standard horizontal geometry, the route requires a skew structure over the abandoned rail line. Route 3.3 runs to the east of Begdale meaning it is therefore unable to form a link back to the A47/B198 junction, limiting growth potential. This route is able to achieve a more perpendicular crossing of the rail line, but crosses the line of pylons which has an impact on the buildability of the route.

Both routes offer good buildability, with route 3.2 fairing slightly better, however, both routes represent more expensive options when compared with option 3.1 due to both routes being unable to utilise any of the existing carriageway.

Route 3.2 Summary:

- Length: 8,587m
- Cost: £55m
- No of junctions: 3
- No of bridges: 7
- No of culverts: 13

Route 3.3 Summary:

- Length: 8,915m
- Cost: £53m
- No of junctions: 3
- No of bridges: 7
- No of culverts: 19

[Route 3.4: Option S2 B 01 \(Section 3\)](#)

- **Route 3.4:** Hybrid of Routes 3.1, 3.2 and 3.3

Route 3.4 is a hybrid option of Route 3.1 and Route 3.2/ 3.3. The alignment follows the line of route 3.2 for the southern half, before linking over to the alignment of route 3.1 to the north. This route does not utilise any of the existing carriageway but runs closer to south Wisbech providing a good junction opportunity and aiding growth potential.

The route generally provides good buildability with clear opportunities for phasing. However, the route does not provide the cost benefits of being able to utilise some of the existing carriageway.

[Route 3.4 Summary:](#)

- Length: 7,582m
- Cost: £50m
- No of junctions: 3
- No of bridges: 4
- No of culverts: 18

[Route 3.5: Option ZZ C 01 \(Section 3\)](#)

- **Route 3.5:** Offline dualling of the A47 between Guyhirn and Walton Highway running south of Elm but north Emneth and Friday Bridge

Route 3.5 spans Section 3 and much of Section 4. The alignment runs from Guyhirn roundabout before tying into the existing A47 carriageway to the east of Wisbech. The route runs parallel alongside the existing pylons to the east of the existing A47, before dissecting the villages of Friday Bridge, Elm and Emneth. Due to the densely built up area around these villages, this route adversely impacts on existing residential and agricultural premises, whilst also imposing significant land and communal severance. In addition, the route passes close to buildings of historical importance in Emneth and crosses the Waldersey Main Drain, going against recommendations made regarding flood risk.

The buildability of this route is not as good as other options considered through section 3, due to the proximity to pylons and building through built up areas. Furthermore, this route moves further away from the majority of the areas surrounding Wisbech which are earmarked for future growth. Due to these reasons, stakeholder support for this route is likely to be low, and the cost will be higher than many of the alternative options.

[Route 3.5 Summary:](#)

- Length: 13,275m
- Cost: £70,000,00
- No of junctions: 3
- No of bridges: 5
- No of culverts: 24

[Route 3.6 \(Option ZZ D 01\) and Route 3.7 \(Option ZZ D 02\)](#)

- **Route 3.6:** Offline dualling of the A47 between Guyhirn and Walton Highway running south of Emneth and Friday Bridge
- **Route 3.7:** Similar to Route 3.6

Route 3.6 and Route 3.7 routes have been considered as two similar routes spanning Sections 3 and 4 and avoiding the densely populated areas of the town of Wisbech and the surrounding villages of Elm, Emneth and Friday Bridge. Due to the urban nature of the area to the south east of Wisbech as described in other route options, it is difficult to provide a corridor through this area that doesn't adversely affect existing properties. These two longer routes run much further south east than the previous routes, but succeed in avoiding built up areas.

The route ties in at the A47/A141 Guyhirn roundabout to the south, and the A47/Lynn Road roundabout to the north. The alignment runs north of Coldham, south of Friday Bridge and south east of Elm and Elmeth. A junction link is suggested with the A1101 to provide a link back to Wisbech, as well as south to Outwell and beyond.

Despite limiting adverse impact on existing properties, this route is an expensive option that does not deliver growth opportunity to the town of Wisbech due to the lack of proximity. Whilst there is potentially good buildability associated with these routes, the land to the north of Emneth village is densely occupied by watercourses, which may cause some issues with the construction. In addition, this route crosses the Waldersey Main Drain, going against recommendations made regarding flood risk.

[Route 3.6 Summary:](#)

- Length: 18,971m
- Cost: £98m
- No of junctions: 3
- No of bridges: 10
- No of culverts: 32

[Route 3.7 Summary:](#)

- Length: 19,438m
- Cost: £100m
- No of junctions: 3
- No of bridges: 10
- No of culverts: 32

Section 4 (Wisbech Bypass)

Route 4.1: Option S3 A 01 (Section 4)

- Route 4.1: Online dualling of the A47

Route 4.1 has been considered as an entirely online upgrade of the existing A47 carriageway between the A47/B198 roundabout and the A47/Lynne Road roundabout. Additional junctions are proposed in line with recommendations made in the Wisbech Access Studies; in addition, a new structure is suggested over the abandoned rail line which crosses the existing A47.

Much of the land around the existing A47 carriageway is open and free from existing properties, lending itself to an online widening option. However, the existing junction between the A47 and Elm High Road imposes a pinch point due to the proximity of residential properties to the existing A47 and the presence of pylons with electricity cables passing directly over the roundabout. A number of junction arrangements have been considered at this location, concluding that some impact on the surrounding properties is unavoidable.

The buildability of this option is good and the construction can be easily phased. By retaining the existing alignment and utilising the existing carriageway, a low cost solution and high growth potential can be realised.

Route 4.1 Summary:

- Length: 6,991m
- Cost: £31m
- No of junctions: 5
- No of bridges: 1
- No of culverts: 5

Route 4.2 (Option S3 B 01) and Route 4.3 (Option S3 B 02)

- Route 4.2: Northern Orbital of the Wisbech
- Route 4.3: Variation on Route 4.2

Routes 4.2 and 4.3 provide alternative routes around the western side of the town of Wisbech, compares with all other routes considered in this assessment. The routes loosely follow the extent of the land allocated for future growth as part of the Wisbech Garden Town plans. The routes tie in to the A47/B198 junction to the south and run west around the town, tying into the A47/Lynn Road junction to the north. Intermediate junctions with the B1169 north east of Wisbech St Mary and the A1101 east of Leverington are suggested, providing links to areas of future growth potential.

However, these routes require two new crossings of the River Nene and are 4 – 5km longer than the online option 4.1, meaning that the cost is higher. The additional river crossing also negatively affect the buildability of the routes, whilst the longer route around the town mean that the effectiveness at reducing congestion is much lower than other routes considered.

Route 4.2 Summary:

- Length: 11,625m
- Cost: £83m
- No of junctions: 4
- No of bridges: 9
- No of culverts: 18

Route 4.3 Summary:

- Length: 12,952m
- Cost: £91m
- No of junctions: 4
- No of bridges: 10
- No of culverts: 29

Appendix C: Initial Option Appraisal

B.1 Introduction

The long list of options have been initially appraised against the Combined Authority's Strategic Case assessment, whose Core Objectives are closely aligned to the A47 scheme primary objectives. Each Option was scored against each of the objectives on a seven-point scale from +3 to -3, as follows:

- +3 major benefit at a regional level
- +2 major benefit at a more local level or more minor benefit at a regional level
- +1 minor benefit at a local level
- 0 neutral: no impact
- -1 minor disbenefit or negative impact at a local level
- -2 major disbenefit at a more local level or more minor benefit at a regional level
- -3 major disbenefit at a regional level

The approach to this work was to undertake the scoring and analysis and then to identify those options that did not “perform” well. The impacts of these options were then re-considered: certain measures were then included within the shortlist and others were rejected. This review process ensured that proper consideration would be given to schemes that merit further consideration, whilst recognising that certain options could not be further justified, on the grounds that they would not meet the objectives for the study area.

The objective of this process was not to rank these measures but to identify the measures that should be taken forward and those that are unlikely to meet the objectives for the A47 study.

B.2 Assessment

Section 1 (A16 to Thorney Bypass)

Comments

- **Route 1.1:** Dual carriageway immediately to the north of the existing A47
- **Route 1.2:** Part online and offline dual carriageway to the north of the existing A47 (predominantly following path of disused railway)
- **Route 1.3:** Fully online dual carriageway to the north of the existing A47.
- **Route 1.4:** As Route 1.1 as one way single carriageway for eastbound traffic, utilising existing carriageway for westbound traffic

Table C.1 – Section 1 (A16 to Thorney Bypass) Initial Option Assessment

Route	Strategic		Economic		Financial	Management			Buildability	Total Score
	Reduce congestion	Unlock housing and jobs	Scale of impact	Expected VFM	Other funding sources / contributors	Delivery certainty	Project risks	Stakeholder support		
1.1	3	3	2	2	2	3	2	2.5	3	22.5
1.2	3	3	2	2	2	2	1	0	1	16
1.3	3	3	3	2	2	1	1	-1	0	14
1.4	3	3	4	1	2	2	1	0	1	17

Note:

- Route 1.3: Should be rejected as it is unlikely to receive stakeholder support due to its impact on existing properties as well as traffic disruption during its construction.

Section 2 (Thorney Bypass to Guyhirn)Comments

- Route 2.1:** Online dualling of the A47
- Route 2.2:** Dualling of the A47 to the south of the existing A47
- Route 2.3:** Dualling of the A47 to the north of the existing A47
- Route 2.4:** Offline dualling Thorney to Wisbech north of Guyhirn village
- Route 2.5:** Offline single carriageway Thorney to Walton Highway running to the north of Wisbech
- Route 2.6:** Offline dualling Thorney to Walton Highway running to the north of Wisbech

Table C.2 – Section 2 (Thorney Bypass to Guyhirn) Initial Option Assessment

Route	Strategic		Economic		Financial	Management			Buildability	Total Score
	Reduce congestion	Unlock housing and jobs	Scale of impact	Expected VFM	Other funding sources / contributors	Delivery certainty	Project risks	Stakeholder support		
2.1	3	3	3	1	2	1	0	-2	0	11
2.2	3	3	3	1	2	2	2	2	3	21
2.3	3	3	3	1	2	2	1	1	1	17
2.4	3	3	3	2	1	1	2	2	3	20
2.5	3	3	3	3	2	1	2	2	3	22

2.6	3	4	3	2	1	1	2	2	3	21
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Note:

- Route 2.1: Should be rejected as it is unlikely to receive stakeholder support due to its impact on existing properties as well as traffic disruption during its construction.
- Routes 2.4, 2.5 and 2.6 cannot be readily phased
- Route 2.6 has the biggest potential to unlock Wisbech Garden Town and maximise wider economic benefits.

Section 3 (Guyhirn to Wisbech)

Comments

- **Route 3.1:** Online dualling of the A47
- **Route 3.2:** Dualling of the A47 south / east of the existing alignment
- **Route 3.3:** Dualling of the A47 south / east of the existing alignment, tying in east of Redmoor Roundabout.
- **Route 3.4:** Hybrid of Routes 3.1, 3.2 and 3.3
- **Route 3.5:** Offline dualling of the A47 between Guyhirn and Walton Highway running south of Elm but north Emneth and Friday Bridge
- **Route 3.6:** Offline dualling of the A47 between Guyhirn and Walton Highway running south of Emneth and Friday Bridge
- **Route 3.7:** Similar to Route 3.6

Table C.3 – Section 3 (Guyhirn to Wisbech) Initial Option Assessment

Route	Strategic		Economic		Financial	Management			Buildability	Total Score
	Reduce congestion	Unlock housing and jobs	Scale of impact	Expected VFM	Other funding sources / contributors	Delivery certainty	Project risks	Stakeholder support		
3.1	3	3	3	1	2	-2	-1	-1	-1	7
3.2	3	3	3	1	2	2	2	2	3	21
3.3	3	3	3	1	2	2	1	1	2	18
3.4	3	4	3	1	2	2	2	2	3	22
3.5	3	1	2	3	1	2	1	-1	2	14
3.6	2	1	1	1	1	2	3	0	3	12
3.7	2	1	1	1	1	2	3	0	3	12

Note:

- Route 3.1: Should be rejected as it contains too many project risks

- Routes 3.5, 3.6 and 3.7 should be rejected as they would fail to deliver housing growth around Wisbech, due to their routing with regard to Wisbech.

Section 4 (Wisbech Bypass)

Comments

- **Route 4.1:** Online dualling of the A47
- **Route 4.2:** Northern Orbital of the Wisbech
- **Route 4.3:** Variation on Route 4.2

Table C.4 – Section 3 (Wisbech Bypass) Initial Option Assessment

Route	Strategic		Economic		Financial	Management			Buildability	Total Score
	Reduce congestion	Unlock housing and jobs	Scale of impact	Expected VfM	Other funding sources / contributors	Delivery certainty	Project risks	Stakeholder support		
4.1	3	3	3	3	2	2	2	1	2	21
4.2	1	1	2	-1	1	1	0	1	1	9
4.3	1	2	2	-1	1	1	0	1	1	10

Note:

- Routes 4.2 and 4.3 should be rejected as they will not reduce existing congestion on the A47 Wisbech bypass (being a longer route) and therefore are likely to offer poor value for money.

B.3 Summary

An early option assessment has been undertaken against the Combined Authority's Strategic Case core assessment criteria. On this basis, Table C.5 summarises the schemes that should be taken through to a more detailed within a separate Option Appraisal report.

Table C.5 – Summary of Routes to be Assessed in Further Detail

Section	Route	Route Description
Section 1 (A16 to Thorney Bypass)	Route 1.1	Dual carriageway immediately to the north of the existing A47
	Route 1.2	Part online and offline dual carriageway to the north of the existing A47 (predominantly following path of disused railway)
	Route 1.4	As Route 1.1 as one way single carriageway for eastbound traffic, utilising existing carriageway for westbound traffic
Section 2 (Thorney Bypass to Guyhirn)	Route 2.2	Dualling of the A47 to the south of the existing A47
	Route 2.3	Dualling of the A47 to the north of the existing A47
	Route 2.4	Offline dualling Thorney to Wisbech north of Guyhirn village
Section 2 to 4 (Thorney Bypass to Walton Highway)	Route 2.5	Offline single carriageway Thorney to Walton Highway running to the north of Wisbech
	Route 2.6	Offline dualling Thorney to Walton Highway running to the north of Wisbech
Section 3 (Guyhirn to Wisbech)	Route 3.2	Dualling of the A47 south / east of the existing alignment
	Route 3.3	Dualling of the A47 south / east of the existing alignment, tying in east of Redmoor Roundabout (B198).
	Route 3.4	Hybrid of Routes 3.2 and 3.3
Section 4 (Wisbech Bypass)	Route 4.1	Online dualling of the A47

Appendix D: Economic Assessment

C.1 Introduction

The Economic Case provides evidence of how the scheme is predicted to perform, in relation to its stated objectives, identified problems and targeted outcomes. The Economic Case determines if the proposed scheme is a viable investment, whose strengths outweigh its weaknesses and which provides good value for money.

The scheme appraisal of identified options focuses on those aspects of scheme performance that are relevant to the nature of the intervention. However, we do acknowledge the strands of assessment that are required under various pieces of statutory guidance (e.g. DfT WebTAG, VfM Assessment, LSTF HM Treasury 'Green Book').

The potential value for money of the A47 improvement scheme has been initially assessed based on spreadsheet modelling results of the average journey times comparing the 'with' and 'without' scheme scenarios. These results are available for the AM, Inter-Peak and PM peaks. A TUBA-like calculation for travel time savings for vehicle user classes has been undertaken to calculate an initial assessment of the option BCRs.

The purpose of the initial assessment is to determine whether it is likely such a scheme would offer a positive value for money and to undertake a qualitative assessment of the potential benefits between Routes.

C.2 Assumptions

The economic case has been developed based on the comparison of a 'without scheme' and the 'with scheme' (proposed dualling improvement options). An indicative cost estimate for each of the options has been provided based on applying standard cost rates to the route length and the number of junctions and structures required.

The following assumptions have been made in the development of the economic case:

- Scheme journey times applied to the 'with scheme' options are based on observed speeds for existing dualled sections of the A47
- Journey time savings for weekday AM and PM peak hours, have been annualised over 253 days (the standard number of working weekdays per annum). There is potential for benefits beyond the peak hours but these have not been accounted for
- Value of time per vehicle and journey purpose proportions are taken from the WebTAG DataBook (December 2017)
- Maintenance costs are included and are based on values taken from the QUADRO user manual
- Scheme opening year has been taken as 2026 and a horizon year assessment based on 2041
- Transport user benefits have been calculated for a 60-year appraisal period in line with WebTAG

- Optimism Bias has been applied at 44%, as recommended by WebTAG for this stage of assessment
- A risk allowance of 15% has been made on top of construction cost estimates
- Potential benefits for Public Transport users have not been included in the assessments
- Land costs for offline options have been taken as £10,000 per acre whilst widening options have been based on a land cost of £100,000 per acre as offline options are more likely to require agricultural land with no development “hope” value
- Preparation costs are based on 9% of construction costs, as used by the HE for its initial appraisals of schemes
- Supervision costs are based on 5% of construction costs, as used by the HE for its initial appraisals of schemes

C.3 Project Costs

The breakdown of the wider project cost estimates for the A47 Dualling Study options are summarised in Table D.1 below.

Table D.1 – Breakdown of Costs (2018 prices)

Option		Construction	Land	Preparation	Supervision	Total
		(£'000s)	(£'000s)	(£'000s)	(£'000s)	(£'000s)
1.1	Yellow (D2)	40,000	500	3,600	2,000	46,100
1.2	Purple Dotted	36,000	486	3,240	1,800	41,526
1.3	Pink Dotted	18,000	2,169	1,620	900	22,689
1.4	Yellow (S2)	29,000	250	2,610	1,450	33,310
2.1	Red	70,000	2,614	6,300	3,500	82,414
2.2	Green	71,000	523	6,390	3,550	81,463
2.3	Purple	75,000	523	6,750	3,750	86,023
2.4	Brown	96,000	901	8,640	4,800	110,341
2.5	Light Blue (S2)	92,000	671	8,280	4,600	105,551
2.6	Light Blue (D2)	135,000	1,342	12,150	6,750	155,242
3.1	Red Dotted	43,000	2,330	3,870	2,150	51,350
3.2	Claret	55,000	530	4,950	2,750	63,230
3.3	Claret Dotted	53,000	551	4,770	2,650	60,971
3.4	Black	50,000	468	4,500	2,500	57,468
3.5	Dark Blue	70,000	820	6,300	3,500	80,620
3.6	Lime Green	98,000	1,172	8,820	4,900	112,892
3.7	Pink	100,000	1,201	9,000	5,000	115,201
4.1	Light Blue Dotted	31,000	2,159	2,790	1,550	37,499
4.2	Orange Dotted	83,000	718	7,470	4,150	95,338
4.3	Orange	91,000	800	8,190	4,550	104,540

The costs presented in Table C.1 are based on standard unit prices per square metre of carriageway construction in the UK. The land costs are based on values per acre of £10,000 for farmland where the route is offline and £100,000 per acre where widening is to be achieved online or involves property demolition (as an average length over the route option).

Preparation and supervision costs have been based on standard values applied to Highways England schemes through the Project Appraisal Report process for a scheme at concept stage of 9% and 5% respectively.

C.4 Quantified Costs

For the purposes of the economic appraisal the project have been converted to 2010 market prices. The construction costs presented below are inclusive of land, supervision, preparations, risk and adjustment for optimism bias.

As the A47 dualling improvements are likely to result in the creation of new road space an initial estimate of the future maintenance costs has also been made. These are based on values provided within the QUADRO manual. For the purposes of the economic appraisal these have been converted to 2010 market prices.

Quantified costs for each of the route options is provided in Table D.2 below.

Table D.2 – A47 Dualling Options: Quantified Costs (2010 Market Prices)

Route	CONSTRUCTION	MAINTENANCE	TOTAL
1.1	£71,280,846	£1,467,039	£72,747,885
1.2	£64,208,314	£1,425,724	£65,634,038
1.3	£35,081,974	£526,768	£35,608,742
1.4	£51,504,621	£607,336	£52,111,957
2.1	£127,430,457	£634,942	£128,065,399
2.2	£125,960,300	£1,535,535	£127,495,835
2.3	£133,009,908	£1,533,360	£134,543,269
2.4	£170,611,981	£2,644,331	£173,256,311
2.5	£163,204,711	£1,629,441	£164,834,152
2.6	£240,037,679	£3,935,963	£243,973,641
3.1	£79,398,965	£566,002	£79,964,967
3.2	£97,768,075	£1,556,011	£99,324,086
3.3	£94,274,027	£1,615,446	£95,889,473
3.4	£88,858,638	£1,373,899	£90,232,537
3.5	£124,656,185	£2,405,502	£127,061,687
3.6	£174,555,528	£3,437,648	£177,993,176
3.7	£178,125,512	£3,522,271	£181,647,783
4.1	£57,982,121	£524,443	£58,506,564
4.2	£147,413,536	£2,106,513	£149,520,049
4.3	£161,641,795	£2,346,972	£163,988,768

C.5 Traffic Forecasting and Economic Appraisal

The economic case for this scheme is focussed on:

- Assessing the direct, localised, economic efficiency benefit of the scheme

- Qualitative appraisal of wider scheme benefits and
- Assessing the scheme benefits against the direct scheme costs as an individual package.

The appraisal criteria and overall approach to the assessment of options at this stage is based on a direct appraisal of journey time saving benefits as compared to the direct scheme costs.

C.6 Environment

The economic benefits of a scheme in relation to carbon reduction and other environmental impacts are often monetised as part of scheme appraisal, particularly for large schemes where congestion reduction is a specific objective of the scheme.

At this stage the appraisal of multiple options has been undertaken and whilst it is evident that some options are shown to result in travel time savings by reducing congestion and assessment of the potential impacts of this on carbon reduction have not yet been undertaken.

C.7 Social

It is noted that highway schemes are often assessed with both travel time savings and accident benefits. Accident benefits normally come from a change of junction or link types or of flow volume. Scheme accident benefits have not been directly assessed at this stage because the proposed scheme does not include sufficient detail at this stage as regards the form of junction to be proposed in each location. In addition, the accident rate in the area is not above what might be expected and the scheme is not being promoted as an accident reduction measure.

However, analysis of this data will become part of the design process and accident monitoring will be part of the post-opening evaluation.

C.8 Quantified Benefits

The user benefits are set out in Table D.3 below and are based on vehicle time savings across the following vehicle/user classes:

- Car Employers Business
- Car Commute
- Car Other
- LGV Employer Business
- LGV Commute
- LGV Other
- OGV1
- OGV2

C.9 Benefit Cost Ratio

Table C.3 below summarises the analysis of monetised costs and benefits (AMCB). The costs and benefits are calculated based on the following:

- Scheme cost (2018 prices)
- Risk and optimism bias adjusted cost (2018 prices excl. VAT)
- Risk and optimism bias adjusted cost in 2010 prices
- Discounted Risk and optimism bias adjusted cost in 2010 prices
- Discounted Risk and optimism bias adjusted cost in 2010 market prices

User Benefits (PVB) for the initial BCR are based on vehicle user time savings (excluding passenger service vehicles), and include two tests.

1. **Core test:** based on TEMPRO 7.2 Government Forecast
2. **Sensitivity test:** based on 50% increase in growth (houses and job) and which resulting increase in traffic delay.

Table D.3 – A47 Dualling Options: Benefit to Cost Ratios

Section	Route	PVC (£,000)	Core Test		Sensitivity Test	
			PVB (£,000)	BCR	PVB (£,000)	BCR
Section 1 (A16 to Thorney Bypass)	1.1	£72,748	£86,411	1.19	£134,643	1.85
	1.2	£65,634	£89,697	1.37	£138,677	2.11
	1.4	£52,112	£81,421	1.56	£128,655	2.47
Section 2 (Thorney Bypass to Guyhirn)	2.2	£127,496	£117,734	0.92	£181,911	1.43
	2.3	£134,543	£117,694	0.87	£181,827	1.35
	2.4	£173,256	£248,979	1.44	£376,066	2.17
Section 2 to 4 (Thorney Bypass to Walton Highway)	2.5	£164,834	£316,253	1.92	£487,357	2.96
	2.6	£243,974	£330,741	1.36	£504,806	2.07
Section 3 (Guyhirn to Wisbech)	3.2	£99,324	£45,414	0.46	£81,232	0.82
	3.3	£95,889	£39,916	0.42	£74,472	0.78
	3.4	£90,233	£62,261	0.69	£101,945	1.13
Section 4 (Wisbech Bypass)	4.1	£58,507	£125,716	2.15	£189,697	3.24

PVC = Present Value of Costs (2010 Market Prices)

PVB = Present Value of Benefits (2010 Market Prices)

BCR – Benefit to Cost Ratio

It should be noted that whilst TEMPRO 7.2 is the latest Government Forecast for traffic growth but does not necessarily reflect the latest Local Plan growth, and the sensitivity testing shows the BCR is very much dependent on the assumed growth in land use (housing and jobs).

C.10 Qualitative assessment of benefits

The appraisal of the identified options for dualling the A47 indicates a range of BCRs which suggest that the options identified could be shortlisted to include only those options which offer medium or high value for money based on the Department for Transport value for money categories:

- Very High: BCR greater than or equal to 4
- High: BCR between 2 and 4
- Medium: BCR between 1.5 and 2
- Low: BCR between 1 and 1.5
- Poor: BCR between 0 and 1

- Very Poor: BCR less than or equal to 0

9.16.2 Note that the BCRs shown in Table 3.3 are ONLY shown for comparative purposes (between Routes), and do not take account of Wider Economic Benefits, the impact of increasing congestion nor phasing: a BCR might be improved by delaying a scheme until the congestion would otherwise occur in the Base Scenario. The key issue to conclude is that initial BCR shown indicate a more detailed assessment is justified (as part of an Option Appraisal Report).