

A47 Blofield to North Burlingham Dualling

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EXECUTIVE SUMMARY

Highways England has identified in their Road Investment Strategy that there is a requirement to increase traffic capacity along the A47 between Blofield and North Burlingham to reduce the traffic congestion and delay, which is forecast to increase in the future due to traffic growth.

The Scheme is currently in the Highways England Project Control Framework (PCF) Stage 3 - Preliminary Design. Galliford Try / Sweco have been appointed by Highways England to undertake a transport modelling and network assessment study to progress the preferred option through the Development Phase of the Highways England's PCF to submission of a draft Development Consent Order (DCO).

The Blofield to North Burlingham section of the A47 is located approximately 9 km to the east of Norwich. This 2.6km stretch of single carriageway, forms part of the main arterial highway route connecting Norwich with Great Yarmouth to the east. The new section of dual carriageway with junction improvements is proposed to be constructed to the south of the existing carriageway.

The purpose of this Transport Assessment (TA) is to assess the impact of the proposed A47 Blofield to North Burlingham Scheme (the Scheme) on the strategic and local highway network with respect to traffic congestion and road safety for motorised transport. Thus, the scope of this report covers the transport modelling assessment of the Scheme's operation in the opening and design year forecast scenarios.

The modelling assessment comprises of a strategic multi-modal model which covers Broadland, Norwich and the surrounding area. The strategic modelling assessment is used as the basis to derive forecasted traffic impacts of the Scheme's performance across the wider area. The strategic model utilised for PCF stage 3 has been developed in line with the Department for Transport (DfT) Transport Appraisal Guidance (TAG). Local traffic models, including a micro-simulation model of the A47/B1140 junction, have also been developed to assess the Scheme's operational performance in the forecast year scenarios.

The modelling analysis indicates that the forecasted local and regional traffic growth will cause the A47 single carriageway section to be over capacity. This will in turn create a increase in delays along the section. The Scheme, however, provides the required capacity improvements to allow for the forecasted traffic growth.

The results of the modelling assessment show that the Scheme improves the overall operation of the network as well as reducing A47 peak hour journey times (between approximately 15% and 32% depending on direction and time period). Based on both the operational and strategic modelling assessments the Scheme will remove all the single carriageway overcapacity delays. In terms of overall annual average daily traffic (AADT) the Scheme provides enough additional capacity to allow traffic flows to increase between 17 and 18% on the Scheme section.

From downgrading the existing A47 alignment to local road status and the provision of new cycling and walking infrastructure the Scheme provides safety improvements. It also improves safety along the A47 for road users by providing an upgraded dual carriageway alignment and an upgraded A47/B1140 interchange junction. In total, modelling analysis indicates that over the assessed timeframe, the Scheme improvements will save a total of 190 accidents and 29 killed or seriously injured (KSI).

The implementation of the Scheme will improve reliability and network resilience as dual

carriageways are more reliable than single carriageways. Road capacity is increased, delays are shortened and accidents (and their impacts) are reduced, all of which contribute to improved reliability.

In summary the Scheme fulfils its objectives by providing additional capacity, relieving congestion, improving journey times and reliability as well as network resilience. Furthermore, it provides additional infrastructure which helps walking, cycling and other vulnerable users as well as reducing the predicted accident rates along the A47 corridor and surrounding network.

Given the overall benefits of the Scheme, its compliance with national, regional and local transport policy and the fact that it achieves its stated objectives, it is considered that there is no reason why the Scheme should not be approved on transport grounds.

1 INTRODUCTION

1.1 Purpose of this Document

1.1.1 Highways England (the Applicant) has submitted an application under Section 37 of the Planning Act 2008 (the 2008 Act) to the Secretary of State via the Planning Inspectorate (the Inspectorate) for an order to grant development consent (DCO) for the A47 Blofield to North Burlingham Scheme (the Scheme).

1.1.2 The purpose of this Transport Assessment (TA) is to assess the impact of the proposed A47 Blofield to North Burlingham Scheme on the strategic and local highway network with respect to traffic congestion and road safety for motorised transport. Thus, the scope of this report covers the transport modelling assessment of the Scheme's operation in the opening and design year forecast scenarios.

1.2 Study Background

The A47 Schemes

1.2.1 In December 2014 the Department for Transport (DfT) published the Road Investment Strategy (RIS) for 2015-2020. The RIS sets out the list of schemes that are to be delivered by Highways England over the period covered by the RIS.

1.2.2 The RIS includes a package of 6 schemes to be developed and constructed by Highways England during Roads Period 1 (2015 - 2020) and the early part of the Roads Period 2 (2020 - 2025). These will improve journeys on the 115-mile section of the A47 between Peterborough and Great Yarmouth. These schemes have been branded as the A47 Improvement Programme.

1.2.3 The 6 schemes are proposed as part of the A47 corridor improvement programme, as shown in Figure 1-1 including the following:

- A47 Wansford to Sutton
- A47 / A141 Guyhirn junction
- A47 North Tuddenham to Easton
- A47 Blofield to North Burlingham
- A47 / A11 Thickthorn junction improvement
- A47 Great Yarmouth junction improvements

Figure 1-1: A47 package location plan



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1.2.4 The RIS 1 comprises of:

- A long-term vision for the Strategic Road Network (SRN), outlining how smooth, smart and sustainable roads will be created;
- A multi-year investment plan that will be used to improve the network and create better roads for users;
- High-level objectives for Roads Period 1 (2015 – 2020).

1.2.5 As part of this process, the government announced that it would identify and fund solutions, initially through feasibility studies, to look at problems and identify potential solutions to tackle some of the worst road hotspots in the country.

1.2.6 One of the hotspots identified was the A47 trunk road corridor. The A47 trunk road forms part of the SRN and provides a variety of local medium and long-distance trips between the A1 and the east coast. The corridor connects 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.

1.2.7 The 6 schemes as listed in paragraph 1.2.3, in summary, include converting almost 8 miles of single-carriageway to dual-carriageway and making improvements to junctions across the route.

Blofield Scheme Status

- 1.2.8 Highways Agency, now Highways England, introduced the Project Control Framework (PCF) for their Major Projects directorate in 2008. The framework sets out how major highways schemes should be managed and delivered with consistent products and a well-defined and consistent approach to project governance. The framework is designed to ensure that Highways England delivers road projects which meet their customers' aspirations in a cost efficient and timely manner.
- 1.2.9 The aim of this TA is to detail the scope, methodology and results of the Project Control Framework (PCF) Stage 3 traffic assessment of the A47 Blofield scheme. A summary of the PCF Stage 1-3 process is provided below.
- 1.2.10 Stage 1 of the Options Phase (Option Identification) involved the identification of junction improvement options to be taken forward for public consultation.
- 1.2.11 Stage 2 of the Options Phase (Option Selection) involved a public consultation and refinement of the environmental impact assessment, traffic forecasts and economic benefits.
- 1.2.12 Stage 3 is the initial stage of the Development Phase (Preliminary Design), which involves refining the traffic modelling and forecasting assessments, as well as undertaking the environmental, economic and operational assessments. The purpose of Stage 3 is to undertake consultation and complete the preliminary design of the preferred route

Option Identification

- 1.2.13 In total, 8 initial potential options for increasing the capacity of the A47 single carriageway section were identified during PCF Stage 1. An option ranking and sifting review was undertaken which reduced the total number of options to 4, based on their potential economic, engineering and environmental impacts.
- 1.2.14 During PCF Stage 2 assessment these 4 identified options were taken forward to public consultation as well as traffic modelling, forecasting and economic assessment. Details of each option are provided below:
- Option 1 - an on-line upgrade of the existing road to dual carriageway standards.
 - Option 2 - a new off-line dual carriageway, to the north of the existing A47 between Blofield and North Burlingham before crossing the A47 and running to the south between North Burlingham and the B1140.
 - Option 3 - a new off-line dual carriageway to the south of the existing A47 which would run south of Poplar Farm and the adjacent properties on Lingwood Road.
 - Option 4 - a new off-line dual carriageway to the south of the existing A47 which would run between the existing A47 and Poplar Farm and the adjacent properties on Lingwood Road.
- 1.2.15 The economic appraisal report produced at the end of PCF Stage 2 showed that Option 4 produced the highest benefit to cost ratio of the 4 assessed options. From the traffic forecasting assessment, it was concluded that there was little difference between the four proposed options in terms of potential journey time

savings compared to the without scheme forecast scenario. Further details can be found in the A47 Blofield to North Burlingham Scheme Assessment Report undertaken in PCF stage 1 and 2¹.

Public Consultation

- 1.2.16 During PCF Stage 2, a Non-Statutory Public Consultation period was undertaken between the 13 March 2017 to the 21 April 2017. A statutory pre-application stage of consultation (from Monday 10 September 2018 to Friday 19 October 2018) was held for the preliminary design.
- 1.2.17 The purpose of the Public Consultation was to seek views on the outline proposals from the general public, statutory consultees, including local authorities, and other interested bodies.
- 1.2.18 Further details of both consultations can be found in the Consultation Report (**TR010040/APP/5.2**). This formed part of a submission to the Secretary of State for Transport, to enable a decision to be made on which option should be taken forward

1.3 Need for a Transport Assessment

- 1.3.1 The primary focus of the TA is to detail the impacts of the proposed Scheme and how they correspond to the Scheme objectives. This TA is a key document in supporting the transport case for the scheme, to document how the transport model assessment was used to forecast future traffic conditions. The results of these model forecast results indicate that without intervention, the traffic conditions along the Scheme section will deteriorate.

1.4 Funding and Delivery

- 1.4.1 The DfT announced its committed investment for the A47 schemes in the 2014 RIS1, carried forward into the 2020 RIS2. Further details can be found in the Funding Statement (**TR010040/APP/4.2**).
- 1.4.2 As detailed in the Scheme Design Report (**TR010040/APP/7.6**) the construction period will take approximately two years. Construction is planned to start in 2022 if the Scheme is approved.

1.5 Structure of this Document

- 1.5.1 This document comprises 9 sections as described below:
- Chapter 1 – Introduces this document
 - Chapter 2 – Provides a high-level description of the Scheme
 - Chapter 3 – Discusses the national and local policy context
 - Chapter 4 – Details the existing site layout and usage
 - Chapter 5 – Gives an overview of the baseline data set

¹ Highways England (2017) Road Investment Strategy East Area 6 A47 Blofield to North Burlingham Scheme Assessment Report (A47 IMPS2-AMY-BB-ZZ-DO-J0006) [online] available at: <https://highwaysengland.citizenspace.com/he/a47-blofield-to-north-burlingham-dualling/results/a47blofieldtonorthburlingham/a47sarimps2-ame-bb-zz-do-j00061.pdf> (last accessed December 2020).

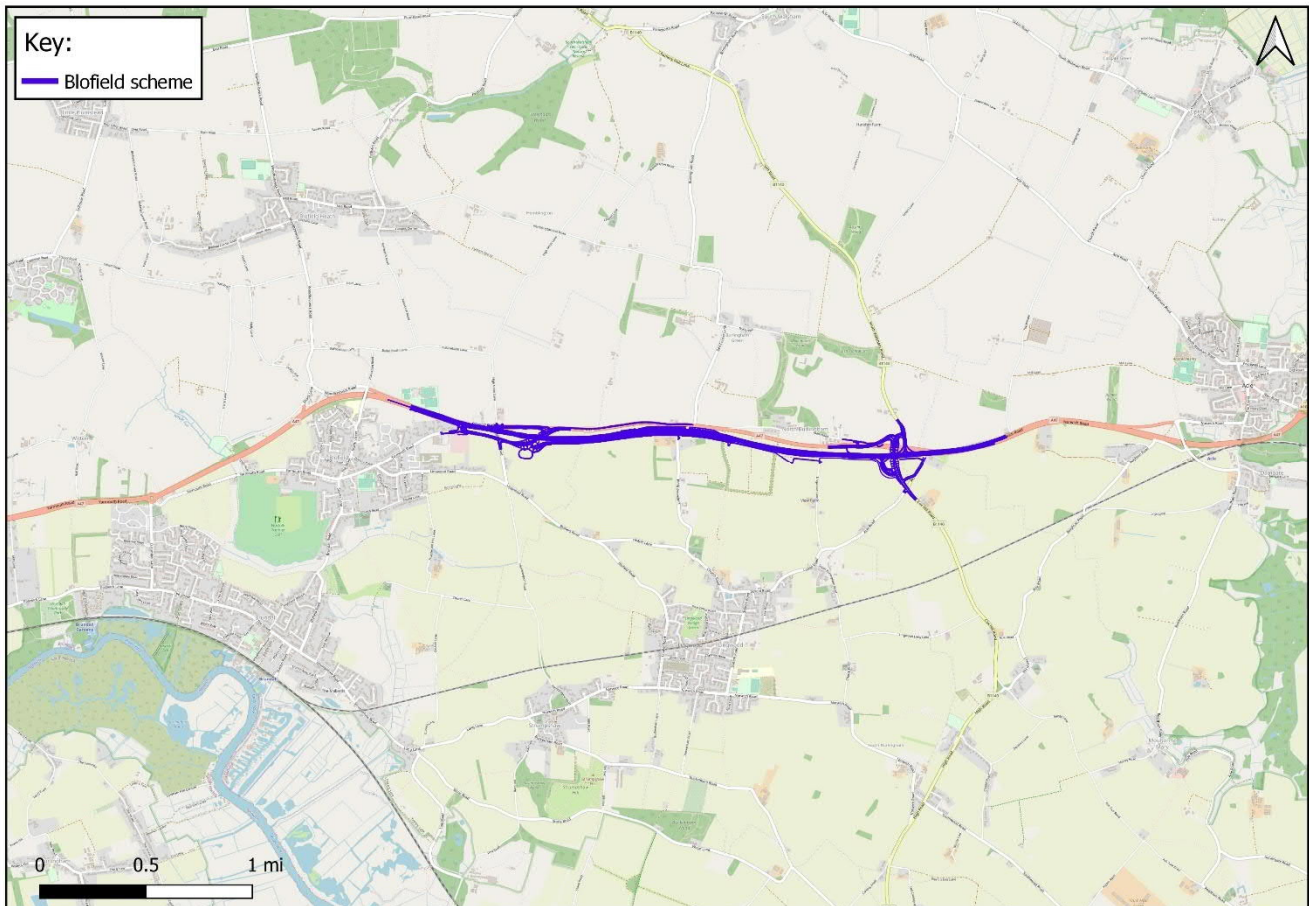
- Chapter 6 – Outlines the traffic modelling assessment methodology
- Chapter 7 – Presents the results of the traffic impact assessment
- Chapter 8 – Details the mitigation of the Scheme's impacts
- Chapter 9 – Provides the summary and conclusions to the assessment

2 THE SCHEME

2.1 Description

- 2.1.1 The Blofield to North Burlingham section of the A47 is located approximately 6-miles to the east of Norwich. This 2.6km stretch of single carriageway, forms part of the main arterial highway route connecting Norwich with Great Yarmouth to the east.
- 2.1.2 The new section of dual carriageway with junction improvements is proposed to be constructed to the south of the existing carriageway. The location of the Scheme is shown in Figure 2-1.

Figure 2-1: Location of the Scheme



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- 2.1.3 The Scheme description along with any supporting information is detailed in ES Chapters 2 and 3 (**TR010040/APP/6.1**), Section 4 of the Scheme Design Report (**TR010040/APP/7.6**) and in Section 2 of the Case for the Scheme (**TR010040/APP/7.1**).

2.1.4 The main features of the Scheme include:

- 2.6km of dual carriageway on the A47
- de-trunking of the existing A47 section between Blofield and North Burlingham
- improvements at Yarmouth Road Junction, including closure of the central reserve, closure of High Noon Lane direct access, merge lane, realignment of Waterlow and local access improvements at the Sparrow Hall properties
- introduction of a compact grade separated junction at B1140 Junction, including the B1140 Overbridge
- a new overbridge at Blofield traversing the proposed A47 dual carriageway, connecting Yarmouth Road with the existing A47
- provision of new drainage systems including an infiltration basin and retention of existing drainage systems where possible
- a retaining wall in the western extents
- introduction of lighting at the Yarmouth Road Junction and new lighting layout at the B1140 Junction
- closure of an existing lay-by and provision of a new lay-by
- walking and cycling routes connecting Blofield and North Burlingham via the Blofield Overbridge to the west and the B1140 Overbridge to the east
- provision of North Burlingham Access
- an agricultural access track
- fencing, safety barriers and signage
- environmental Mitigation
- diversion of a medium pressure gas main and other utilities

2.2 Scheme Objectives

2.2.1 The key objectives of the Scheme are outlined as follows:

- **Supporting economic growth** - The Scheme aims to reduce congestion related delay, improve journey time reliability and increase the overall capacity of the A47. This will help contribute to sustainable economic growth by supporting employment and residential development opportunities.
- **Making a safer network** - Improving road safety for all road users by designing to modern highway standards appropriate for a major A road.
- **A more free-flowing network** - Increasing the resilience of the junction in coping with incidents such as collisions, breakdowns, maintenance and extreme weather. The improved A47 Blofield to North Burlingham will be more reliable, reducing journey times and providing capacity for future traffic growth.
- **Protected environment** - We will protect the environment by minimising adverse impacts and where possible, improving the environmental effects

of transport on those living along the route of the new and existing road. We will do this by reducing the impact on the natural and built environment by the new road and any associated works.

- **An accessible and integrated network** - To ensure the proposals consider local communities and access to the road network, providing a safer route between communities for cyclists, pedestrians, equestrians and vulnerable users where a need is identified.
- **Value for money** - To ensure that the Scheme is affordable and delivers good value for money.

2.3 The Need for the Scheme

2.3.1 The need for the Scheme is comprehensively set out in Section 3 of the Case for the Scheme (**TR010040/APP/7.1**).

2.3.2 Whilst around half of the A47 is already dual carriageway, the Blofield to North Burlingham section is not, with studies having identified that the single carriageway section of the road no longer meets the needs of its users. Sandwiched between two dual carriageway sections, the Blofield to North Burlingham stretch of the road acts as a bottleneck, resulting in congestion and leading to longer and unreliable journey times.

2.3.3 There are a number of reasons for these delays. The Scheme investigations have highlighted these reasons as:

- difficulty of accessing and crossing the A47 from side road junctions
- traffic levels outgrowing the capacity of the road, causing tailbacks and delays
- limited opportunities for overtaking slower moving vehicles
- development in the local area

2.3.4 The Blofield to North Burlingham section of the A47 also has a poor safety record, with a total of 42 collisions recorded on the section between 2014 and 2018 (giving an average of nearly 9 collisions per year). The greater Norwich area is set to see major housing and employment growth.

2.3.5 In developing the scheme, Highways England aim to address these issues by improving the traffic flow, reducing journey times on the route, increasing the route safety and resilience and improving the environment. The Scheme is also intended to support economic growth by making journeys safer and more reliable.

3 POLICY CONTEXT

3.1 Overview

3.1.1 This section outlines the national, regional and local transport policies that are relevant to the Scheme. A comprehensive review of the Scheme's accordance with national and local transport and other policies, local transport plans and associated supplementary plans, particularly the National Networks National Policy Statement (NNNPS), is provided in Section 6 of the Case for the Scheme (TR010040/APP/7.1) and in the NNNPS Accordance Tables (TR010040/APP/7.2).

3.2 National Planning Policy Context

National Networks National Policy Statement

3.2.1 The NNNPS sets out the need for, and the Government's policies to deliver the development of NSIPs on the national road network in England and also sets out the primary basis for making decisions of development consent for Nationally Significant Infrastructure Projects (NSIPs) in England. The National Policy Statements supplement the National Planning Policy Framework.

3.2.2 Section 104 of the Planning Act 2008 states that, where a relevant NPS has been designated, decisions about applications for a DCO must be taken in accordance with it. The Government has highlighted the express need for further growth and improvements to the national networks within the NNNPS. The Road Investment Strategies which explore these needs in further detail, support the Scheme as a required improvement to the SRN.

3.2.3 Paragraph 2.2 of the NNNPS states: "There is a critical need to improve the national networks to address road congestion and crowding on railways to provide safe, expeditious and resilient networks that better support social and economic activity; and to provide a transport network that is capable of stimulating and supporting economic growth".

3.2.4 Further, Paragraph 2.10 states, the Government has concluded that, at a strategic level there is a compelling need for development of the national networks and that the Examining Authority and the Secretary of State should start their assessment of applications for infrastructure covered by the NNNPS on that basis.

3.2.5 There is an assumption within NNNPS that significant improvements to the road network will be necessary in order to support the Government's vision for the national networks. In this regard Paragraph 2.22 states that without improving the road network, including its performance, it will be difficult to support further economic development and this will impede economic growth and reduce people's quality of life. The Government has therefore concluded that, at a strategic level, there is a compelling need for development of the national road network.

3.2.6 The Scheme comprises an essential part of a wider package of proposals for the A47 corridor to transform connectivity to and from the East of England, as described in the Roads Investment Strategy, the Transport Investment Strategy, the National Infrastructure Delivery Plan, and the Highways England Delivery

Plan. The Scheme therefore helps to address the compelling and strategic need for development, identified in the NNNPS.

- 3.2.7 Compliance of the Scheme's objectives with the vision and strategic objectives, contained within Chapter 2 of the NNNPS is set out in Chapter 3 of the Case for the Scheme **(TR010040/APP/7.1)**.
- 3.2.8 The Scheme directly addresses the Government's wider strategic policy objectives, whilst specifically addressing the historic problems in connectivity to the east. It will deliver benefits in terms of resolving local transport, economic, environmental and heritage concerns and the Government's recognised national commitment to improving the SRN.
- 3.2.9 The NNNPS states that the assessment of the Scheme should consider the balance of potential benefits and adverse impacts, as well as planned mitigation of these impacts at a national, regional and local level.

National Planning Policy Framework 2019

- 3.2.10 The National Planning Policy Framework (NPPF) sets out the government's national planning policies for England and how these should be applied strategically in the development plan system and in the management of development. Paragraph 5 of the NPPF states: "*The Framework does not contain specific policies for nationally significant infrastructure projects. These are determined in accordance with the decision-making framework in the Planning Act 2008 (as amended) and relevant national policy statements for major infrastructure, as well as any other matters that are relevant (which may include the National Planning Policy Framework).*"
- 3.2.11 Paragraph 1.18 states that the NPPF will be an important and relevant consideration 'but only to the extent relevant to [the] project'. Therefore, it is necessary to consider the extent of any such relevance and compliance with the policies that it contains.
- 3.2.12 The NPPF confirms that the purpose of the planning system is to contribute to the achievement of sustainable development (paragraph 7), and that a presumption in favour of sustainable development lies at the heart of the NPPF (paragraph 10).
- 3.2.13 With regards to promoting sustainable transport, the NPPF, Chapter 9 states that transport issues should be considered from the earliest stages of plan-making and development proposals, so that opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised and the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains (paragraph 102).
- 3.2.14 Paragraph 104 states that planning policies should: "Be prepared with the active involvement of local highways authorities, other transport infrastructure providers and operators and neighbouring councils, so that strategies and investments for supporting sustainable transport and development patterns are aligned; and identify and protect, where there is robust evidence, sites and routes which could be critical in developing infrastructure to widen transport choice and realise opportunities for large scale development;" they should also provide for

any large scale transport facilities that need to be located in the area, and the infrastructure and wider development required to support their operation, expansion and contribution to the wider economy. In doing so they should take into account whether such development is likely to be a nationally significant infrastructure project and any relevant national policy statements.”

- 3.2.15 Paragraph 8 of the NPPF confirms that sustainable development is to be achieved by three overarching objectives: economic, social and environmental. The Scheme would improve the quality of the SRN in the east by improving connectivity, reliability, safety and resilience on the A47 between Blofield and Acle which accords with the social objective of the NPPF. The Scheme supports the NPPF economic objective and strategic policy in making adequate provision for transport infrastructure and supporting future economic growth. The Scheme therefore accords with the key aims of the NPPF by providing improved infrastructure to support economic growth.

Road Investment Strategy (RIS)

- 3.2.16 The DfT’s RIS defines a national programme of improvements to the SRN.
- 3.2.17 Road Investment Strategy 1: 2015 to 2020 (‘RIS1’) stated that 127 major schemes would be undertaken over the course of the 2015-2020 period, in order to deliver benefits quickly.
- 3.2.18 Road Investment Strategy 2: 2020 to 2025 (‘RIS2’) sets a long-term strategic vision for the network. It then specifies the performance standards Highways England must meet; lists planned enhancement schemes we expect to be built; and states the funding that we will make available during the Second Road Period (‘RP2’), covering the financial years 2020/21 to 2024/25.
- 3.2.19 It describes a long-term vision for what the SRN should be like in 2050 and the steps that will help them achieve it. RIS2 sets out the list of schemes that are to be developed by Highways England over the period covered by the RIS including the Scheme to complete a gap in dual carriageway between Norwich and Acle.
- 3.2.20 Highways England, as the strategic highways company and appointed by the Secretary of State, must in exercising its functions and complying with its legal duties and other obligations, act in a manner which it considers best calculated to, among others:
- minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment
 - conform to the principles of sustainable development

Highways England Policy

The Strategic Road Network and the Delivery of Sustainable Development (DfT Circular 02/2013)

- 3.2.21 This Circular explains how the Highways Agency (Highways England) will engage with the planning system, communities and the development industry to deliver sustainable development and, thus, economic growth, whilst safeguarding the primary function and purpose of the SRN.

- 3.2.22 Paragraph 8 states that “A well-functioning strategic road network enables growth by providing for safe and reliable journeys. This can help reduce business costs by providing certainty, improving access to markets, enabling competition, improving labour mobility, enabling economies of scale, and helping attract inward investment.”
- 3.2.23 Further, Paragraph 19 states that “where a potential capacity need is identified, this will be considered and weighed alongside environmental and deliverability considerations. Additional capacity may be considered in the context of the Highways Agency’s forward programme of works, balancing the needs of motorists and other road users with wider impact on the environment and the local/regional community.”
- 3.2.24 An impact assessment, describing the potential issues with implementation of the Circular, was released on the 24 September 2014 which recognised that it must be updated to reflect the changes brought about by the Localism Act 2011 and the National Planning Policy Framework (NPPF) and to emphasise the Highways Agency’s role and responsibilities in being an effective delivery partner to enable economic growth. The impact assessment states that where necessary Circulars should be replaced to remove unnecessary regulation and ensure that policy for the SRN is fully compatible with the NPPF.

The Highways England Licence document (2015)

- 3.2.25 The Licence document sets out key requirements which must be complied with by the Licence holder as well as statutory guidance. In exercising its functions and complying with its legal duties and obligations, the Licence holder must act in such a manner which it considers best calculated to:
- ensure the effective operation of the network
 - ensure the maintenance, resilience, renewal, and replacement of the network
 - ensure the improvement, enhancement and long-term development of the network
 - ensure efficiency and value for money
 - protect and improve the safety of the network
 - co-operate with other persons or organisations for the purposes of coordinating day-to-day operations and long-term planning
 - minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment
 - conform to the principles of sustainable development
 - in complying with section 4.2(g) and its general duty under section 5(2) of the Infrastructure Act 2015 the Licence holder must have regard for the environment
 - ensure that protecting and enhancing the environment is embedded into its business decision-making processes and is considered at all levels of operations

- ensure the best practicable environmental outcomes across its activities, while working in the context of sustainable development and delivering value for money
- consider the cumulative environmental impact of its activities across its network and identify holistic approaches to mitigate such impacts and improve environmental performance
- where appropriate, work with others to develop solutions that can provide increased environmental benefits over those that the Licence holder can achieve alone, where this delivers value for money
- calculate and consider the carbon impact of road projects and factor carbon into design decisions and seek to minimise carbon emissions and other greenhouse gases from its operations
- adapt its network to operate in a changing climate, including assessing, managing and mitigating the potential risks posed by climate change to the operation, maintenance and improvement of the network
- develop approaches to the construction, maintenance and operation of the Licence holder's network that are consistent with the government's plans for a low carbon future
- take opportunities to influence road users to reduce the greenhouse gas emissions from their journey choices

Highways England Strategic Business Plan 2015-2020 and 2020-2025

- 3.2.26 The DfT's RIS defines a national programme of improvements to the SRN. The Applicant is responsible for planning the long-term future and development of the SRN including its maintenance, operation and improvement.
- 3.2.27 In 2014 the Applicant published its Strategic Business Plan 2015-2020 ('SPB') in response to the Government's RIS (RIS1). The SBP set out the Applicant's main activities and strategic outcomes and sets how the Applicant will deliver the investment plan and performance requirements for the network for the next five years, together with a long-term commitment to capital funding totalling more than £11bn.
- 3.2.28 The SPB 2015-2020 defined KPIs against which the performance of the Applicant will be measured, based on the Performance Specification included in the RIS.
- 3.2.29 Section 4 of the SBP gave the background to the subsequent publication of the Route Strategies for the entire national network. The East of England Route Strategy, April 2015² considered the A47, including the issues, key opportunities and challenges for the Route.

² Highways Agency developed a Route Based Strategy approach to identify key investment needs on the SRN. The Route Based Strategy brought together both national and local priorities in 18 Route-Based Strategy Evidence Reports, used to inform the RIS.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/416730/East_of_England.pdf

- 3.2.30 The Strategic Business Plan 2020-2025 was published in March 2020 and responds to and aligns with government's RIS2. It provides the high-level direction for every part of Highways England for the second road period (2020 to 2025), setting the outcomes Highways England will work to deliver and the strategic priorities for the business. This SBP includes similar KPIs as agreed with DfT, Transport Focus and ORR, the framework reflects how we they deliver the following six outcomes
- 1) Improving safety for all
 - 2) Providing fast and reliable journeys
 - 3) A well-maintained and resilient network
 - 4) Delivering better environmental outcomes
 - 5) Meeting the needs of all users
 - 6) Achieving efficient delivery
- 3.2.31 These outcomes respond to and align with government's priorities, as set out in RIS2: a network that supports the economy; a greener network; a safer and more reliable network; a more integrated network; and a smarter network.

Highways England Delivery Plan, 2015-2020 and 2020-2025

- 3.2.32 The DfT's RIS defines a national programme of improvements to the SRN. The Delivery Plan 2015-2020 built on the SBP and set out in detail how the strategic outcomes and the RIS1 will be delivered and success measured, while identifying future goals and plans. The Applicant's SBP and Delivery Plan (2015-2020) responds directly to RIS1.
- 3.2.33 The A47 Blofield to North Burlingham is listed under the "*Major Improvements Investment Plan Scheme Schedule 2015-2020*" as one of the "Schemes identified following the outcomes from the six feasibility studies". The feasibility study relevant to the A47 corridor being The A47/A12 Corridor Feasibility Study.
- 3.2.34 The Strategic Business Plan 2020-2025 is supported by the Highways England Delivery Plan 2020-2025 which provides the detail of specific funding, activities and projects Highways England will deliver over the five years. It also discusses how Highways England approach efficiency and risk management. The Delivery plan includes a performance framework, which brings together all the delivery aims for the Second Road Period.

National Infrastructure Delivery Plan, 2016- 2021

- 3.2.35 The National Infrastructure Delivery Plan (NIDP) 2016-2021 (produced by the Infrastructure and Projects Authority) outlines details of £483 billion of investment in over 600 infrastructure projects and programmes across the UK to 2020-21 and beyond.
- 3.2.36 The NIDP focuses specifically on nearly £300 billion of infrastructure that will be delivered over the next 5 years to 2020-21.
- 3.2.37 Chapter 3 of the NIDP sets out how the Government is investing over £15 billion to support the transformation of the SRN, with over 100 major schemes completed or in construction by the end of 2020-21. Ministers have established

a clear regulatory framework, setting up investment periods with legally-guaranteed funding levels. The first of these, Road Period 1, runs from 2015 to 2020. The goals and objectives of Road Period 1 are detailed within RIS1.

- 3.2.38 Currently there is no National Infrastructure Plan for beyond 2020, however the Government have produced the National Infrastructure and Construction Procurement Pipeline 2020/21 in June 2020, which is a forward-looking pipeline of planned procurements for the 2020/21 financial year in economic and social infrastructure. This analysis document, published alongside the procurement pipeline data, provides insights across the wide range of infrastructure the UK is planning to procure over the coming year. The A47 is not included in the projects for this year.
- 3.2.39 Projects where contracts have already been awarded or where funding has already been drawn down will not be included in the procurement pipeline. Projects in the early stages of development are also not included in the procurement pipeline for 2020/21. This pipeline sets out those procurements that are planned to go to market in 2020/21, some of which will be awarded within this financial year and others to be awarded in future years.

National Infrastructure Strategy Plan, November 2020

- 3.2.40 HM Treasury, advised by the National Infrastructure Commission, presented the National Infrastructure Strategy Plan to Parliament in November 2020. It sets out the government's plans to deliver a radical improvement to the UK's infrastructure system delivering projects better, greener and faster, underpinned by high levels of government investment. It aims to:
- boost growth and productivity across the whole of the UK, levelling up and strengthening the Union
 - put the UK on the path to meeting its net zero emissions target by 2050
 - support private investment
 - accelerate and improve delivery.
- 3.2.41 The foundational role of high quality infrastructure in relation to economic growth is emphasised, particularly in current times in the UK's recovery from the COVID-19 pandemic. The 2020 Spending Review pledges £27 billion in 2021 to develop the economic infrastructure sectors, including transport. Further, it states, *"continuing to progress the UK's ambitious infrastructure plans in all parts of the country is vital to the recovery of the construction sector, and the economy as a whole"*.

Summary of National Policy Context

- 3.2.42 The Scheme complies with national planning policy in that the Government has highlighted the express need for further growth and improvements to the national networks within the NNNPS and in the recently published National Infrastructure Strategy Plan.
- 3.2.43 The criteria identified within NNNPS are met with mitigation measures incorporated into the Scheme to reduce any unavoidable impacts on the surrounding environment. Any residual impacts are not without sufficient justification.

- 3.2.44 Highways England's RIS, which explores these needs in further detail, has supported the Scheme as a required improvement to the network. The Highways England Delivery Plan, built on the HE Strategic Business Plan lists the A47 Blofield to North Burlingham under the "Major Improvements Investment Plan Scheme Schedule 2015-2020".
- 3.2.45 The Scheme meets the environmental and sustainable objectives of the NPPF, providing mitigation where unavoidable impacts occur. The Scheme as submitted will improve safety along this section of the A47, improved journey times and network resilience.
- 3.2.46 Highways England has engaged with the planning system, communities and the development industry to ensure the delivery of sustainable development and, thus, economic growth, whilst safeguarding the primary function and purpose of the SRN in line with the requirements of Circular 2/2013.

3.3 Sub-Regional Policy

New Anglia Strategic Economic Plan, 2014

- 3.3.1 The Plan states that the Local Enterprise Partnership's local transport priorities reflect the adopted Norwich Area Transportation Strategy and identifies Blofield to North Burlingham as a National Network Improvement (Road) for 'dualling'. It states that improvements at the A47 are needed to improve access to enterprise zone sites, such as those in Great Yarmouth and Lowestoft.

New Anglia Local Enterprise Partnership (LEP) Norfolk and Suffolk Unlimited Economic Strategy, 2017

- 3.3.2 The Economic Strategy produced by the New Anglia LEP in November 2017 seeks to address the regions' shortfalls and potential growth locations. Improvements to the A47 are identified as key to improve the region's internal connectivity and links to wider markets. The document states, "*we are committed to securing the full dualling of this major artery between East Anglia to the Midlands, which would unlock growth along its route, including significant commercial and housing developments as well as improve job opportunities in locations.*"

New Anglia LEP Integrated Transport Strategy (ITS), 2018

- 3.3.3 The In May 2018, the New Anglia LEP produced An Integrated Transport Strategy for Norfolk And Suffolk ('ITS') which highlighted the congestion in, amongst others, the critical east-west growth corridors along the A47 from Lowestoft and Great Yarmouth to King's Lynn. The ITS aims to '*ensure a resilient SRN that is agile to future opportunities, the timely delivery of already committed schemes and certainty that the A47 amongst others would feature prominently in future Roads Investment Strategies by strengthening relationships with Highways England*'.

New Anglia Norfolk and Suffolk Limited, Draft Local Industrial Strategy, 2020

- 3.3.4 The Draft Local Industrial Strategy awaits Government approval. It reflects the opportunities and needs of Norfolk and Suffolk's growing economy and how it will respond in a fast-changing world setting out specific actions that will drive productivity and growth across the economy as a whole. Improvements to the A47 are mentioned and it is states that Committed improvements to date through

the RIS will deliver significant benefits, but additional investment on the A47 could further drive growth opportunities for Norfolk and Suffolk.

The A47 Alliance

- 3.3.5 The A47 Alliance brings together the business community, local authorities, MPs and stakeholders along the whole of the trunk road route between Peterborough and Lowestoft. The Alliance is calling on the Government to commit funding to fully dual the A47 by 2030 and specifically to prioritise upgrading sections from single to dual carriageway by 2025.
- 3.3.6 A number of technical papers supporting the case for improvements are on the A47 Alliance website. In 2019 the Alliance produced its latest brochure: *The A47 Investing in East-West Success* which details why in their opinion getting the A47 fully dualled is vital to the East of England's businesses and economic growth.

Summary of Sub-Regional Policy

- 3.3.7 There is a strong drive in the Norfolk and Suffolk Regions for sustained economic transformation and growth to build upon the area's strong employment rate and its specific strengths in energy generation and usage, and hi-tech sustainable agri food. The development of the trunk road network is seen as key to economic delivery – jobs, business and housing, including access to Enterprise Zones, particularly along the critical east-west growth corridor of the Region. The New Anglia LEP Integrated Transport Strategy highlights the cross-party, cross-county support for the A47 dualling while the A47 Alliance in particular brings together the Chamber of Commerce, Local Authorities, LEPs, MPs and other stakeholders who support dualling of the A47 in its entirety. The Scheme is therefore an essential and integral part of the Region's drive for economic success articulated in the objectives of the various sub regional policy documents

3.4 Local Development Plans and Local Transport Plan Policy

Local Development Plans

- 3.4.1 The Scheme is wholly located in the Broadland District Council area, within the county of Norfolk. Broadland's current local plan is made up of several documents as detailed below.

Joint Core Strategy (JCS) for Broadland, Norwich and South Norfolk, 2011, amended 2014

- 3.4.2 Para 3.19 of the JCS acknowledges the congestion issues on the A47 to the east of Norwich "The A47 and A12 to the east of the JCS area, connect to Great Yarmouth and Lowestoft, which are coastal resorts and industrial towns with significant regeneration needs. The development of Eastport at Great Yarmouth will provide access to continental Europe. However, the A47 to the east of Norwich has significant limitations."
- 3.4.3 *Policy 1: Addressing Climate Change and Protecting Environment Assets* recognises the importance of minimising the need to travel and give priority to low impact modes of travel and highlights the need to develop and maintain green infrastructure networks.
- 3.4.4 Policy 5 seeks to develop the local economy in a sustainable way to support jobs and economic growth both in urban and rural locations. The JCS states that achieving the full economic potential of the area is dependent on improved

connectivity, including the implementation of the priorities set out in the sustainable transport policy and maintaining and enhancing the environment and quality of life in the area.

- 3.4.5 Policy 6 of the JCS seeks to improve the transportation system in order to develop the role of Norwich as a Regional Transport Node, particularly through the implementation of the Norwich Area Transportation Strategy (2003) and will improve access to rural areas. One of the ways this will be achieved is “*by promoting improvements to the A11 and A47*”. The policy recognises that supported strategic improvements to aid delivery and economic success include A47 improvements to reduce the significant stretches that remain single carriageway.
- 3.4.6 *Policy 9: Strategy for growth in the Norwich Policy Area* states that opportunities will be sought to enhance green infrastructure throughout the area, with particular emphasis on priority areas. This includes public rights of ways including local footpaths. Blofield is within the Norwich Policy Area.

Development Management Development Plan Document (DPD) adopted August 2015

- 3.4.7 Development Management DPD seeks to further the aims and objectives set out within the NPPF and JCS. It therefore includes more detailed local policies for the management of development.
- 3.4.8 There are certain sites identified within the site Allocations DPD adjacent to the A47 such as site reference BLO1: Land south of A47 and north of Yarmouth Road, Blofield, approximately 9.9ha to be developed in accordance with planning permission reference 20111303. This will include a mixed used development to deliver 175 dwellings, a maximum floor space of 4000m² B1 Class Use and open space.

Site Allocations DPD adopted May 2016

- 3.4.9 The Site Allocations DPD sets out those sites across the district that are suitable for certain forms of development. There are certain sites identified which are adjacent to the A47 such as site reference BLO1: Land south of A47 and north of Yarmouth Road, Blofield, approximately 9.9ha to be developed in accordance with planning permission reference 20111303. This will include a mixture used development to deliver 175 dwellings, a maximum floor space of 4000m² B1 Class Use and open space. This allocation has been taken into account in this TA.

Blofield Neighbourhood Plan, 2016

- 3.4.10 The Plan covers the period up to 2036 and now forms part of the development plan for the District. It is one of the main considerations in determining any future planning applications submitted in Blofield.
- 3.4.11 The Plan states that “The parish of Blofield is bisected by the A47 trunk road, which severs Blofield Heath from Blofield. Safe access from and onto the A47 at the east end of Blofield is of concern to residents and businesses. Delays joining the A47 at the west end of Blofield (Brundall parish) getting onto the roundabout, are most likely to increase with a growing parish population.” As a rural parish there is a high dependency on the car. Public transport is not convenient enough to alleviate this. Car ownership is high with only 10% of households having no

access to a car or a van. An objective of the plan is to achieve the best possible road infrastructure for the parish. 'Policy TRA1: Local Traffic Generation'.

Greater Norwich Local Plan (pending adoption):

- 3.4.12 The Greater Norwich Local Plan ('GNLP') is emerging policy which plans for the housing and job needs of the area to 2026 and the GNLP will ensure that these needs continue to be met to 2036.
- 3.4.13 The GNLP will also include strategic planning policies to guide future development and plans to protect the environment. It will look to ensure that delivery of development is done in a way which promotes sustainability and the effective functioning of the whole area.

Local Transport Policy

Norwich Area Transportation Strategy, 2003, updated in 2004 with Implementation Plan in 2010

- 3.4.14 The Norwich Area Transportation Strategy (NATS) summarises the characteristics of the Norwich area, existing and predicted future travel patterns, and transport problems and issues in the Norwich area. It has evolved and delivered improvements over a number of years. Blofield to North Burlingham works are not specifically mentioned within the document.

Norwich Area Transportation Strategy, 2003, updated in 2004 with Implementation Plan in 2010

- 3.4.15 The Norwich Area Transportation Strategy (NATS) summarises the characteristics of the Norwich Area, existing and predicted future travel patterns, and transport problems and issues.
- 3.4.16 Blofield to North Burlingham is not specifically mentioned within the document though there is support for other parts of the A47 Improvement Programme.

Greater Norwich Infrastructure Plan (GNIP), 2020

- 3.4.17 The GNIP discusses housing growth and identifies the delivery of approximately 500 dwellings at various sites around Blofield and Brundall. Appendix A within the GNIP identifies all the currently planned strategic infrastructure projects. Approximately 500 dwellings are permitted and underway in the Blofield / Brundall area.
- 3.4.18 Under 'Green Infrastructure – Projects being progressed and delivered', the Plan identifies three projects that are relevant to the Scheme (all of which also feature in the East Broadland Green Infrastructure Plan). These are the Burlingham Trails Cycling and Walking Routes, the A47 Safe Foot and Cycle Crossing and the Link from Blofield to Blofield Heath.

Summary of Local Development Plan and Local Transport Plan Policy

- 3.4.19 The Broadland's Development Plan highlights existing congestion on the A47 and the limitations inherent for users and potential investors in the area where economic growth is sought. This is interdependent with improved connectivity particularly in rural areas where there is high car dependency and a growing population. The Blofield Neighbourhood Plan also presents concerns regarding the need for safer access to the A47 east and west of Blofield. It is an

objective of this Plan to achieve the best possible road infrastructure for the Parish.

- 3.4.20 The Broadland's Development Plan actively supports dualling improvements by restricting the development of land adjacent to the single carriageway sections so that it is available for potential future improvements by the Applicant. The single lane carriageway between Blofield and Acle is specifically identified as requiring improvement to dual status to support local demand and growth aspirations on the corridor.
- 3.4.21 The Plan also highlights the importance of creating attractive communities where healthy travel choices are available, noting the commitment to climate change and green infrastructure including public rights of way.
- 3.4.22 The Scheme meets Development Plan objectives in relieving congestion for the benefit of users and potential investors, will result in safer connections and a reduction in accidents and provides for improved footpath and cycle way connections to support the provision of sustainable travel.
- 3.4.23 The Scheme also supports the priorities of the current and emerging NCC Local Transport Plan in supporting growth, improving a strategic connection and improving safety and access for current users while providing for future proposed and committed residential and business developments in the area.

4 EXISTING SITE INFORMATION

4.1 Overview

4.1.1 This chapter provides an overview of the existing location of the Scheme the current layout of the road network as well as the existing and proposed land uses in the vicinity of the Scheme.

4.2 Location of the Scheme

4.2.1 The A47 from Blofield to North Burlingham is located approximately 6 miles to the east of Norwich and forms part of the main arterial highway route connecting Norwich and Great Yarmouth. The Scheme is an offline alignment running parallel to the south of the existing A47. The layout extents are shown in the General Arrangement Plans **(TR010040/APP/2.6)**.

4.2.2 The surrounding area is a generally flat and low-lying landscape. It has limited topographic variation and slopes gently from west to east, becoming flatter as it merges with the Broads.

4.2.3 The area is also characterised by isolated farmsteads and small, nucleated villages with local businesses and retail outlets which are linked by a network of local access roads. Larger populations include Blofield to the west, Acle to the east and North Burlingham located centrally to the Scheme, adjacent to the eastbound carriageway of the existing A47.

4.2.4 In the immediate vicinity of the existing A47 there are agricultural fields enclosed by hedgerows with mature trees and small areas of woodland. The existing A47 is partially lined by mature trees and hedgerows but is more widely characterised by a context of open arable farmland with limited field boundary vegetation.

4.3 Permitted and Existing Use of the Site

The Transport Network

4.3.1 The existing single carriageway layout is in general between 7.3 and 7.9m wide with central markings to delineate east and west bound traffic. From the west the horizontal alignment of the carriageway is a series of straight sections linked by short and tight radius curves. There are no notable structures across the A47 east of Blofield until the village of Acle, two miles east of North Burlingham.

4.3.2 The speed limit on the dual carriageway at either end of the Scheme is the national speed limit; with the single carriageway section being a 50mph limit.

4.3.3 There are nine at grade priority junctions along the Scheme section. From west to east the following side roads and junction types are noted:

- Yarmouth Road and High Noon Lane – Priority Junctions
- High Noon Lane - Priority Junction
- Lingwood Road – Priority Junction
- Dell Corner Lane – Priority Junction
- Main Road – Priority Junctions with eastbound exit link
- Lingwood Lane – Priority Junction

- Main Road – Priority Junction left out only
- B1140 South Walsham Road – Priority Junction
- B1140 White House Lane – Priority Junction

- 4.3.4 The Yarmouth Road and High Noon Lane Priority Junction consists of two T-junctions which are located on directly opposite sides of the A47. At this location the A47 is dual carriageway. A central reservation in the dual carriageway alignment provides a gap in the central barrier allowing traffic to make right turns from both of these access roads.
- 4.3.5 The B1140 accesses the A47 from both the north and south sides of the corridor. This entails that B1140 through traffic will have to make a staggered movement across the A47.
- 4.3.6 There are direct accesses from the A47 into surrounding fields, one farm access track and one direct property access.
- 4.3.7 There are lay-bys on both sides of the highway at the start of the single carriageway section travelling eastbound, a lay-by on the north side mid-way and on the south side before the recommencement of the dual carriageway.
- 4.3.8 There is no lighting present on this section of the A47 until the transition to dual carriageway at the eastern end.

Walking, Cycling and Horse-riding

- 4.3.9 Limited, discontinuous sections of footway adjacent to the highway are provided along the Scheme, including the provision of tactile paving and dropped kerbs. A number of Public Rights of Way (PRoW) are also present in the vicinity of the Scheme. Further details on the existing walking, cycling and horse-riding facilities are set out below in Section 5.8. A Walking, Cycling and Horse-riding (WCHR) assessment was undertaken and the outcome is provided in ES Chapter 12 Population and Human Health (**TR010040/APP/6.1**).

4.4 Existing and Proposed Land Use in the Vicinity of the Scheme

Existing Land Use

- 4.4.1 The dominant land use along the Scheme section is agriculture. The majority of the fields located around the A47 are used for arable farming, indicating that the soils are of good quality. Some fields are used for grazing livestock. There are few features of interest in the landscape. Fields are large in size with hedgerow or fencing along the boundaries. Woodland is limited, although north of North Burlingham there are locally important areas of plantation and semi-natural woodland. South of the A47 around the farm at Lingwood Road, community woodland has been planted.
- 4.4.2 The majority of private land (residential housing), within the vicinity of the Scheme section is located in the villages of Blofield, North Burlingham, Acle and Lingwood. Strategic long-distance trips from these villages will use the A47 to travel east and west to access the wider transport network. Scattered isolated properties are located along the minor road network around the vicinity of the Scheme section.
- 4.4.3 Community facilities such as schools, shops and churches are also concentrated within the villages. Other community facilities on the outskirts of the villages are

Norwich School of Horticulture, Norwich United Football Club and Blofield community allotments.

Planned Developments

- 4.4.4 Table 4-1 provides details of the planned developments which have been included in the modelling uncertainty log. The developments identified in the uncertainty log are attributed a status regarding their likely. Table 4-1 provides details of the planned developments which are regarded as “near certain” or “more than likely”. Further information can be found in Section 6.3 and Table 6-1 of this assessment.
- 4.4.5 Figure 4-1 shows the location of the planned developments in the local area. These developments are primarily located in Blofield or along Yarmouth road between Brundall and Blofield. In total nine identified development sites are situated in the Blofield-Brundall area and one site is located north of Norwich Road in Acle.
- 4.4.6 Included in the list of planned developments is a residential and retail development located on land to the north east of Brundall village, to the west of Blofield. The site is bounded by Yarmouth Road and Berryfields Road Brundall. This planned development includes a projected 192 dwellings and a retail site area of around 2300 sqm.
- 4.4.7 In addition to the ‘Yarmouth Rd & Berryfields’ Brundall site a planned residential development of 175 dwellings is situated further east along Yarmouth road, north west of Blofield village. The ‘Blofield: Land at Yarmouth Road’ site is bounded between the A47 on the north, Yarmouth road on the south and the local access road Globe Lane to the east.

Table 4-1: Local planned developments

Site Reference	Site name	Parish	Type	Size		
				sqm	Other	Unit
2	Blofield: Land off Wyngates	Blofield	Residential	-	64	Dwellings
5	Blofield: Land East of Plantation Road	Blofield	Residential	-	14	Dwellings
6	Blofield: Land Adj. 20 Yarmouth Road	Blofield	Residential	-	30	Dwellings
7	Blofield: Land South of Yarmouth Road and North of Lingwood Road	Blofield	Residential	-	80	Dwellings
8	Blofield: Land South of Yarmouth Road and North of Lingwood Road, Phase II	Blofield	Residential	-	30	Dwellings
9	Blofield: Land at Yarmouth Road	Blofield	Residential	-	175	Dwellings
10	Brundall: Land to west of Cucumber Lane	Brundall	Residential	-	7	Dwellings
48	Acle: Land North of Norwich Road	Acle	Residential	-	137	Dwellings
881	Residential development & retail development Yarmouth Road & Berryfields Brundall	Blofield	Residential		192	Dwellings

Site Reference	Site name	Parish	Type	Size		
				sqm	Other	Unit
881	Residential development & retail development Yarmouth Road & Berryfields Brundall	Blofield	Retail	2261		Area

Figure 4-1: Local planned developments



Source: SWECO. This Map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Highways England 100030649 2016.

4.5 Abnormal Load Uses

4.5.1 Abnormal load users travel across the A47 Scheme section as a part of longer distance east to west strategic movements. The principle trip generator for these abnormal load vehicles is the Great Yarmouth port. The port of Great Yarmouth site is situated along both sides of the river Yare and is accessed by South Beach Parade and the A1243 South Denes Road. The port contains a deep-water outer harbour providing strategic access to the North Sea and northern Europe. Abnormal load user trips from the port can gain access to the A47 from the A149/Runham Road/A47 roundabout in Runham to the north west of Great Yarmouth.

4.6 Air Quality Management Area

- 4.6.1 There are no Air Quality Management Areas (AQMAs) currently declared in Broadland District Council. The closest AQMA is located over 6 miles to the north-east, within Norwich City Centre. Norwich City Council declared the AQMA for the exceedances of the annual mean nitrogen dioxide (NO₂) objective in 2012.

5 BASELINE TRANSPORT DATA

5.1 Introduction

5.1.1 This chapter of the TA provides a summary of the baseline data collection used for the assessment of the Scheme and the development of the highway assignment and microsimulation models. This includes the collection of volumetric traffic count data, network data and vehicle journey time data. This data is used in the model development process to calibrate and validate the baseline in order to provide a stable basis to undertake the future year assessment of the Scheme.

5.1.2 In addition to the traffic data collection, reported accident data information has been sourced to inform the road safety assessment. Public transport, walking and cycle information has also been sourced to inform the assessment of the WCHR impacts.

5.2 Road Network and Traffic Movement Data

5.2.1 Highways England have developed a series of regional traffic models under a consistent framework to support the delivery of the schemes identified in the RIS. The entire SRN and major associated links in England are represented in five strategic models representing the north, the trans-Pennine south or “Northern Powerhouse” area, the midlands, the south-west and the south-east. The South East Regional Transport Model (SERTM) was used in the development of this scheme.

5.2.2 Provisional trip matrices were constructed using mobile phone data. The SERTM models network and mobile phone prior matrix traffic movement data were therefore adopted in the study to inform the development of the Blofield Scheme assessment 2015 base year model.

5.2.3 In addition to SERTM data, Google Earth Pro and TrafficMaster data have been used as data sources for traffic highway network development. Traffic signal data has been sourced from Norfolk County Council.

5.3 Traffic Flows

5.3.1 A range of traffic surveys have been undertaken along the A47 Blofield Scheme section and across the surrounding network in 2015, 2016 and 2019. The traffic surveys in 2015 and 2016 provide the input traffic flow data for the development of the base year strategic highway model whereas the 2019 provides the input traffic data for the operational models.

5.3.2 In June 2015 12-hour Manual Classified Turning Counts (MCTC) surveys were undertaken to observe the traffic flows along the A47 corridor. In addition to providing the number of vehicles, vehicle speeds and classifications were also recorded.

5.3.3 To supplement the 2015 data additional MCTC and Automated Traffic Counts (ATCs) were undertaken during the months of May, June and July 2016. Figure 5-1 and Figure 5-2 below show the extent of the 2015 and 2016 traffic flow data collection. The ATC surveys were undertaken over a 14-day period, for 12 hours a day collecting traffic data 15 minutes intervals. In summary, the 2015 data

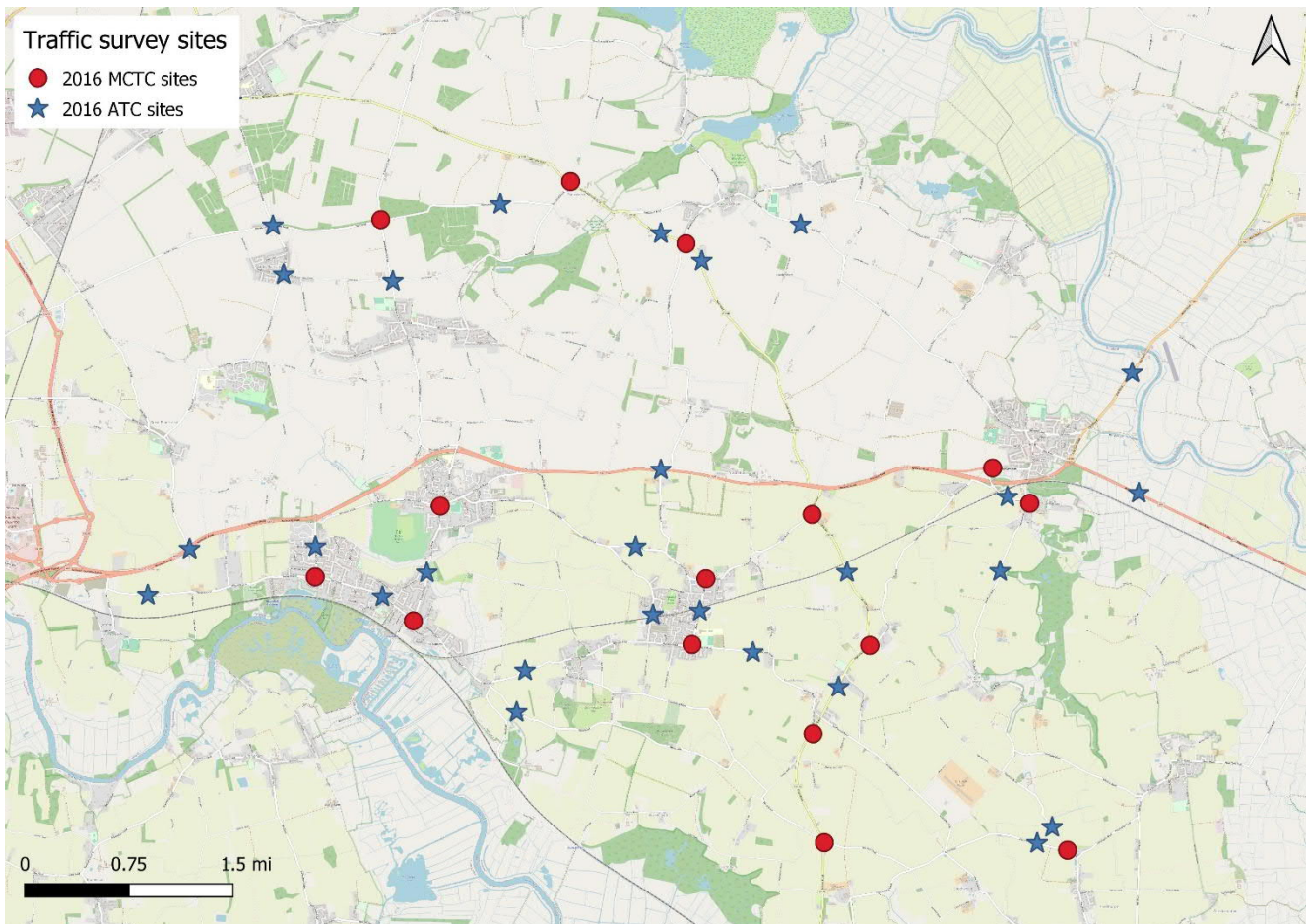
collection study focused primarily on the A47, whereas the 2016 data collection covered the wider surrounding area.

Figure 5-1: 2015 traffic survey sites



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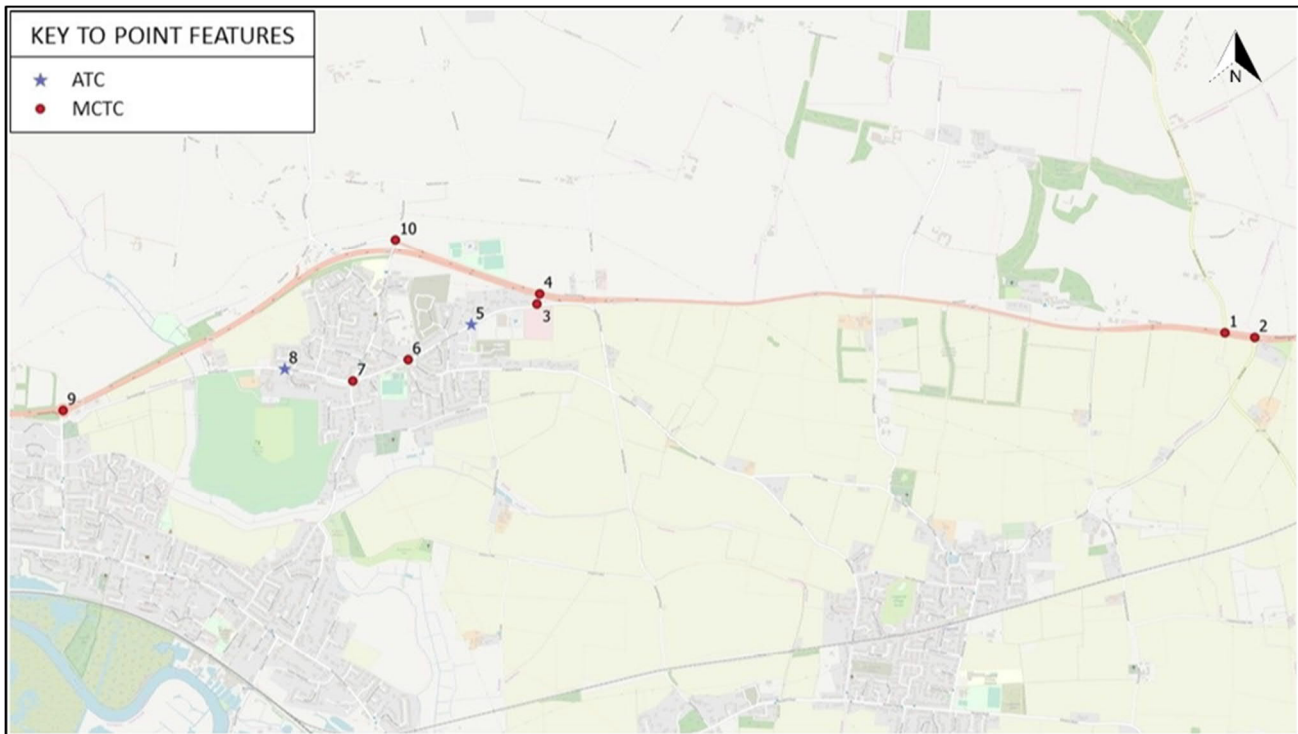
Figure 5-2: 2016 survey sites



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5.3.4 In October 2019, further traffic surveys were undertaken to inform the local junction modelling. Figure 5-3 shows the location of the 2019 survey sites, this data exercise involved collecting traffic data on the local roads as well as recollecting data on a number of sites included in 2015 and 2016. Therefore, the 2019 survey information was used to update the microsimulation model. In addition to this, as the 2019 surveys were undertaken in October they capture the extra HGV demand on the local road network, including B1140 White House Lane, generated from the British Sugar PLC during its seasonal period.

Figure 5-3: location of 2019 survey sites



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5.4 Congestion and Queuing

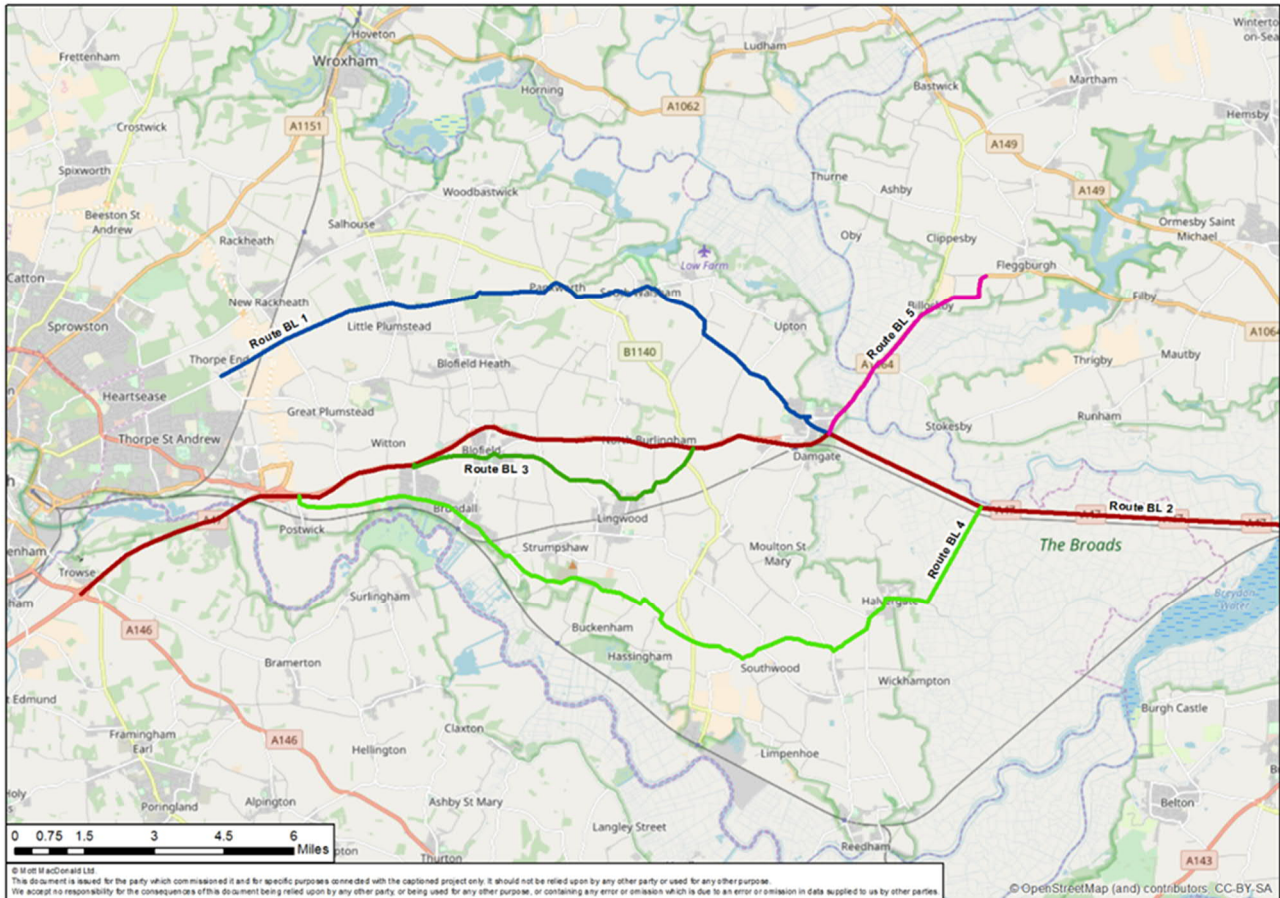
5.4.1 Queuing data was collected as part of the 2015 traffic surveys. During the 2015 data collection exercise queue length surveys were undertaken concurrently with the MCTCs surveys.

5.5 Journey Times

5.5.1 TrafficMaster data was obtained for the period October 2014 to September 2015. From this data a neutral month was extracted to inform the traffic modelling assessment. WebTRIS3 journey times were also utilised in the traffic modelling validation assessment to supplement the TrafficMaster data. WebTRIS data was available along the A47 corridor for neutral months in 2015. Figure 5-4 below shows the Blofield journey time routes.

³ WebTRIS is a open data source of traffic flow information provided by Highways England at <https://webtris.highwaysengland.co.uk/>

Figure 5-4: TrafficMaster journey time data



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5.6 Accidents

5.6.1 Department for Transport Stats19 accident data records have been analysed, over the 2014-2018 period, to identify all reported accidents which have occurred across the Scheme impact area. The data set includes details of all recorded slight, serious and fatal accidents across the five-year time period. This information has been adopted to provide the total observed accidents as an input to the COBA-LT (Cost-Benefit of Accidents - Light Touch) modelling assessment.

5.7 Public Transport Facilities

5.7.1 East Anglia rail services include connections between Cambridge and Ely. At Ely the rail line branches off westwards towards Peterborough, northwards towards Kings Lynn and eastwards towards Norwich, Great Yarmouth and Lowestoft. Rail services between Norwich to London Liverpool Street are also connected via Ipswich. The services are currently operated by Abellio Greater Anglia, East Midlands and Thameslink Great Northern.

5.7.2 The Wherry railway line, which connects Norwich to Great Yarmouth and Lowestoft, operates approximately a mile south of this section of the A47. Brundall and Brundall Gardens Stations are the closest to the residential area of

Blofield. Lingwood and Acle Stations are the closest to the residential area of North Burlingham.

5.7.3 There are a number of bus services that operate end to end along the corridor. First Group operates the Excel X1/X11 service along the A47/A12 corridor connecting Peterborough, King's Lynn, Norwich, Great Yarmouth and Lowestoft. The closest park and ride site is located at Postwick approximately three miles from Blofield and outside of the Scheme boundary. Table 5-1 summarises the bus stops, services and railway stations within the vicinity of the Scheme.

Table 5-1: Bus stop locations, railway station locations and services

Bus stop location	Bus service	Frequency	Route	Interchange information
Blofield, opposite surgery	15	hourly	Blofield Heath – Acle – Wymondham via Norwich	Brundall Railway Station
Blofield, opposite surgery	5A	hourly	Eaton – Blofield Heath	Brundall Railway Station
Acle, Beighton Road	15	hourly	Blofield Heath – Acle – Wymondham, via Norwich	Brundall Railway Station
Acle, Kings Head	71A	Single service weekdays	Acle – Ranworth- Wroxham	N/A
Acle, Kings Head	72A	2 services AM / 3 services PM	Thurne – Fleggburgh – Martham – Hemsby - Acle	N/A
Acle, opposite Budgens	73A	Single service AM / single service PM	Acle – Cantley – Reedham – Freethorpe - Acle	N/A
Acle, opposite Budgens	73C	2 services AM / single service PM	Acle – Cantley – Reedham – Freethorpe – Acle -Great Yarmouth	N/A
Acle, Kings Head	491	3 services per day	London – Great Yarmouth	N/A
Acle, Kings Head	X1	½ hourly	Norwich – Great Yarmouth – Gorleston - Lowestoft	N/A
Acle, Kings Head	X11	½ hourly	Norwich – Great Yarmouth – Gorleston - Belton	N/A
Railway station location	Train service	Frequency	Route	Interchange information
Acle	Greater Anglian	hourly	Norwich – Great Yarmouth	24 cycle storage spaces with 4 lockers
Lingwood	Greater Anglian	hourly	Norwich – Great Yarmouth	8 cycle storage spaces with 2 lockers
Brundall	Greater Anglian	hourly	Norwich – Great Yarmouth	10 cycle storage spaces
Brundall	Greater Anglian	Every 2 hours	Lowestoft	10 cycle storage spaces
Brundall Gardens	Greater Anglian	hourly	Norwich – Great Yarmouth	8 cycle storage spaces

5.8 Pedestrian, Cycling and Horse-riding Facilities

- 5.8.1 Walking, Cycling and Horse-riding (WCHR) assessment was undertaken and the outcome is provided in Chapter 12 Population and Human Health of the ES **(TR010040/APP/6.1)**.
- 5.8.2 In term of pedestrian facilities, a footway approximately 1.8 metres wide is provided on the northern frontage of the existing A47 between its junction with Dell Corner Lane and a point 80 metres in a westerly direction (towards the Old Post Office).
- 5.8.3 A footway approximately 1.8m wide is provided on the northern frontage of the existing A47 between its junctions with Dell Corner Lane and Main Road, a distance of 230 metres in an easterly direction.
- 5.8.4 A further section of footway approximately 1.8m wide is provided on the northern frontage of the existing A47 at a point 50m west of its junction with The Windle for 1.32km to the junction of Norwich Road via the eastbound off-slip for Acle, Reedham and Upton.
- 5.8.5 There are a number of Public Rights of Way (PRoW) in the vicinity of the improvement Scheme which have been identified using Norfolk County Council's interactive PRoW mapping tool and the detailed descriptions of the routes are taken from the Definitive Statements which accompany the Definitive PRoW Map.
- 5.8.6 The locations of each PRoW are shown in Figure 5-5 with the routes described in Table 5-2.

Figure 5-5: Location of PRoW and permissive routes (ES Figure 12-1 (TR010040/APP/6.3))

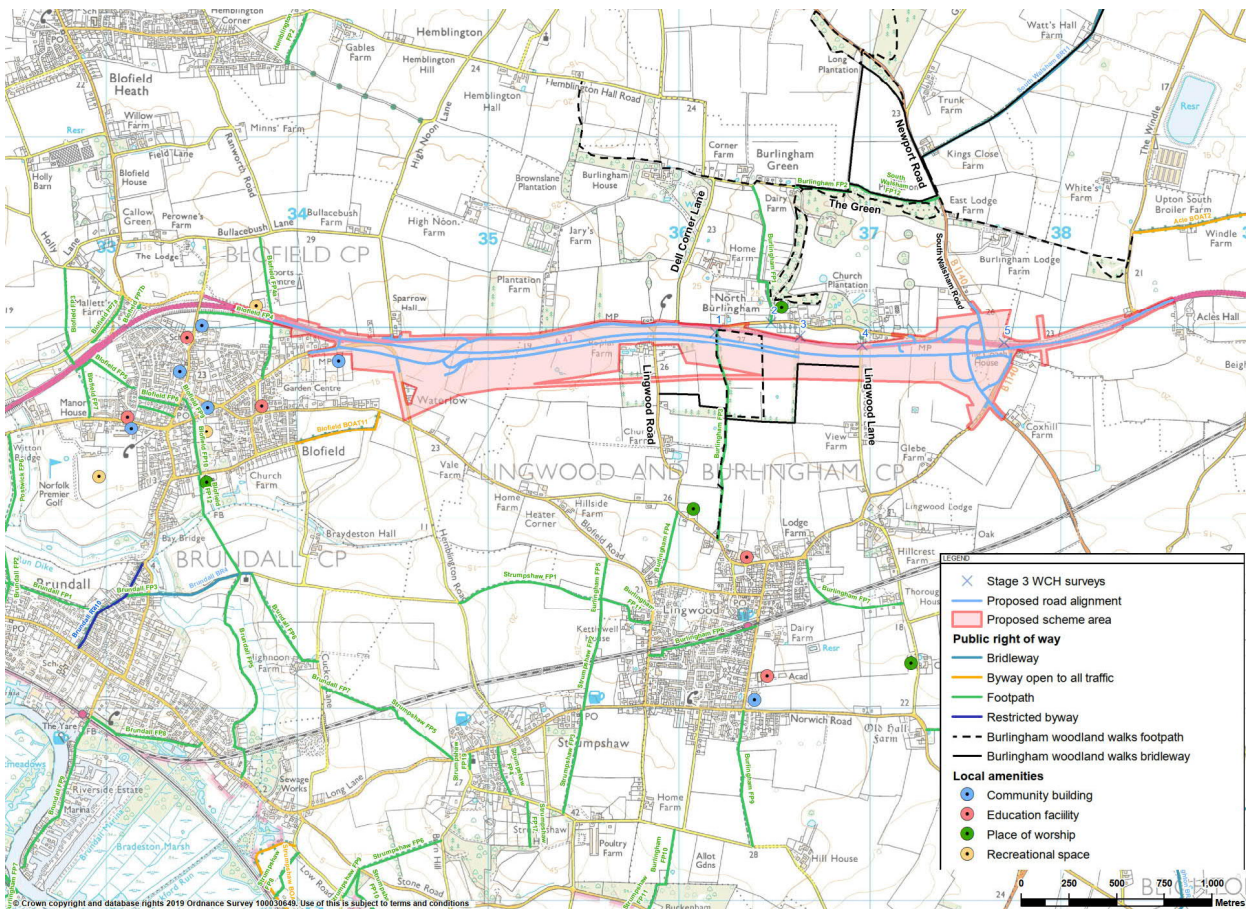


Table 5-2: PRoW in the vicinity of Scheme

Reference	PRoW Name	Description
1	Blofield FP4	“ <u>Footpath No. 4</u> (Norwich – Yarmouth Road to Plantation Road). Starts from the former Norwich-Yarmouth Road immediately to the west of Turret House and runs in a north north-easterly direction for a short distance, then turns northwards and continues to the south side of the Blofield Bypass, a distance of approximately 290 metres. It then runs mainly westwards to join Plantation Road.”
2	Blofield FP4A	“ <u>Footpath No. 4A</u> Starts on the north side of the Blofield Bypass and runs northwards to join Bullacebush Lane.”
3	Blofield (BOAT) 11	“ <u>Byway Open to All Traffic No. 11</u> (Pound Lane). Starts from Pound Lane at the point where Pound Lane turns southwards into Braydeston Hall Road. It leads in a generally easterly direction from some 420 metres then turns east of north from 94 metres to enter Lingwood Road slightly east of a property call Red Tiles. The total length of the route is 514 metres.”
4	Burlingham FP1	“ <u>Footpath No.1</u> (Burlingham Green to Norwich-Yarmouth Road). Starts from the public highway at Burlingham Green and runs southwards to a point north west of St Andrew’s Church and then turns eastwards for a short distance then southwards again to enter the Norwich-Yarmouth Road at North Burlingham.”

5	Burlingham FP2	“ <u>Footpath No. 2</u> (Burlingham Green to Parish Boundary). Starts from the public highway at Burlingham Green by a field gate opposite Dairy Farm and runs in an easterly direction to the parish boundary where it joins South Walsham Footpath No. 12.”
6	Burlingham FP3	“ <u>Footpath No.3</u> (Norwich-Yarmouth Road to Lingwood Church Road). Starts from the Norwich-Yarmouth Road by a stile and runs in a southerly direction to enter Lingwood Church Road by a stile.”
7	South Walsham FP12	“ <u>Footpath No. 12</u> (North Burlingham Road to Parish Boundary). Starts from North Burlingham Road and runs in a westerly direction to enter Green Lane then turns southwards along Green Lane to the parish boundary where it joins Burlingham Footpath No. 2.”

5.8.7 In addition to the PRow, a number of permissive paths and bridleways are also located in the vicinity of the Scheme and have been identified from the Map of Burlingham Woodland Walks, a network of local leisure routes in the vicinity of North Burlingham. These are also shown in Figure 5-5 as a dashed black line for permissive footpaths and a solid black line for permissive bridleways

5.8.8 The definitions of each type of PRow and permissive route are summarised in Table 5-3.

Table 5-3: PRow definitions

Type	Definition
Footpath (FP)	If a path is used for walking only, it is a footpath. Footpaths are legally protected routes that the public can travel along by foot. These are different from footways (the pavement alongside a road), as they comprise the whole width of the highway. Footpaths are usually unsurfaced tracks (rarely surfaced or lit), open to walkers, runners and users of mobility vehicles or powered wheelchairs.
Bridleway (BR)	Bridleways are legally protected routes that the public can use on foot or on horseback. Cyclists are permitted to use the bridleways although, through the Countryside Act 1968, there is no obligation to facilitate cycling on the routes, and cyclists must give way to other users. Horse drawn vehicles are not permitted. Note. No PRow bridleways are present in the immediate vicinity of the Scheme.
Byway open to all traffic (BOAT)	These are open to all forms of traffic; pedestrians, horse riders, cyclists and car and other motor vehicle drivers.
Restricted byway (RB)	On restricted byways, individuals are permitted to use the route on foot, horseback, bicycle or horse-drawn carriage. Motorised vehicles are not permitted. Note, no restricted byways are present in the immediate vicinity of the Scheme.
Permissive footpath/bridleway	It is possible for landowners to allow access over their land without dedicating a right of way. These accesses are called permissive paths. To the user they are often indistinguishable from normal highways. Landowners have granted permission for the route to be used by the public, but they also have the right to withdraw that permission if they choose. They can also specify which user groups are permitted to use these routes, which can include cyclists, equestrians and pedestrians.

5.9 Pedestrian, Cycling and Horse-riding Movements

- 5.9.1 The Walking, Cycling, Horse-riding Assessment and Review (WCHAR) process has been undertaken as part of the Scheme. The outcome of the assessment is presented in Chapter 12 Population and Human Health of the ES (TR010040/APP/6.1).
- 5.9.2 As part of the WCHAR process walking, cycling and horse-riding (WCH) surveys were undertaken at the following locations along the Scheme, also indicated with a blue 'X' in Figure 5-5:
- the junctions of the A47 with:
 - Burlingham FP3
 - Lingwood Lane
 - B1140 and South Walsham Road
 - The field access (south of 16 Main Road)
 - the junction of Main Road with Burlingham FP1
- 5.9.3 The surveys were carried out between 7am and 7pm for 9 consecutive days between Saturday 26 May and Sunday 3 June 2018 using CCTV video cameras. In the main, the weather during the surveys was dry and bright.
- 5.9.4 The surveys recorded very low usage of Burlingham FP3 and the connecting permissive footpath on all weekdays and at the weekends and very few crossing movements of the A47 were observed. A maximum two-way flow over the 12hr survey period of less than five users was recorded using both routes in a weekday with only three users crossing the A47. A similar situation was observed during the Saturday survey periods whereas during the Sunday survey periods, a maximum two-way flow of 10 users was recorded using Burlingham FP3, the majority of which crossed the A47. All the recorded users were either lone pedestrians or dog walkers.
- 5.9.5 No users were observed crossing the A47 between the field access and the permissive footpath on any of the survey days.
- 5.9.6 A maximum two-way flow over the 12hr survey period of 6 users was recorded using the permissive bridleway on each survey day and these users were either lone pedestrians or dog walkers.
- 5.9.7 A maximum two-way flow over the 12hr survey period of 5 users was recorded crossing the A47 between Lingwood Lane and the short length of road leading to the centre of North Burlingham. On the weekdays, only pedestrians crossed the A47.
- 5.9.8 The surveys recorded high usage of Burlingham FP1, which runs north to south from Main Road to the north of North Burlingham, on weekdays and at weekends, especially on a Sunday. A maximum two-way flow over the 12hr survey period of around 70 users was observed on a weekday whereas the maximum flow on a Sunday was around 90 users. Only around 20 users were observed using the route on a Saturday. Based on the results for the various count points it can be deduced that very few or indeed none of the users of Burlingham FP1 continue on the footway of Main Road in either direction to access and cross the A47. This is not a surprising result given that one of the

recommended starting points for accessing the Burlingham Woodland Walks is the St Andrew and St Peter's Church car park located just off Main Road in North Burlingham and the vast majority of the walking routes lie to the north of North Burlingham and the existing A47.

5.9.9 The low numbers of users observed crossing the A47 may, in part, reflect the severance effect of the A47.

5.9.10 Very few movements were recorded at the junctions of the A47 with the B1140 and South Walsham Road on each of the survey days. The only crossing movements of the A47 to access the side roads were undertaken by cyclists with a maximum two-way flow over the 12hr survey period of nine users and this was observed on a Saturday.

5.10 Parking Facilities

5.10.1 In the vicinity of the Scheme, parking facilities are located in the villages of Blofield, North Burlingham, Acle and Lingwood. As discussed in Section 4 of this assessment, the surrounding area is predominantly rural and therefore has minimal public parking facilities.

5.10.2 Notable parking facilities are located at the following locations:

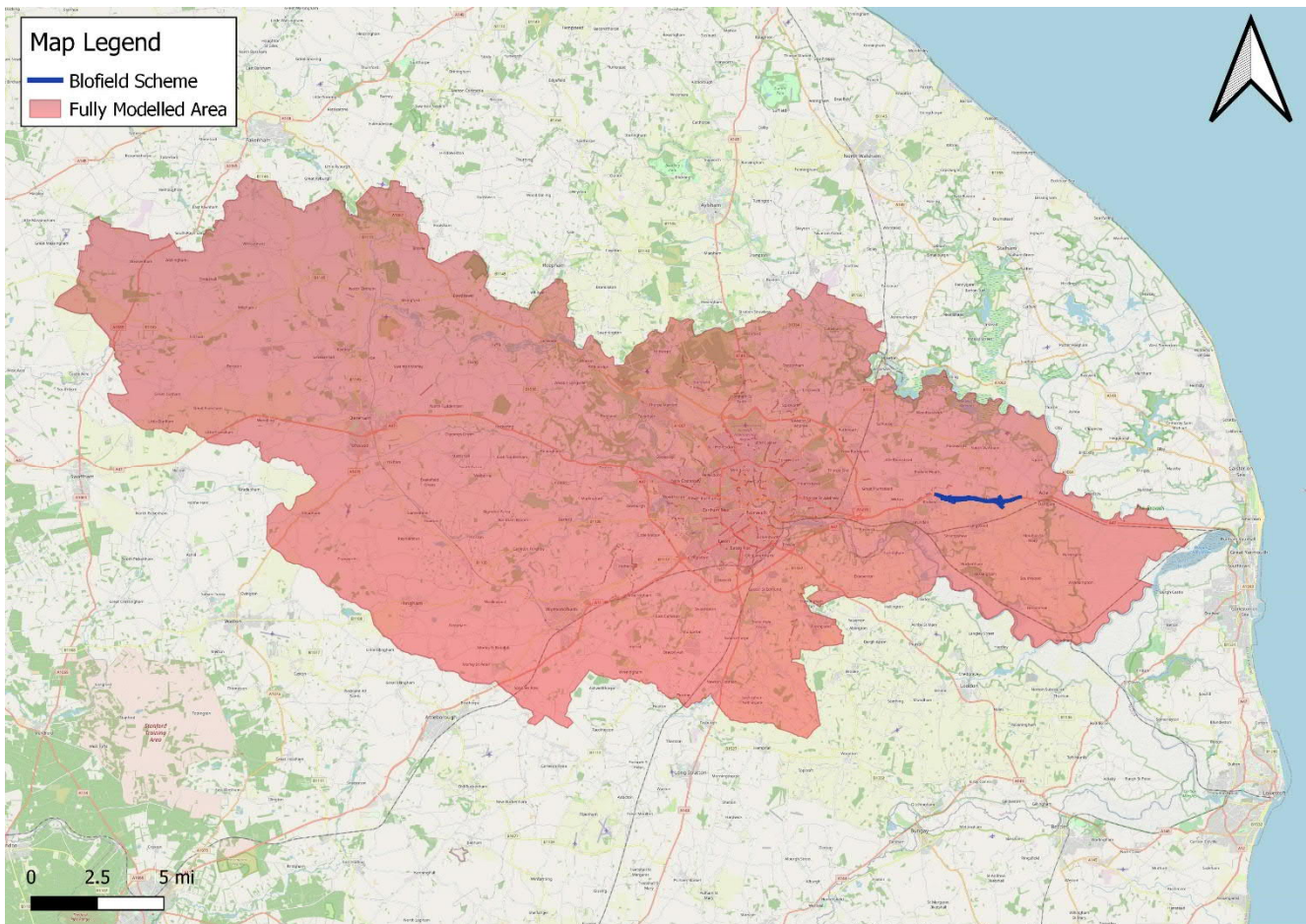
- Blofield - Kings Head Car Park, accessed from The Street
- Further parking facilities are provided for the following notable retail sites:
- Norwich Camping and Leisure – accessed from Yarmouth road, Blofield
- McDonalds Broadlands – accessed from Yarmouth road, Brundall
- British Wild Flower Plants – accessed from Main Street, North Burlingham
- Postwick Park and Ride (P&R) - located just off the A47, on the A1042, between Brundall and Norwich (at Postwick) approximately three miles from Blofield and outside of the Scheme area.

6 ASSESSMENT METHODOLOGY

6.1 Introduction

- 6.1.1 This section of the TA provides information on the A47 Blofield modelling assessment. The framework of the A47 Blofield modelling assessment has been developed to enable the comparative analysis of the existing single carriageway section and the proposed dual carriage way improvements against the Scheme objectives.
- 6.1.2 The modelling assessment comprises of a strategic multi-modal model which covers Broadland, Norwich and the surrounding area. The strategic modelling assessment is used as the basis to derive forecasted traffic impacts of the Scheme's performance across the wider area. The model utilised for the assessment of the Scheme is called the Norwich Area Transport Strategy Model (referred to as the NATS Model). The NATS model, utilised for PCF stage 3, has been developed in line with the DfT Transport Appraisal Guidance (TAG).
- 6.1.3 Local traffic models, including models of the A47/B1140 junction and Northern South Walsham Road Junction have been utilised to assess the Scheme's operational performance in the forecast year scenarios. Together these models are used to evaluate current and future conditions along the A47 single carriageway section and the immediate surrounding road network. The strategic model has been used to provide the initial assessment of any strategic implications of the Scheme, as well as the basis for forecasting future year traffic demand matrices. The purpose of the local junction model is to examine the operational performance of the Scheme on the A47 mainline, B1140 interchange slip road approaches as well the Scheme's A47\B1140 priority junctions.
- 6.1.4 Overview of the A47 Strategic Modelling Figure 6-1 shows the extent of the NATS model and the location of the A47 Blofield Scheme. The NATS model covers all strategic traffic movements across Broadland and the wider Norwich area. Within the Blofield Scheme's area of impact the model contains a detailed zoning and network resolution and has been calibrated to a high level of accuracy.

Figure 6-1: Extent of the 2015 NATS model



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- 6.1.5 The NATS models' highways component adopts the SATURN⁴ software package which calculates converged assignment impacts of the Scheme. This is supplemented by a public transport component constructed in VISUM⁵ software and a variable demand model in DIADEM⁶ software packages.
- 6.1.6 The NATS model has been calibrated to represent a 2015 base year utilising the data collected as part of the Blofield Scheme assessment as well as SERTM network and mobile phone data. Key features of the NATS model include:
- 6.1.7 The model contains AM and PM peak hours (08:00 to 09:00 and 17:00 to 18:00) and an IP average hour (10:00 to 16:00) time segments.
- 6.1.8 The highway trip purposes represented in the model comprise of 5 user groups: car employer business, car commute, car other, light goods vehicles (LGVs) and heavy goods vehicles (HGVs).

⁴ Simulation and Assignment of Traffic in Urban Road Network (SATURN): <https://saturnsoftware2.co.uk/>

⁵ VISUM is a Transport Demand modelling software provided by PTV:

<https://www.ptvgroup.com/en/solutions/products/ptv-visum/>

⁶ Dynamic Integrated Assignment and Demand Modelling is a (DIADEM):

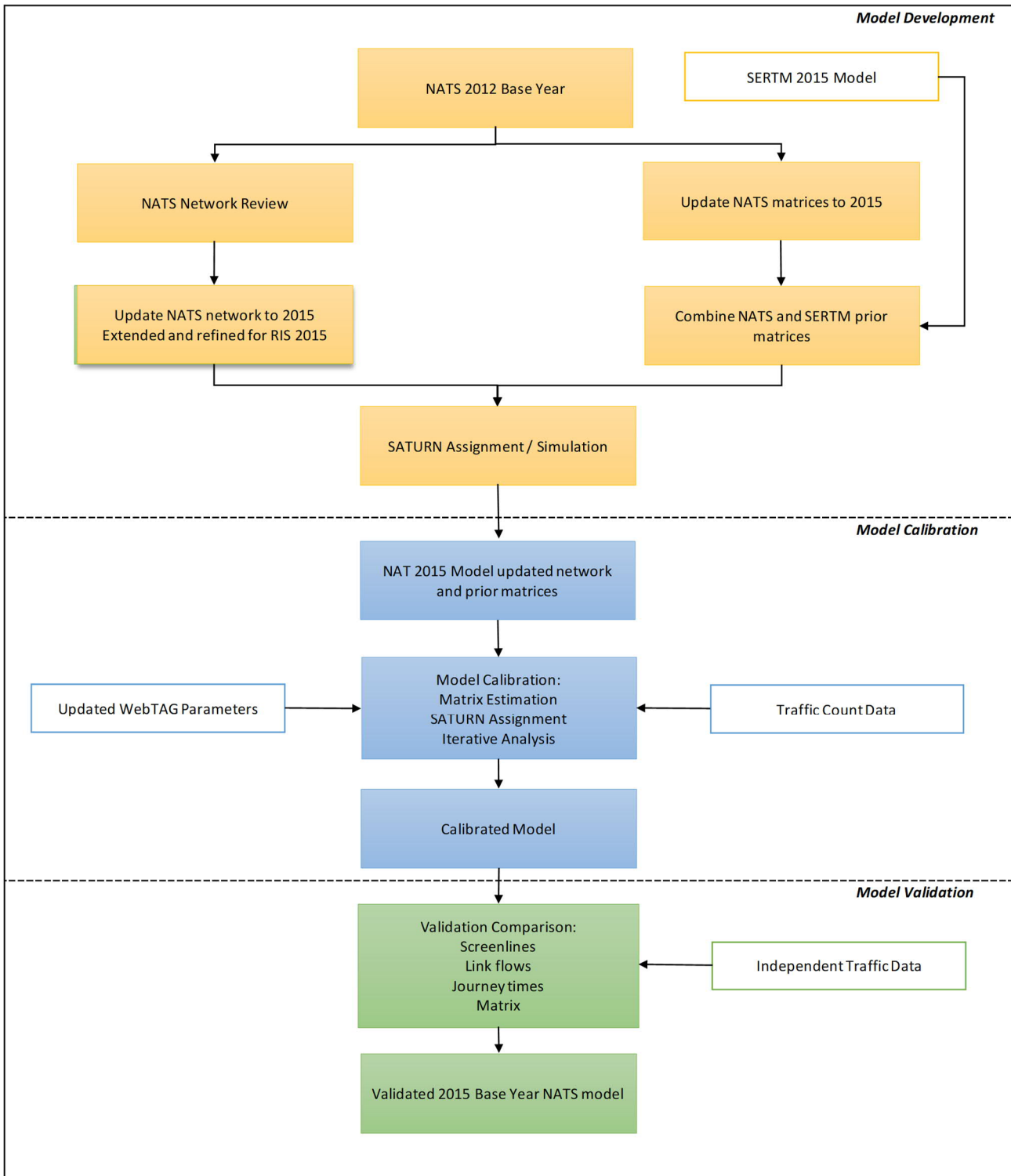
<https://www.gov.uk/government/publications/diadem-software>

- 6.1.9 Mobile phone data, from SERTM, is the primary source used for deriving the distribution of trips in the base year prior demand matrices in the Scheme's impact area. Traffic count data is used to calibrate the model based on a Matrix Estimation (ME) procedure. The SATURN ME process adjusts the prior trip matrix based on the strategic traffic assignment and the observed count data. This process utilises the data referred to in Section 4 of this assessment, and traffic data collect across the wider NATS model study area. A variety of checks were undertaken to ascertain that ME has not altered the integrity and profile of the trip matrix. Subsequent to the ME process, the model has been validated against independent data sets based on the following criteria:
- Flows across screenlines
 - Individual link flows
 - Journey time comparison
 - Model convergence
- 6.1.10 The base model was developed in accordance with the DfT's TAG Unit M3.1: Highway Assignment Modelling (2020). The strategic base year model development process is outlined in Figure 6-2.

Forecast year scenarios

- 6.1.11 The base year and forecast years are listed as follows:
- 2015 Base Year
 - 2025 Opening Year
 - 2040 Design Year (15 years after opening)
- 6.1.12 In both the future year scenarios, 2025 and 2040, both a Do-Minimum (DM) and a Do-Something (DS) network scenario has been modelled. Hence the comparison of the Do-Minimum and a Do-Something provides the assessment of the Scheme's impacts in a given forecast year.

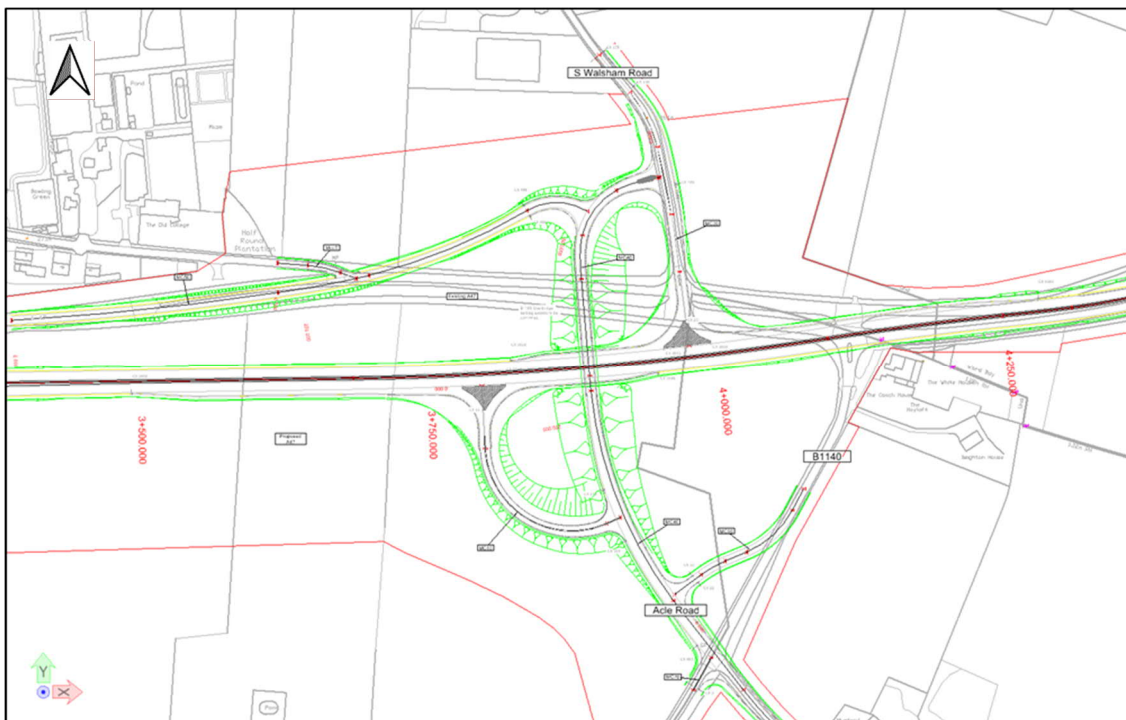
Figure 6-2: Strategic base year model development process - overview



6.2 Overview of the Operational Modelling

- 6.2.1 Figure 6-3 shows the A47/B1140 Scheme interchange junction and Figure 6-4 shows the study area for the VISSIM model. The Scheme includes upgrades to the A47/B1140 junction to provide a compact grade separated interchange. The objective of the VISSIM⁷ model was to assess the performance of the Blofield Scheme with respect to its merges, diverges at and local priority junctions. As the model is only used for the operational assessment of the Scheme layout no base model has been developed.
- 6.2.2 The future year 2040 demand forecasts for the VISSIM model assessment have been derived from the NATS model. For this assessment, the October 2019 traffic counts were utilised to calculate the additional seasonal growth in traffic relating to the British Sugar PLC located in Cantley. The additional British Sugar PLC demand was added to the NATS 2040 forecasts. This ensures that the VISSIM operational assessment accounts for the extra demand generated from the British Sugar PLC during its seasonal period.
- 6.2.3 A PICADY⁸ model was also developed to assess the capacity of the proposed Northern South Walsham Road Junction which connects Yarmouth Road to the B1140. Similar to the VISSIM assessment, the PICADY model accounts for the extra demand generated from the British Sugar PLC during its seasonal period.

Figure 6-3: A47/B1140 Scheme interchange junction



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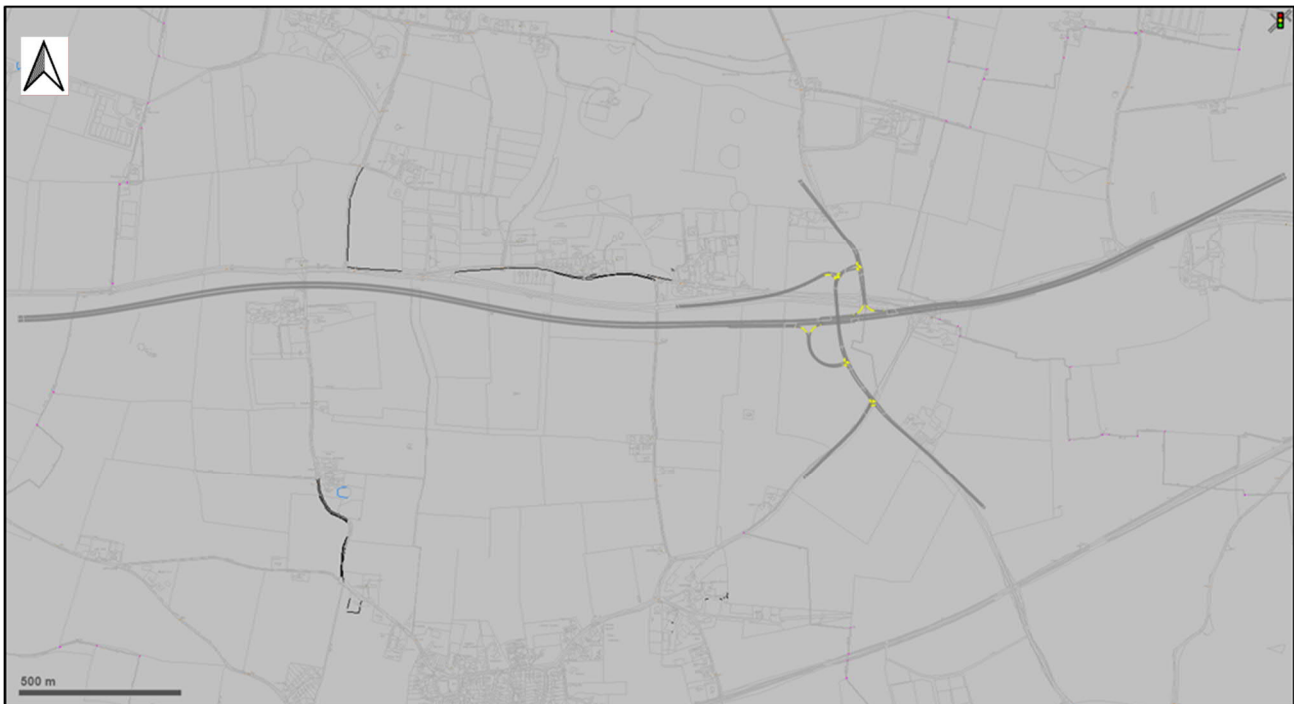
⁷ VISSIM is a micro-simulation modelling software developed by the PTV Group, Germany :

<https://www.ptvgroup.com/en/solutions/products/ptv-vissim/>

⁸ PICADY - Priority Intersection Capacity and Delay, Priority Junction modelling software developed by TRL:

<https://trlsoftware.com/products/junction-signal-design/junctions/picady/>

Figure 6-4: Blofield VISSIM model study area



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6.3 Use of traffic modelling to support the transport assessment

The Strategic Model

- 6.3.1 In order to complete a fully TAG compliant assessment of the Scheme, the existing NATS model was updated and recalibrated based on up to date survey data. The results of the calibration indicated that the TAG criteria were achieved for link flow calibration and validation. In addition, TAG criteria were also achieved for the journey time validation assessment.
- 6.3.2 Overall, it is considered that the updated NATS base year model demonstrates a good representation of traffic behaviour in the A47 Blofield Scheme study area as well as Norwich and the surrounding wider area. Therefore, the model forms a robust basis for the future year forecast assessment of the Scheme.
- 6.3.3 The forecasting approach involves creating initial reference case travel demand forecasts which reflect changes in car ownership, population, employment and other demographic and economic factors. However, traffic growth resulting from other sources, such as changes in generalised costs due to traffic conditions, are not included in the reference case forecasts. These impacts are evaluated through the variable demand model (VDM).
- 6.3.4 The VDM calculates the increment in demand applied to the reference case forecasts generated by changes in road network congestion. To calculate this increment, the VDM alternates between demand matrix calculations and

highway assignment model runs to achieve an appropriate equilibrium between demand and supply⁹.

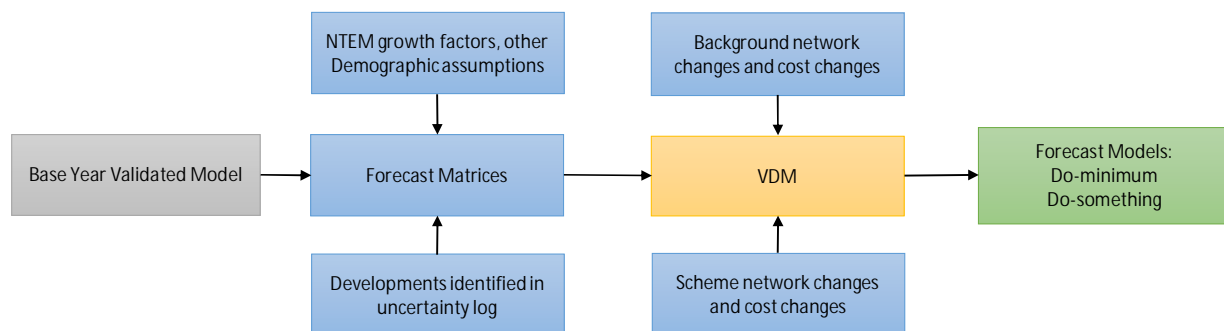
6.3.5 In this iterative process, the VDM calculates the growth in traffic demand across the network, between origin and destination pairs. Based on the origin-destination demand and the available highway network supply capacity, the NATS SATURN assignment model's algorithm calculates the equilibrium traffic flows on individual road links. The underlying principle of this equilibrium, or steady state, is outlined in DfT's WebTAG¹⁰ Unit M3.1 guidance:

- Traffic arranges itself on networks such that the cost of travel on all routes used between each OD (Origin-Destination) pair is equal to the minimum cost of travel and all unused routes have equal or greater cost.

6.3.6 Based on this approach VDM is applied to derive the demand impacts of both the without-Scheme scenario (Do-Minimum) as well as the with-Scheme scenario (Do-Something).

6.3.7 The overall forecasting approach is summarised in the flowchart in Figure 6-5.

Figure 6-5: Forecasting approach



Traffic Forecast Development

6.3.8 The traffic forecasts are dependent on household and employment growth, which were derived from both local and national growth forecasts. The local growth forecasts consider the local authority growth projections and the national growth forecasts take wider anticipated growth into account.

6.3.9 The wider area national growth in car trips is derived from the DfT National Trip End Model (NTEM 7.2). This provides demographic projections in employment and population throughout the UK. The change in freight traffic (light and heavy goods vehicles) was derived from the DfT 2018 road traffic forecasts.

6.3.10 The local authority forecasts on development growth are derived from the uncertainty log. The uncertainty log details the local authority development schemes in regions which are both nearby and significant to the model. This

⁹ DfT WebTAG Unit M1 Section 4.2 :

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/427118/webtag-tag-unit-m1-1-principles-of-modelling-and-forecasting.pdf

¹⁰ DfT WebTAG Unit M3.1 Section 2.7.3 :

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/888363/tag-unit-m3.1-highway-assignment-modelling.pdf

includes assumptions on local uncertainty, which is dependent on whether developments or other planned transport schemes close to the Scheme area are proposed. In addition to identifying each source of uncertainty in the local area, the uncertainty log lists the following information for each source:

- The core assumptions – describing the assumptions that have been made for the core scenario
- The likelihood that the scheme or development will go ahead.
- The range of assumptions around each input or parameter and, if possible, information about the distribution

6.3.11 The core scenario represents the most unbiased and realistic set of assumptions. It is intended to provide a sound basis for decision-making given current evidence. It must be robust and evidence-based taking on board various factors and noting uncertainties affecting travel demand in the future. In accordance with TAG guidance, the uncertainty log includes the management of the uncertainties required for formulating the core scenario.

6.3.12 The definition of each classification of likelihood is summarised in Table 6-1. Where a scheme or land use change is considered “near certain” or “more than likely”, it will be included in the core scenario.

Table 6-1: Uncertainty log – classification of future inputs

Probability of the Input	Local Authority / Development Scheme	Core Scenario Assumption
<p>Near Certain: The outcome will happen or there is a high probability that it will happen</p>	<ul style="list-style-type: none"> • Intent announced by the proponent to regulatory agencies • Approved development proposals • Projects under construction 	<p>This should form part of the core scenario</p>
<p>More than likely: The outcome is likely to happen but there is some uncertainty</p>	<ul style="list-style-type: none"> • Submission of planning or consent application imminent • Development application within the consent process • Projects under construction 	<p>This could form part of the core scenario</p>
<p>Reasonably Foreseeable: The outcome may happen, but there is significant uncertainty</p>	<ul style="list-style-type: none"> • Identified within a development plan; • Not directly associated with the transport strategy/scheme, but may occur if the strategy/scheme is implemented • Development conditional upon the transport strategy/scheme proceeding • Or, a committed policy goal, subject to tests (e.g. of deliverability) whose outcomes are subject to significant uncertainty 	<p>These should be excluded from the core scenario but may form part of the alternative scenarios</p>
<p>Hypothetical: There is considerable uncertainty whether the outcome will ever happen</p>	<ul style="list-style-type: none"> • Conjecture based upon currently available information • Discussed on a conceptual basis • One of a number of possible inputs in an initial consultation process • Or a policy aspiration 	<p>These should be excluded from the core scenario but may form part of the alternative scenarios</p>

6.3.13 The categorisation and schedule for the potential developments included in the uncertainty log for the Blofield traffic modelling forecasting was agreed from correspondence with Norfolk County Council.

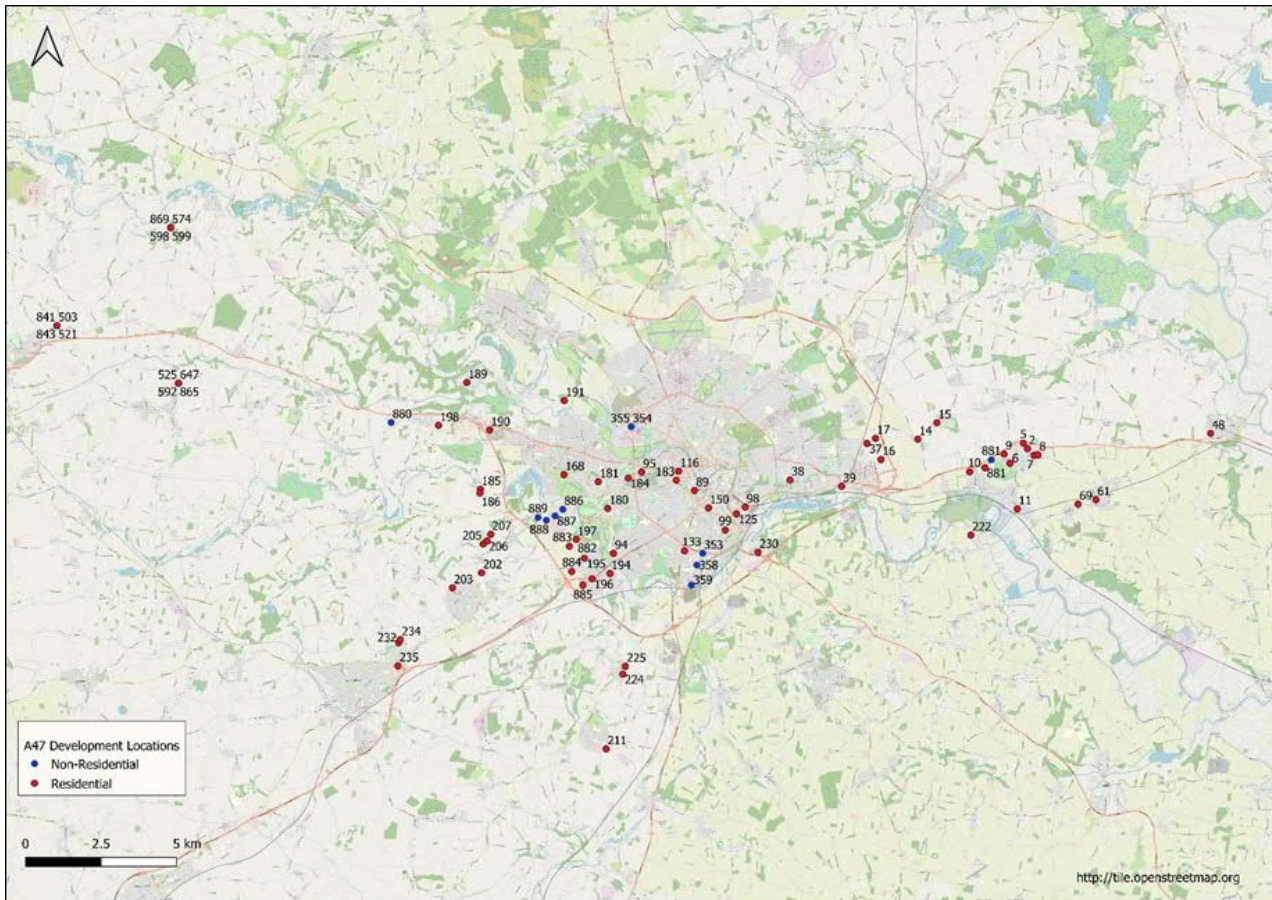
6.3.14 The ‘core’ scenario traffic growth forecast matrices representing car growth are calculated by spatially allocating development trips from the uncertainty log using trip rates derived from the NTEM 7.2 data. PT growth was fully based on NTEM 7.2 growth factors and LGV and HGV growth was derived using DfT RTF 2018 growth factors. A constraining process is then carried out to control the development growth in accordance with the overall growth forecast from the DfT.

Local Development

6.3.15 Following the TAG guidance, developments with the likelihood of at least ‘near certain’ or ‘more than likely’ were included in the forecast estimates. The

locations of each development included within the uncertainty log can be seen in Figure 6-6.

Figure 6-6: NATS DM Development Locations (wider area)

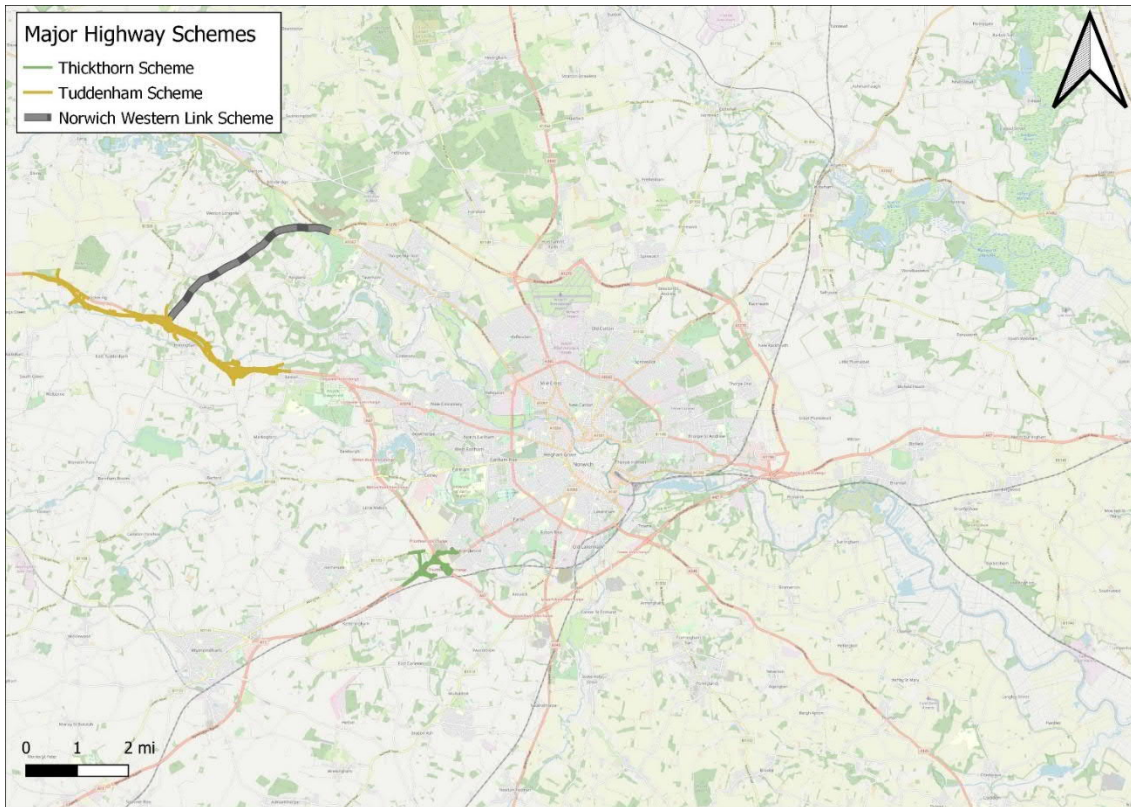


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Highway schemes

- 6.3.16 The uncertainty log contains the significant local authority and Highways England network schemes. Based on TAG guidance, the schemes included in the Do-Minimum scenario have a likelihood of at least 'near certain' or 'more than likely'.
- 6.3.17 The major highway schemes listed in the uncertainty log as 'near certain' or 'more than likely' include the Norwich Western Link (NWL) as well as the following schemes: A47 North Tuddenham to Easton and A47 / A11 Thickthorn junction improvement.
- 6.3.18 Figure 6-7 shows the location of all identified highway schemes.

Figure 6-7: NATS Do-Minimum network alterations (wider area)



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Forecast Year Networks

- 6.3.19 The Do-Minimum is defined as the core highway network scenario without the A47 dualling scheme intervention, against which the Scheme is compared. As discussed, in the wider area network the Thickthorn and North Tuddenham PCF Stage 3 schemes improvements are included.
- 6.3.20 In July 2019 the preferred route was announced for the NWL with the estimated start of construction in late 2022 and estimated opening year in 2025. The NWL is classified as "near certain" and therefore will be included in the Do-Minimum scenario.
- 6.3.21 The Scheme included in the Do-Something scenario is described in Section 2. Table 6-2 summarises the assumptions adopted in the Do-Minimum and Do-Something scenarios.

Table 6-2: DM/DS network assumptions

Scenario	Appraisal	Schemes Included			
		Thickthorn	Blofield	North Tuddenham	Other DM Schemes including NWL
DM	Blofield	Y	N	Y	Y
DS	All	Y	Y	Y	Y

7 TRANSPORT IMPACTS

7.1 Introduction

7.1.1 This chapter provides an overview of the current and forecasted future year operation of the road network as well the impacts of the Scheme. The source of information for the strategic assessment is the NATS SATURN highway network assignment model. Local operational models provide a platform for the operational assessment of the Scheme junctions.

7.1.2 In the current situation, assessed as part of the base year model, the single carriageway section of the A47 between Blofield and North Burlingham acts as a bottleneck, resulting in congestion and leading to longer and unreliable journey times.

7.1.3 Traffic forecasts for 2025 and 2040 have been prepared using the modelling approach outlined in Section 6 above. Using these models and assumptions Do-Minimum and Do-Something scenarios have been prepared. The comparison of these two scenarios enables the impacts of the Scheme to be evaluated.

7.1.4 The Do-Minimum represents a without Scheme scenario, it includes all the changes unrelated to the Scheme which are considered more than likely to be in place prior to the respective future year.

7.1.5 The Do-Something scenario includes the Scheme. The local development and transport infrastructure assumptions for both scenarios are detailed in Section 6.2 above.

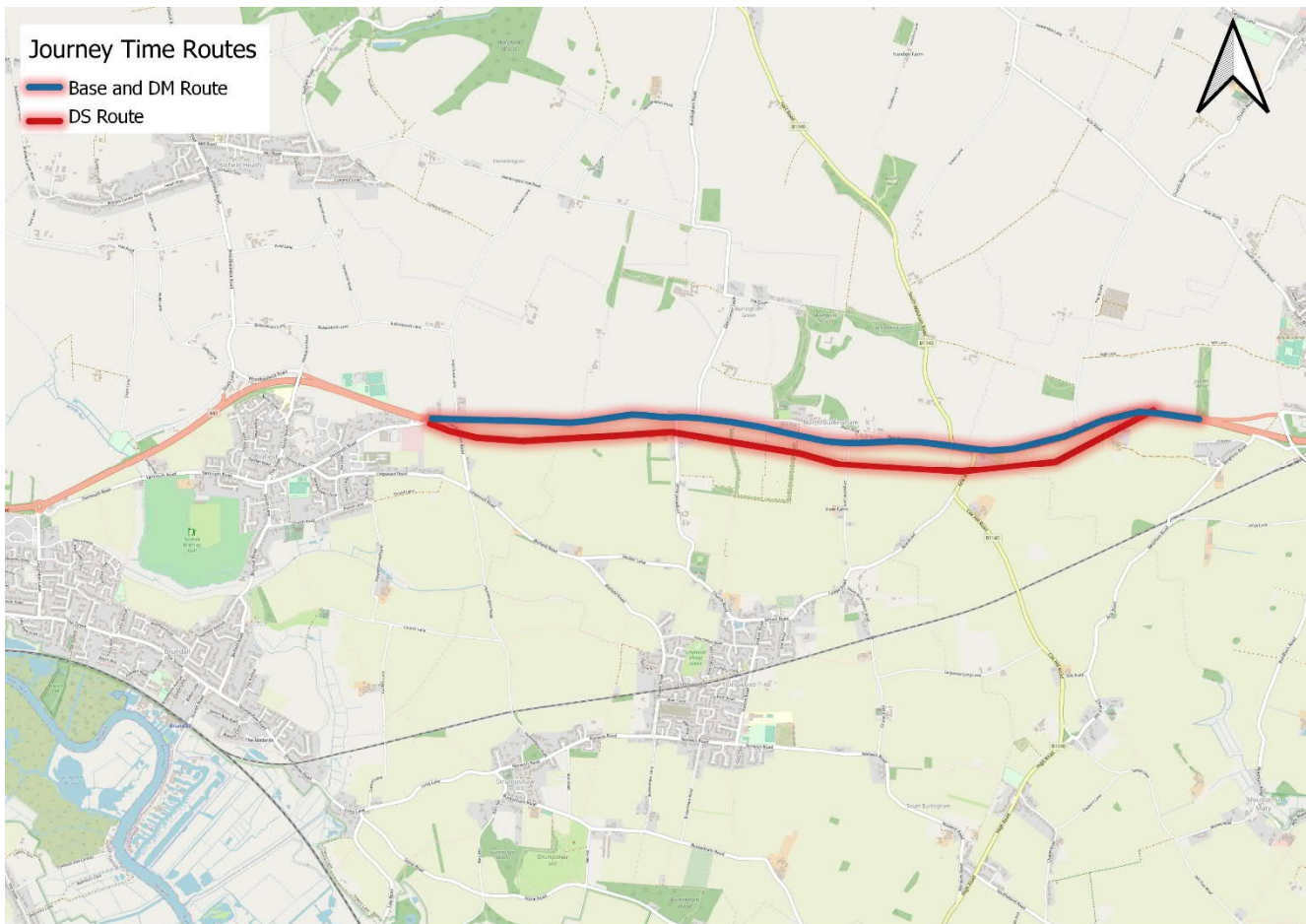
7.1.6 This chapter also provides an overview of the Scheme's impact on road safety, WCHs, public transport and network resilience. The combination of these separate assessments are then summarised with respect to the overall Scheme benefits.

7.2 Key Locations for the Assessment

7.2.1 The key link for the Scheme assessment is the A47 single carriageway section between Blofield and North Burlingham. Analysis of journey time routes across this section capture the change in congestion related delays across the A47 corridor. Thus, the comparison of Do-Minimum and Do-Something journey times across these sections highlight the positive benefits of the Scheme in terms of relieving congestion. The following journey time routes, shown in Figure 7-1 and Figure 7-2, have been selected for this assessment:

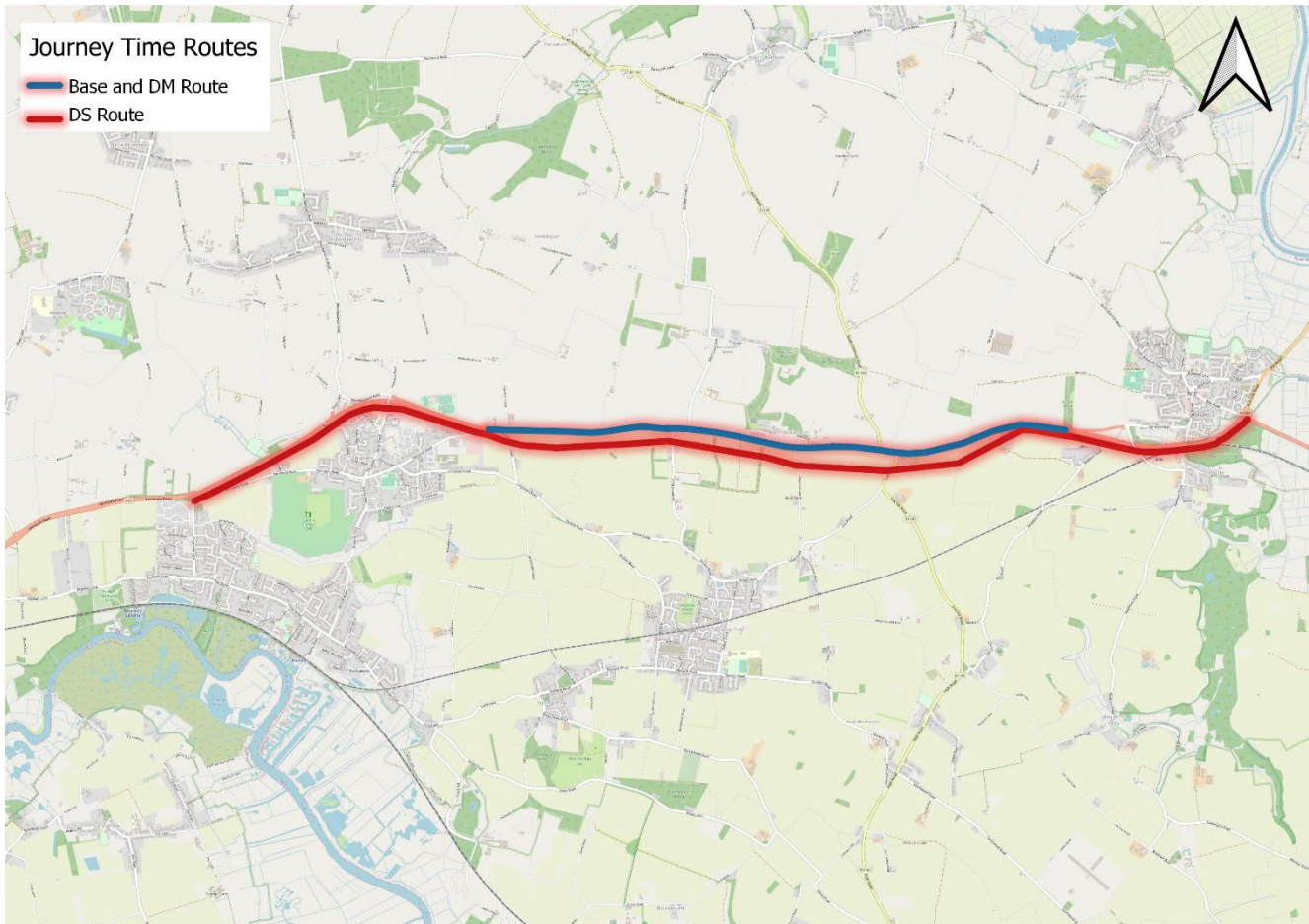
- A47 near Beighton Road in Acle and the A47 near Yarmouth Road in Blofield
- A47 Acle Roundabout and A47 Brundall Roundabout

Figure 7-1: Journey time routes between A47 near Beighton Road and A47 near Yarmouth Road



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Figure 7-2: Journey time routes between A47/Acle roundabout and A47/Brundall roundabout

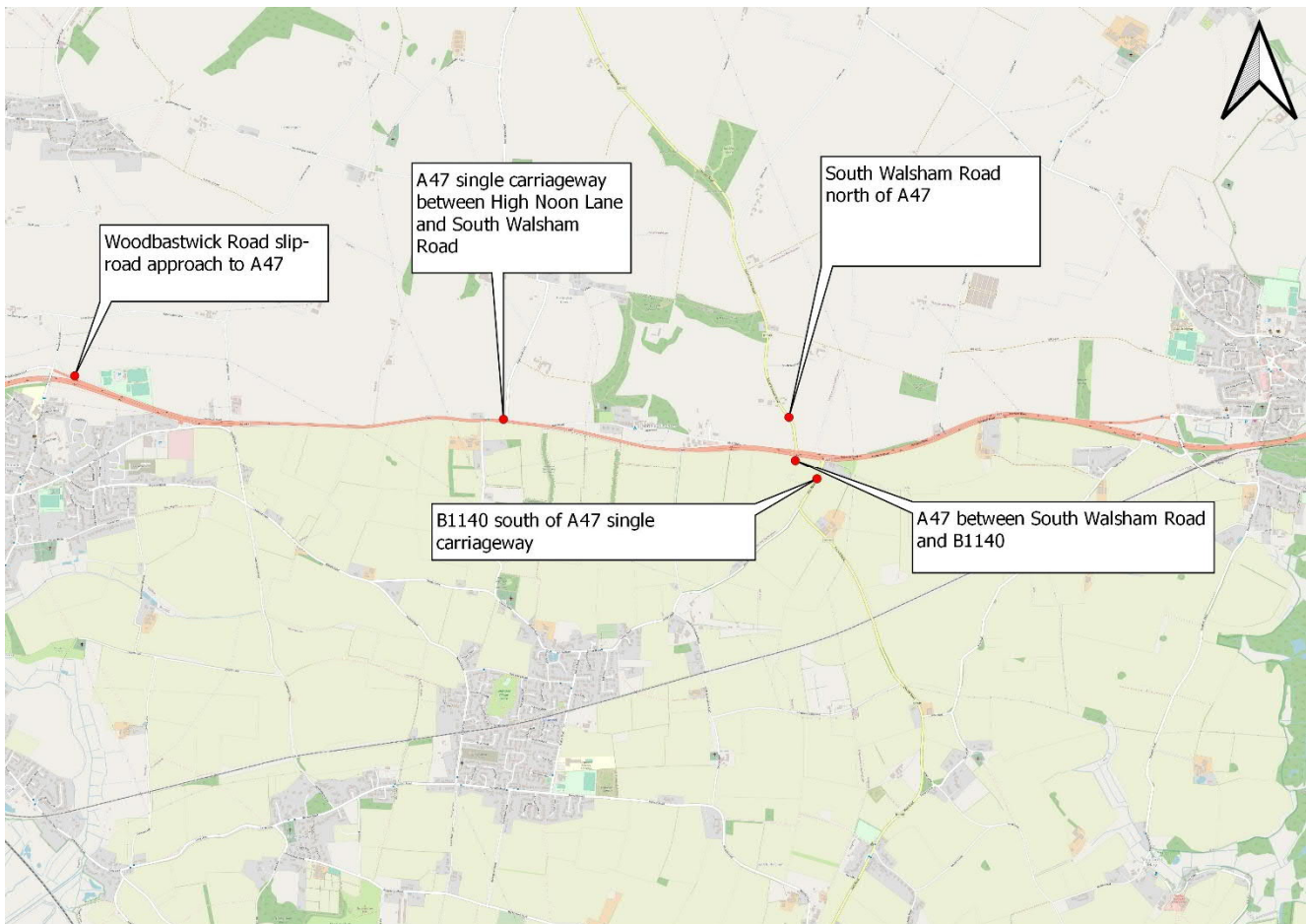


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7.2.2 Traffic impacts of the Scheme have also been analysed using the forecast model traffic flows, delays and capacities for the locations shown in Figure 7-3. The analysis of these metrics highlights the direct impact of the Scheme with respect to the relieving congestion. The following locations are included in this assessment:

- The A47 mainline between High Noon Lane and South Walsham Road
- The A47 mainline between South Walsham Road and B1140
- The B1140 access the A47 from the south
- South Walsham Road access to A47 from the north
- Woodbastwick Road slip road approach to A47 in the eastbound direction

Figure 7-3: Scheme assessment locations



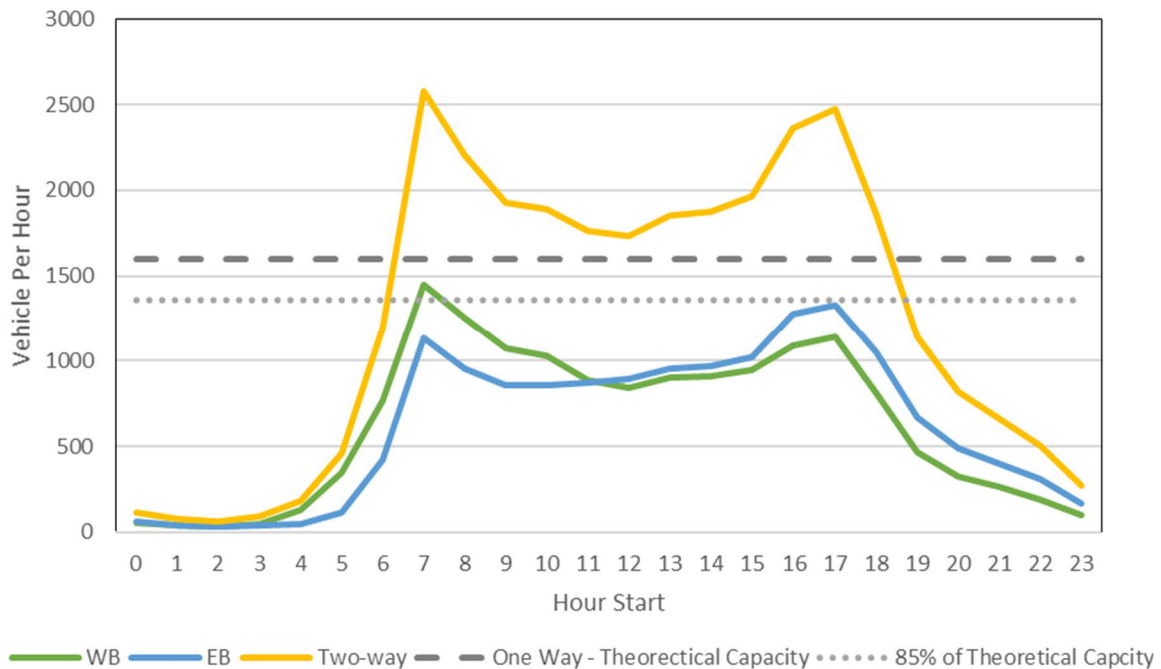
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7.3 Existing Traffic Conditions and the Impact of Traffic Growth to 2040

Existing Traffic Conditions – Observed Data Base Year 2015

- 7.3.1 Figure 7-4 shows the base year observed traffic flow profile along the A47 Scheme section based on average weekday 2015 June data from the WebTRIS counter located just west of Lingwood Lane. The traffic flows shown are hourly total vehicles, whereas the theoretical capacity is an approximate value based on the models calibrated capacity assumption.
- 7.3.2 Analysis of the observed data indicates that the traffic peak movement in the AM period is in the westbound direction. Conversely, in the PM period the peak traffic movement is in the eastbound direction. Based on the theoretical capacity indicative analysis, in both of the AM and PM peaks the A47 observed traffic flow is approximately equal to or greater than the 85% benchmark.

Figure 7-4: Observed flow profile – WebTRIS data 2015



7.3.3 The base year observed traffic speeds, based on average weekday 2015 June data from WebTRIS, are shown in Table 7-1 and Table 7-2. The data shows that in both directions observed speeds are below the 50mph speed limit. On the single carriage way section speeds drop to around 42-43 mph, which represents a 14-15% decrease from the speed limit. Reduced speeds, of 32 mph (19% decrease from the speed limit), are observed in the eastbound direction as vehicles approach the single carriage way section at High Noon Lane.

Table 7-1: 2015 observed traffic speeds – Scheme section eastbound PM

Section	A47 between Yarmouth Road - High Noon Lane	A47 between High Noon Lane - Lingwood Lane	A47 between Lingwood Lane - S Walsham Road
Road Type	Dual	Single	Dual
Road Speed – EB (mph)	32	43	53

Table 7-2: 2015 observed traffic speeds – Scheme section westbound AM

Section	A47 between S Walsham Road - Lingwood Lane	A47 between Lingwood Lane - High Noon Lane	A47 between High Noon Ln - Yarmouth Rd
Road Type	Dual	Single	Dual
Road Speed – WB (mph)	40	42	50

7.4 Existing Traffic Conditions – Base Year Model 2015

7.4.1 The base year modelled traffic flows along the A47 Scheme section as well as the access roads are shown in Table 7-3. The traffic flows shown are peak hour flows, in passenger car units (PCUs) for the AM and PM peaks.

7.4.2 The A47 mainline traffic flows, between High Noon Lane and South Walsham Road, peak at around 1,600-1,450 PCUs. The highest flows in the AM peak are in the westbound direction and in the PM peak the primary traffic movement is in

the eastbound direction. Along the A47 access roads traffic flows range between approximately 75-145 PCUs.

Table 7-3: 2015 Base year traffic flows

Section	Link	Direction	Peak Hour Flow (PCUs)	
			AM Peak	PM Peak
A47 Mainline	A47 between High Noon Lane and South Walsham Road	EB	1,116	1,443
		WB	1,584	1,190
	A47 between South Walsham Road and B1140	EB	1,752	1,273
		WB	1,250	1,527
A47 Access Roads	B1140 south of A47	NB	144	86
	South Walsham Road north of A47	SB	136	84
	Woodbastwick Road slip-road approach to the A47	EB	75	109

7.4.3 The base year modelled traffic delays along the A47 Scheme section and access roads are shown in Table 7-4. Volume over capacity ratios (V/C) are also shown in this table. The ratio of (volume of traffic) flow to capacity, is an indicator of the likely performance of a road link. According to DMRB guidance, in general a V/C ratio of about 85% is advised.

7.4.4 The A47 Scheme section is operating just below the available capacity during the AM peak in the westbound direction (97%) and the PM peak (88%) in the eastbound direction. On average vehicles experience around 1.2 – 1.5 mins of delay due to the traffic congestion along the A47 single carriageway mainline link between High Noon Lane and South Walsham Road.

Table 7-4: 2015 Base year traffic delay and V/C results

Section	Link	Direction	V/C Ratio		Delay (min)	
			AM Peak	PM Peak	AM Peak	PM Peak
A47 Mainline	A47 between High Noon Lane and South Walsham Road	EB	68%	88%	0.7	1.2
		WB	97%	73%	1.4	0.8
	A47 between South Walsham Road and B1140	EB	43%	32%	0.0	0.0
		WB	32%	38%	0.0	0.0
A47 Access Roads	B1140 south of A47	NB	60%	21%	1.2	0.7
	South Walsham Road north of A47	SB	51%	44%	0.4	0.6
	Woodbastwick Road slip-road approach to the A47	EB	5%	8%	0.0	0.1

Existing Traffic Conditions – Do-Minimum Model 2025 & 2040

7.4.5 Table 7-5 shows the forecasted change in traffic flows along the Scheme between the base year and 2025, 2040 Do-Minimum for the AM and PM peak

periods. Figure 7-5 and Figure 7-6 show the growth in traffic over the wider network between the 2015 base year and the 2040 Do-Minimum scenario.

- 7.4.6 Overall, there is expected to be an increase in traffic throughout the network across the Norfolk area. This traffic growth is derived from the modelling approach detailed in Section 6.3. In summary, the growth in traffic at an individual link level is calculated by the NATS SATURN highway assignment model based on the available road capacity and the total network wide demand.
- 7.4.7 Along the A47 mainline Scheme section 2040 traffic flows, between High noon Lane and South Walsham, increases by around 10% in the AM peak in the westbound direction and 15% in the PM peak in the eastbound direction. In the opposite direction in each peak period 2040 traffic increases by around 37% - 48%. The larger levels of growth in the non-peak direction is due to the single carriageway capacity limits constraining growth in the peak directions. A similar pattern is seen in 2025, with peak direction growth increasing by 7-12% (AM EB, PM WB) and non-peak direction growth increasing by 23%-34% (AM WB, PM EB).
- 7.4.8 Low levels of traffic growth are observed on the access roads to the Scheme A47 section. The only A47 access road location showing an increase is the Woodbastwick Road approach. The remaining A47 access road locations are showing a decrease in traffic volume as users are avoiding accessing the congested A47.
- 7.4.9 The increase in traffic flows along the A47 corresponds with the increase in delays and V/C ratios shown in Table 7-6. Delays along the A47 between the High Noon Lane and South Walsham Road section are forecasted to increase by approximately 0.3 -1.1mins in 2025 and 0.7-1.6 mins in 2040. Furthermore, the deterioration in V/C ratio (91%-103%) indicates that the link is operating over the advisable capacity in 2025 in both directions in both periods. In the 2040 scenario V/C ratios increase further (99%-105%), due to the additional growth in A47 traffic demand.

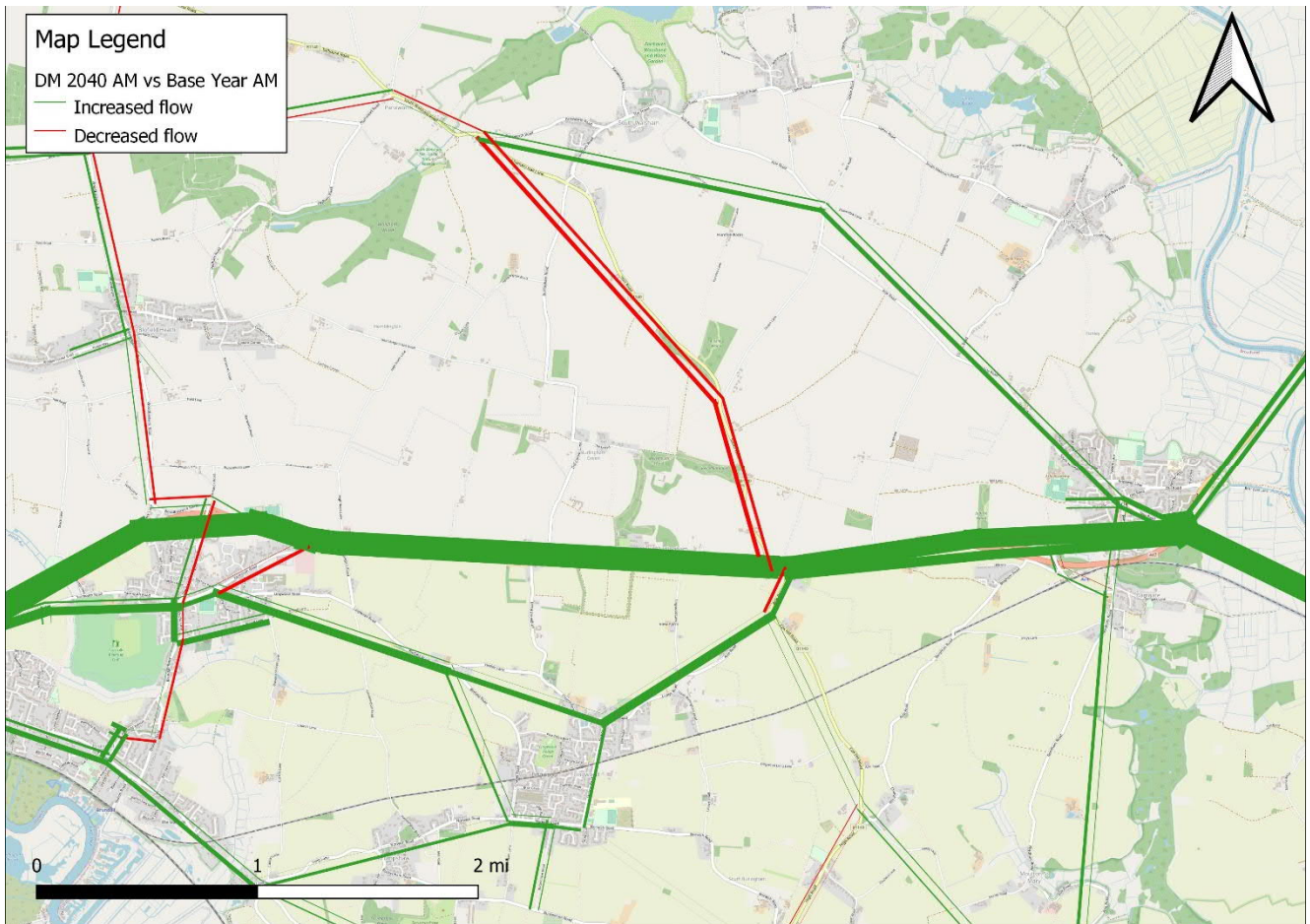
Table 7-5: 2025 and 2040 Do-Minimum and Base Year (2015) traffic flows

Section	Link	Direction	Base Year (2015) Peak Hour Flow (PCUs)		2025 DM Peak Hour Flow (PCUs)			
			AM Peak	PM Peak	AM Peak	PM Peak	% Change vs Base	% Change vs Base
A47 Mainline	A47 between High Noon Lane and South Walsham Road	EB	1,116	1,443	1,498	1,623	34%	12%
		WB	1,584	1,190	1,693	1,469	7%	23%
	A47 between South Walsham Road and B1140	EB	1,752	1,273	1,782	1,520	2%	19%
		WB	1,250	1,527	1,556	1,681	24%	10%
A47 Access Roads	B1140 south of A47	NB	144	86	125	72	-13%	-17%
	South Walsham Road north of A47	SB	136	84	59	58	-57%	-31%
	Woodbastwick Road slip-road approach to the A47	EB	75	109	90	100	20%	-8%
Section	Link	Direction	Base Year (2015) Peak Hour Flow (PCUs)		2040 DM Peak Hour Flow (PCUs)			
			AM Peak	PM Peak	AM Peak	PM Peak	% Change vs Base	% Change vs Base
A47 Mainline	A47 between High Noon Lane and South Walsham Road	EB	1,116	1,443	1,655	1,659	48%	15%
		WB	1,584	1,190	1,722	1,627	9%	37%
	A47 between South Walsham Road and B1140	EB	1,752	1,273	1,795	1,689	2%	33%
		WB	1,250	1,527	1,708	1,721	37%	13%
A47 Access Roads	B1140 south of A47	NB	144	86	74	83	-48%	-4%
	South Walsham Road north of A47	SB	136	84	69	81	-49%	-3%
	Woodbastwick Road slip-road approach to the A47	EB	75	109	107	219	43%	100%

Table 7-6: 2040 Do-Minimum traffic delay and V/C results

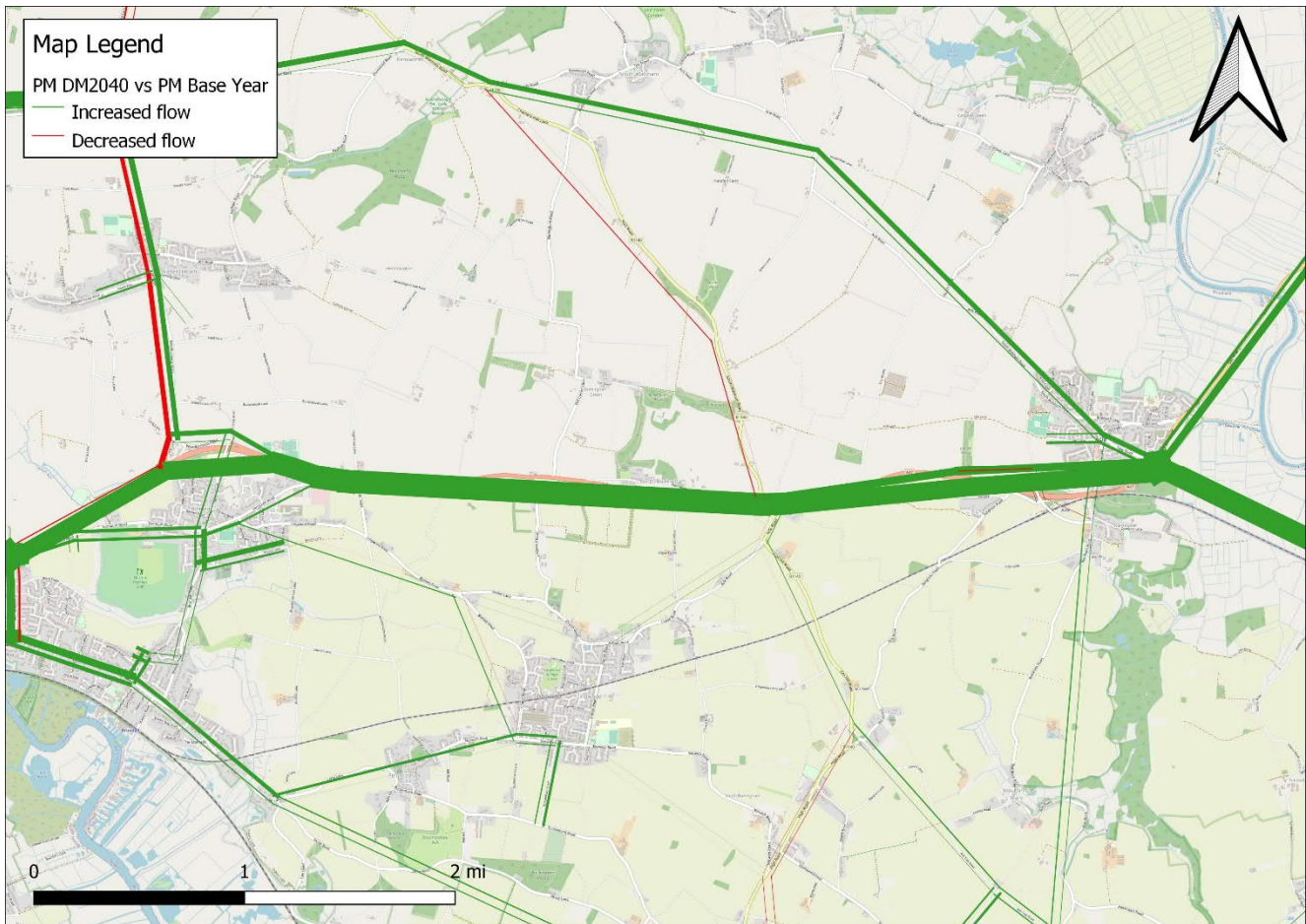
Section	Link	Direction	Base Year (2015)				DM 2025			
			V/C Ratio		Delay (min)		V/C Ratio		Delay (min)	
			AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
A47 Mainline	A47 between High Noon Lane and South Walsham Road	EB	68%	88%	0.7	1.2	91%	99%	1.3	1.5
		WB	97%	73%	1.4	0.8	103%	90%	2.5	1.2
	A47 between South Walsham Road and B1140	EB	43%	32%	0.0	0.0	45%	39%	0.0	0.0
		WB	32%	38%	0.0	0.0	40%	43%	0.0	0.0
A47 Access Roads	B1140 south of A47	NB	60%	21%	1.2	0.7	63%	25%	2.1	1.2
	South Walsham Road north of A47	SB	51%	44%	0.4	0.6	33%	39%	0.5	0.7
	Woodbastwick Road slip-road approach to the A47	EB	5%	8%	0.0	0.1	7%	8%	0.1	0.1
Section	Link	Direction	Base Year (2015)				DM 2040			
			V/C Ratio		Delay (min)		V/C Ratio		Delay (min)	
			AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
A47 Mainline	A47 between High Noon Lane and South Walsham Road	EB	68%	88%	0.7	1.2	101%	101%	1.8	1.9
		WB	97%	73%	1.4	0.8	105%	99%	3.0	1.5
	A47 between South Walsham Road and B1140	EB	43%	32%	0.0	0.0	46%	43%	0.0	0.0
		WB	32%	38%	0.0	0.0	44%	44%	0.0	0.1
A47 Access Roads	B1140 south of A47	NB	60%	21%	1.2	0.7	48%	40%	4.3	1.9
	South Walsham Road north of A47	SB	51%	44%	0.4	0.6	47%	56%	0.8	0.9
	Woodbastwick Road slip-road approach to the A47	EB	5%	8%	0.0	0.1	8%	14%	0.1	0.1

Figure 7-5: Traffic flow change: 2040 DM vs 2015 – AM peak



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Figure 7-6: Traffic flow change: 2040 DM vs 2015 – PM Peak



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- 7.4.10 To assess the impact of the forecasted traffic growth on the A47 journey times, analysis has been carried out between the Do-Minimum and base year scenarios for the two key journey time routes identified in Section 7.2. The results are reported in Table 7-7.

Table 7-7: 2025 2040 Do-Minimum Vs Base Year (2015) journey time comparison (mins)

Direction	Scenario	A47 Beighton Rd to Yarmouth Rd			A47 Acle Roundabout and A47 Brundall Roundabout		
		AM	IP	PM	AM	IP	PM
A47 WB	2015 Base	5.0	4.1	4.4	7.4	6.5	6.8
	2025 DM	6.1	4.4	4.8	8.6	6.7	7.1
	DM - BY	1.1	0.3	0.4	1.2	0.2	0.3
	DM - BY % difference	22%	7%	9%	16%	3%	4%
A47 EB	2015 Base	4.2	4.1	4.7	6.5	6.4	7.0
	2025 DM	4.8	4.5	5.0	7.0	6.7	7.3
	DM - BY	0.6	0.4	0.3	0.5	0.3	0.3
	DM - BY % difference	14%	10%	6%	8%	5%	4%
Direction	Scenario	A47 Beighton Rd to Yarmouth Rd			A47 Acle Roundabout and A47 Brundall Roundabout		
		AM	IP	PM	AM	IP	PM
A47 WB	2015 Base	5.0	4.1	4.4	7.4	6.5	6.8
	2040 DM	6.6	4.8	5.1	9.5	7.1	8.5
	DM - BY	1.6	0.7	0.7	2.1	0.6	1.7
	DM - BY % difference	32%	17%	16%	28%	9%	25%
A47 EB	2015 Base	4.2	4.1	4.7	6.5	6.4	7.0
	2040 DM	5.4	4.9	5.4	7.6	7.1	7.7
	DM - BY	1.2	0.8	0.7	1.1	0.7	0.7
	DM - BY % difference	29%	20%	15%	17%	11%	10%

7.4.11 The journey time results along the A47 between Beighton Road and Yarmouth Road indicate that traffic growth from 2015 to 2025 will cause AM and PM peak journey times to deteriorate by around 9%-22% in the westbound direction (0.4-1.1 mins) and by 6%-14% in the eastbound direction (0.3-0.6 mins). The 2040 Do-Minimum scenario peak hour journey times increase by around 16%-31% in the westbound direction (0.7-1.6 mins) and by 15%-29% in the eastbound direction (0.7-1.2 mins).

7.4.12 Along the A47 between Acle Roundabout and Brundall Roundabout journey times increase by around 4%-16% and 10% - 28% in the AM and PM peak 2025 and 2040 Do-Minimum scenarios respectively (2025: 0.3-1.2mins. 2040: 0.7-2.1 mins).

7.4.13 In summary, in the Do-Minimum with-out Scheme scenario traffic growth between 2015-2025 will cause the A47 single carriageway section to go over capacity. This will result in A47 users experiencing increased journey times. Further traffic growth is forecasted between 2025-2040. This additional growth will exacerbate congestion on the A47 single carriageway section.

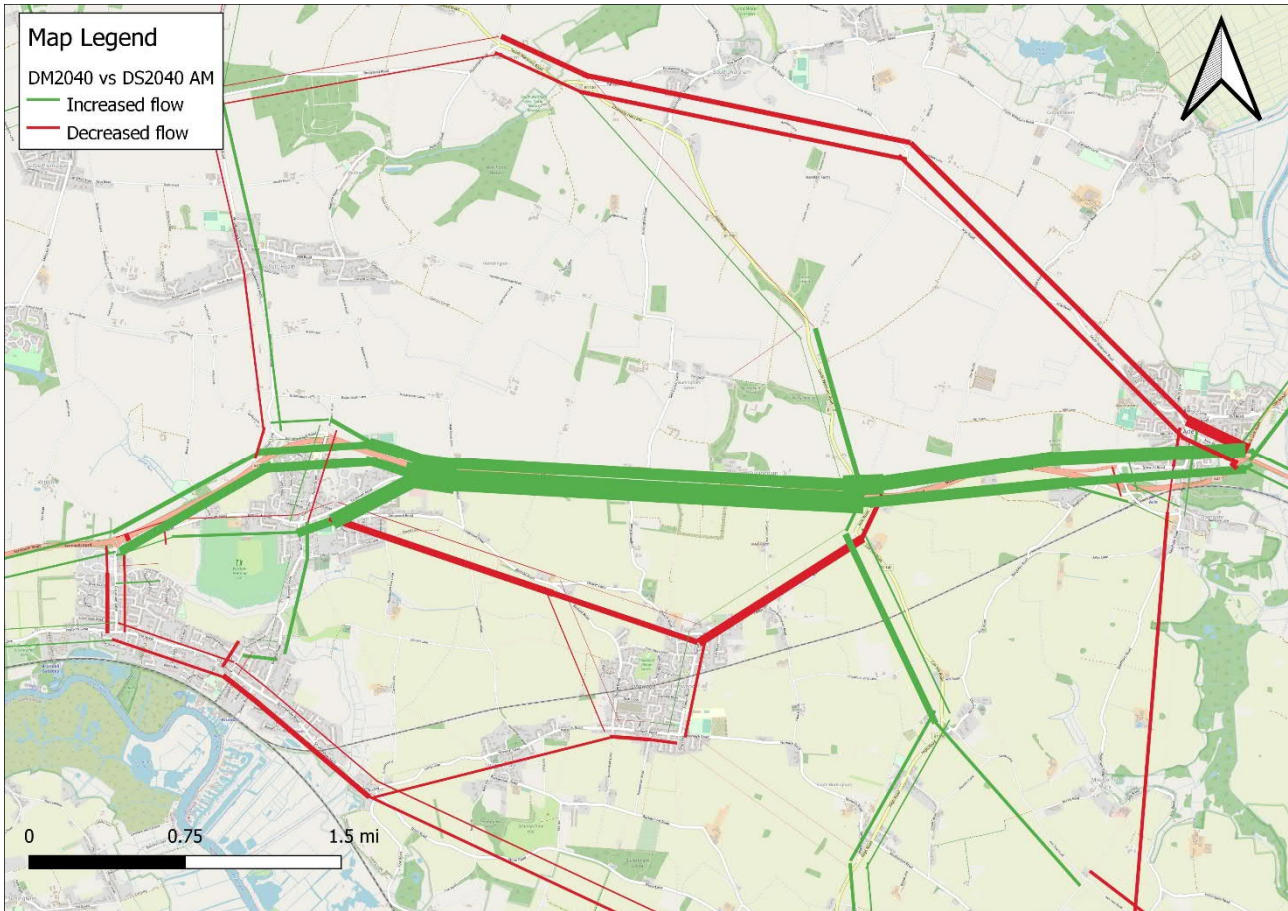
7.5 Impact of the Scheme on link flows

- 7.5.1 Table 7-8 shows the projected change in traffic flows between the Do-Minimum and Do-Something scenarios for the AM and PM peak periods in 2025 and 2040. The comparison of these two forecast scenarios shows the impact of the Scheme on traffic flows. Figure 7-7 and Figure 7-8 show the growth in traffic over the wider area. This traffic growth is derived from the modelling approach detailed in Section 6.3.
- 7.5.2 The Scheme is forecasted to increase traffic flows between High Noon Lane and South Walsham Road by around and 16%-22% in 2025 and 16%-29% in 2040. Growth is particularly focused in the peak directional AM (westbound) and PM (eastbound) movements. This is due to the A47 single carriageway capacity limitations constraining growth in the Do-Minimum scenario. In addition to this, traffic growth is also present across all of the A47 access roads as there is now available capacity on the A47 mainline.
- 7.5.3 In the Do-Something scenario traffic can now complete the following new movements:
- Access from Yarmouth Road Blofield across the A47, via an overbridge, and join the B1140 at South Walsham road; and
 - Travel across the A47 along the B1140 from Lingwood to South Walsham via an overpass.
- 7.5.4 These additional traffic movements add further capacity and improve resilience to the overall highway network. Analysis of the Do-Something traffic flows indicates that around 5-10 PCU trips will use the extended Yarmouth road and 100-250 PCU trips will use the B1140 overpass

Table 7-8: 2025 and 2040 Do-Something and Do-Minimum traffic flows

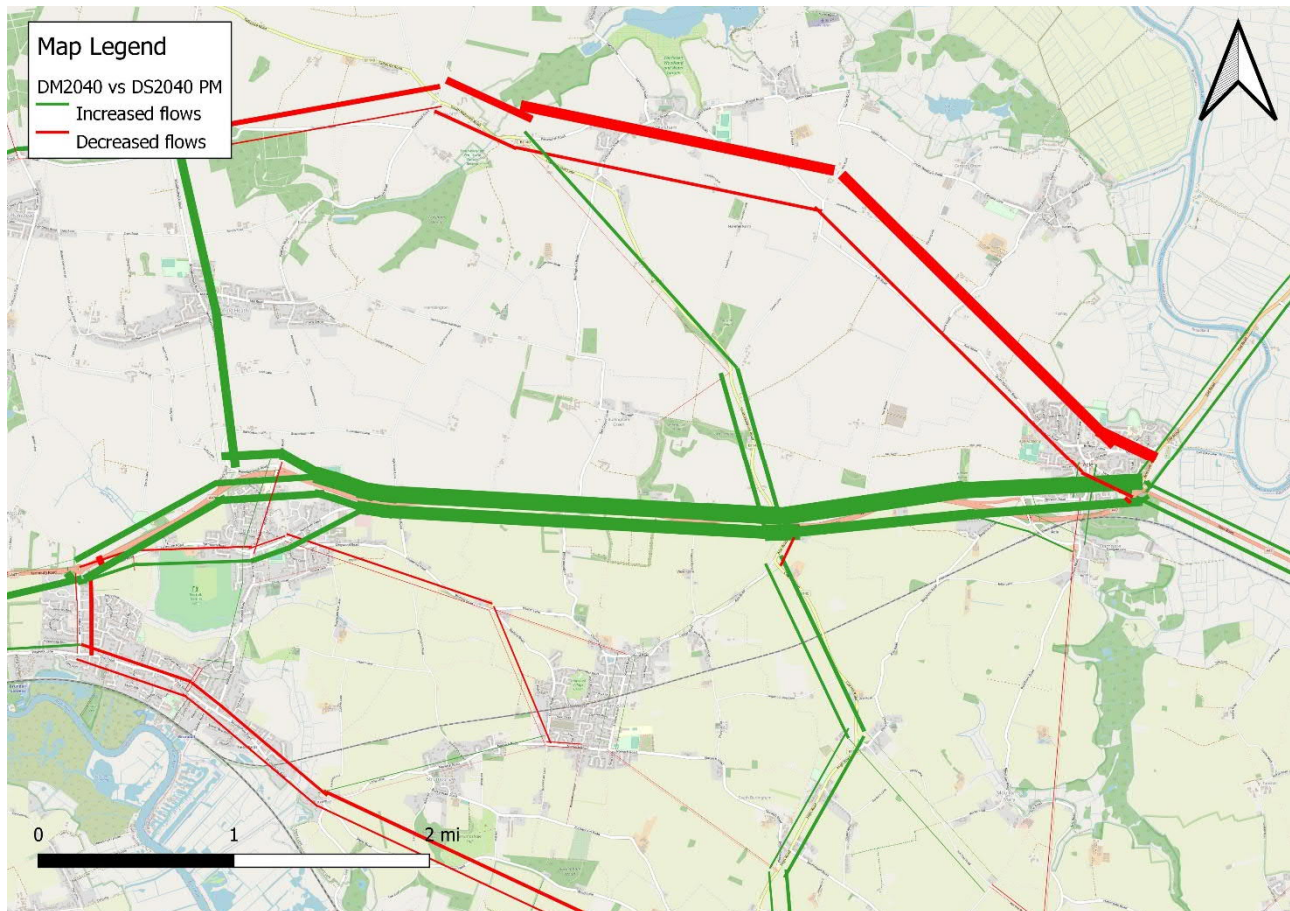
Section	Link	Direction	DM 2025 Peak Hour Flow (PCUs)		2025 DS Peak Hour Flow (PCUs)			
			AM Peak	PM Peak	AM Peak	PM Peak	% Change vs DM	% Change vs DM
A47 Mainline	A47 between High Noon Lane and South Walsham Road	EB	1,498	1,623	1,732	1,936	16%	19%
		WB	1,693	1,469	2,057	1,698	22%	16%
	A47 between South Walsham Road and B1140	EB	1,782	1,520	1,790	1,879	0%	24%
		WB	1,556	1,681	1,983	1,718	27%	2%
A47 Access Roads	B1140 south of A47	NB	125	72	129	70	3%	-2%
	South Walsham Road north of A47	SB	59	58	135	85	130%	45%
	Woodbastwick Road slip-road approach to the A47	EB	90	100	157	239	75%	138%
DS Scheme Roads	DS - Extended Yarmouth Road access to B1140 from Blofield	EB	-	-	5	11		
		WB	-	-	5	2		
	DS B1140 overpass A47	NB	-	-	161	93		
		SB	-	-	95	175		
Section	Link	Direction	DM 2040 Peak Hour Flow (PCUs)		2040 DS Peak Hour Flow (PCUs)			
			AM Peak	PM Peak	AM Peak	PM Peak	% Change vs DM	% Change vs DM
A47 Mainline	A47 between High Noon Lane and South Walsham Road	EB	1,655	1,659	1,925	2,048	16%	23%
		WB	1,722	1,627	2,215	1,926	29%	18%
	A47 between South Walsham Road and B1140	EB	1,795	1,689	2,025	2,061	13%	22%
		WB	1,708	1,721	2,176	1,952	27%	13%
A47 Access Roads	B1140 south of A47	NB	74	83	148	85	99%	3%
	South Walsham Road north of A47	SB	69	81	186	181	169%	123%
	Woodbastwick Road slip-road approach to the A47	EB	107	219	209	459	95%	110%
DS Scheme Roads	DS - Extended Yarmouth Road access to B1140 from Blofield	EB	-	-	5	13		
		WB	-	-	5	3		
	DS B1140 overpass A47	NB	-	-	246	115		
		SB	-	-	106	212		

Figure 7-7: Traffic flow change: 2040 DS vs DM – AM peak



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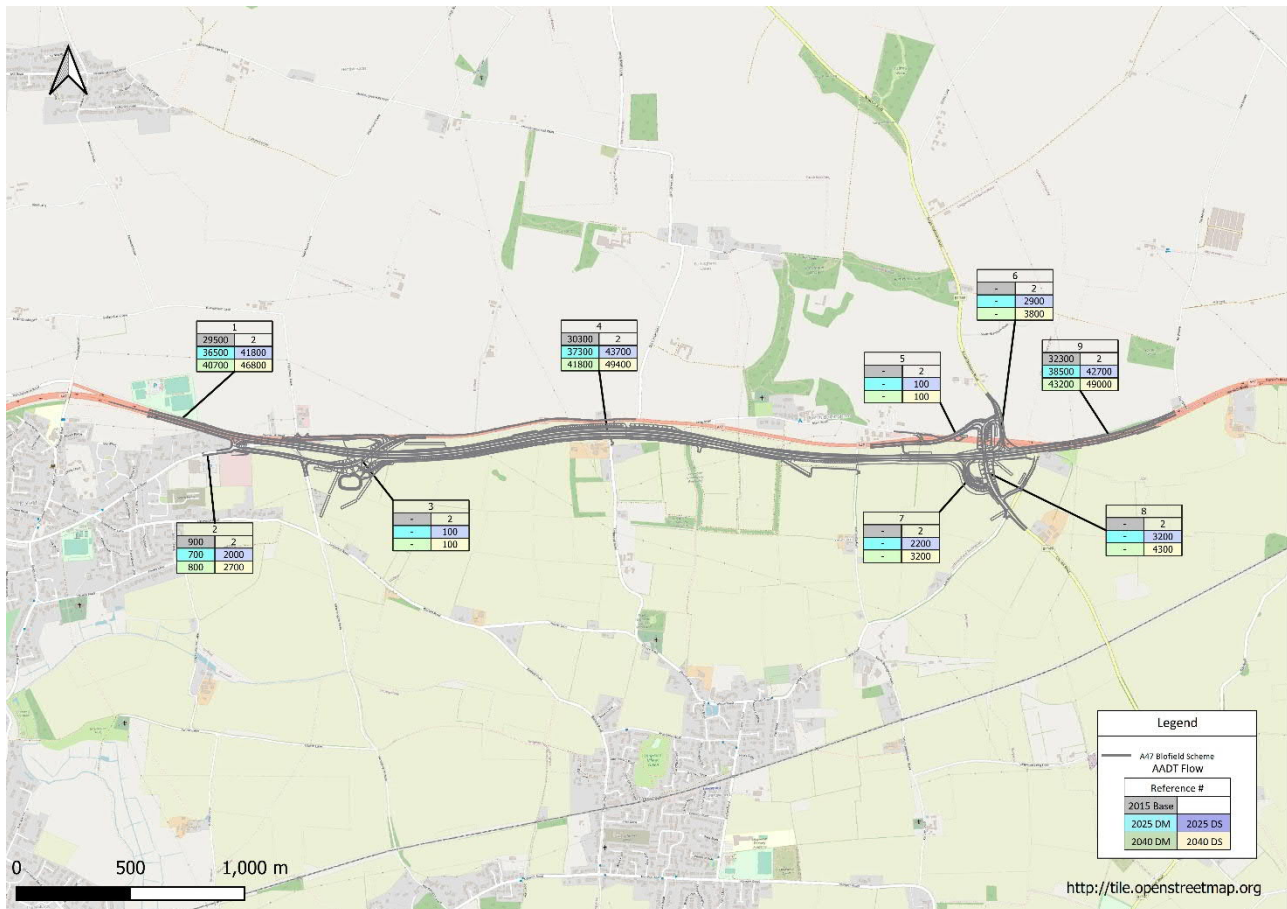
Figure 7-8: Traffic flow change: 2040 DS vs DM – PM peak



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- 7.5.5 Figure 7-9 shows the Total Annual Average Daily Traffic flows (AADT) for the Blofield Scheme area are shown in Figure 7-9 to the nearest 100 vehicles for each forecast scenario. This figure shows the overall impact of the Scheme on an average day for all modelled scenarios.
- 7.5.6 The two-way AADT flows on the Scheme section (Location 4) are forecast to increase from 30,300 in the base scenario (2015) to 37,300 in the opening year (2025) and 41,800 in the designing year (2040) in the Do-Minimum scenario. This represents an approximate increase of 23% from 2015 to 2025 Do-Minimum and a 38% increase from 2015 to 2040 Do-Minimum.
- 7.5.7 In the Do-Something scenario, with the new offline dual carriageway in place, the new forecasts are estimated to be 43,700 in 2025 and 49,400 in 2040. This represents an approximate increase of 17% in 2025 and 18% in 2040 in the Do-Something compared to the respective Do-Minimum scenario. On Yarmouth Road (Location 2) there is a minor increase in traffic, of around 1000-2000 AADT, due to an increase in vehicles heading west towards Blofield village.

Figure 7-9: AADTs in Scheme area – Base and Do-Minimum and Do-Something



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7.6 Impact of the Scheme on Journey Times and Congestion

Link Delay and Capacity Results

- 7.6.1 Table 7-9 shows the delays and volume over capacity ratios of the Do-Something and Do-Minimum 2025 and 2040 scenarios. In the Do-Something scenario delays across the Scheme section reduce to around 0.1 mins. Furthermore, due to the additional capacity available from the dual carriageway Scheme V/C ratios decrease to well within the acceptable range of less than 85%. This indicates that the introduction of the Scheme has removed the overcapacity delays across the Scheme section.
- 7.6.2 Delays on the side roads joining the A47 have also been reduced to around 0.1 mins by the Scheme from around 0.5-2.1 mins in 2025 and 0.8-4.3 mins in 2040 (Table 7-9). Delays on the B1140 and South Walsham road have reduced to negligible levels (Table 7-9 : 2040 AM peak B1140 reduces from 4.3 mins to 0.0 mins , 2040 PM peak B1140 reduces from 1.9 mins to 0.0 mins).

Table 7-9: 2025 & 2040 Do-Something and Do-Minimum delay and V/C results

Section	Link	Direction	DM 2025				DS 2025			
			V/C Ratio		Delay (Min)		V/C Ratio		Delay (Min)	
			AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
A47 Mainline	A47 between High Noon Lane and South Walsham Road	EB	91%	99%	1.3	1.5	44%	49%	0.0	0.0
		WB	103%	90%	2.5	1.2	52%	43%	0.1	0.0
	A47 between South Walsham Road and B1140	EB	45%	39%	0.0	0.0	46%	48%	0.0	0.0
		WB	40%	43%	0.0	0.0	51%	44%	0.0	0.0
A47 Access Roads	B1140 south of A47	NB	63%	25%	2.1	1.2	6%	4%	0.0	0.0
	South Walsham Road north of A47	SB	33%	39%	0.5	0.7	7%	4%	0.0	0.0
	Woodbastwick Road slip-road approach to the A47	EB	7%	8%	0.1	0.1	11%	17%	0.1	0.1
Section	Link	Direction	DM 2040				DS 2040			
			V/C Ratio		Delay (Min)		V/C Ratio		Delay (Min)	
			AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
A47 Mainline	A47 between High Noon Lane and South Walsham Road	EB	101%	101%	1.8	1.9	49%	52%	0.0	0.1
		WB	105%	99%	3.0	1.5	56%	49%	0.1	0.0
	A47 between South Walsham Road and B1140	EB	46%	43%	0.0	0.0	52%	53%	0.0	0.0
		WB	44%	44%	0.0	0.1	55%	50%	0.0	0.0
A47 Access Roads	B1140 south of A47	NB	48%	40%	4.3	1.9	7%	4%	0.0	0.0
	South Walsham Road north of A47	SB	47%	56%	0.8	0.9	9%	9%	0.0	0.0
	Woodbastwick Road slip-road approach to the A47	EB	8%	14%	0.1	0.1	15%	29%	0.1	0.1

Journey Time Results

7.6.3 To assess the journey time savings generated from the Scheme, results for the Do-Minimum and Do-Something scenarios are reported in Table 7-10.

Table 7-10: 2025 & 2040 Do-Something and Do-Minimum journey time comparison (mins)

Direction	Scenario	A47 Beighton Rd to Yarmouth Rd			A47 Acle Roundabout and A47 Brundall Roundabout		
		AM	IP	PM	AM	IP	PM
A47 WB	2015 Base	5.0	4.1	4.4	7.4	6.5	6.8
	2025 DM	6.1	4.4	4.8	8.6	6.7	7.1
	2025 DS	2.9	2.8	2.8	6.9	5	5.1
	DS - DM	-3.2	-1.6	-2.0	-1.7	-1.7	-2.0
	DS - DM % difference	-52%	-36%	-42%	-20%	-25%	-28%
A47 EB	2015 Base	4.2	4.1	4.7	6.5	6.4	7.0
	DM	4.8	4.5	5.0	7.0	6.7	7.3
	DS	2.8	2.8	2.8	5.0	4.9	5.0
	DS - DM	-2.0	-1.7	-2.2	-2.0	-1.8	-2.3
	DS - DM % difference	-42%	-38%	-44%	-29%	-27%	-32%
Direction	Scenario	A47 Beighton Rd to Yarmouth Rd			A47 Acle Roundabout and A47 Brundall Roundabout		
		AM	IP	PM	AM	IP	PM
A47 WB	2015 Base	5.0	4.1	4.4	7.4	6.5	6.8
	2040 DM	6.6	4.8	5.1	9.5	7.1	8.5
	2040 DS	2.9	2.8	2.8	7.5	5.1	6.5
	DS - DM	-3.7	-2.0	-2.3	-2.0	-2.0	-2.0
	DS - DM % difference	-56%	-42%	-45%	-21%	-28%	-24%
A47 EB	2015 Base	4.2	4.1	4.7	6.5	6.4	7.0
	2040 DM	5.4	4.9	5.4	7.6	7.1	7.7
	2040 DS	2.8	2.8	2.8	5.0	5.0	5.1
	DS - DM	-2.6	-2.1	-2.6	-2.6	-2.1	-2.6
	DS - DM % difference	-48%	-43%	-48%	-34%	-30%	-34%

7.6.4 The journey time results along the A47 between Beighton Road and Yarmouth Road show a travel time saving of approximately 3 minutes in 2025 and 3.7 minutes 2040 in the westbound direction in the AM peak, when compared to the Do-Minimum in those years. This represents approximately 50% reduction in the total journey time across the route. The rest of the peaks also experience an average of approximately 2 minutes saving in both directions.

7.6.5 Along the A47 between Acle Roundabout and Brundall Roundabout journey times decrease by around 1.7 to 2.3 minutes in 2025 and 2.0 to 2.6 minutes in 2040.

The largest journey time savings are generated in 2040 in the westbound direction with reductions of up to 2.6 mins in the AM and PM peaks (approx. 34%).

7.6.6 Overall, across all assessed routes the Do-Something journey times are reduced to levels either comparable or below the 2015 base year model. These journey time savings are a result of upgrading the A47 alignment to dual carriageway, as part of the Scheme improvements.

Global Statistics

7.6.7 Network wide average speeds, travel times and delays have been extracted from the NATS model for the wider area. The SATURN 2025 and 2040 average network speeds represent an average of all trips travelling across every link on the entire NATS simulation network within the specified time periods. Whereas the travel times and delay results represent the flow weighted total of all trips across the wider network.

7.6.8 The overall average speeds are displayed in Table 7-11. In both 2025 and 2040, there is a relative improvement in network speeds in the Do-Something scenario in the order of 0.7%-1.0% (Table 7-11 2040 DS – DM AM: 0.7%, 2040 DS – DM AM and IP: 1.0%).

7.6.9 Overall, this indicates that the Scheme will have a positive impact in terms of improving the operation of the wider network. The global statistics are calculated over the entire NATS study area (Figure 6-1), which contains Broadlands and the wider Norwich and South Norfolk area. Therefore, deriving a network wide increase in average speeds of 0.7-1%, from the implementation of the Scheme, is considered to represent a considerable improvement in the overall operation of the network.

Table 7-11: SATURN simulation network overall average speed (km/hr)

Scenario	AM	IP	PM
2025 DM	48.1	51.4	47.8
2025 DS	48.6	51.9	48.2
2025 DS- DM	0.5	0.5	0.4
2025 DS- DM % difference	1.0%	1.0%	0.8%
2040 DM	45.7	51.4	45.4
2040 DS	46	51.8	45.8
2040 DS- DM	0.3	0.4	0.4
2040 DS- DM % difference	0.7%	0.8%	0.9%

7.6.10 The total travel times and delays across the simulation network are displayed in Table 7-12 and Table 7-13. Overall, the results show a decrease in total delay ranging between -0.4% to -2% and a reduction in total time travelled of -0.4% to -0.2%. These results support the average speed analysis as they indicate in the Do-Something scenario, the Scheme is predicted to improve the overall operational performance of the network.

Table 7-12: SATURN simulation network overall total travel time (PCU.hrs/hr)

Scenario	AM	IP	PM
2025 DM	18,429	12,882	18,862
2025 DS	18,352	12,845	18,819
2025 DS- DM	-77	-37	-43
2025 DS- DM % difference	-0.4%	-0.3%	-0.2%
2040 DM	22,547	15,761	23,177
2040 DS	22,482	15,709	23,122
2040 DS- DM	-65	-52	-55
2040 DS- DM % difference	-0.3%	-0.3%	-0.2%

Table 7-13: SATURN simulation network total delay (PCU.hrs/hr)

Scenario	AM	IP	PM
2025 DM	4,114	2,000	4,220
2025 DS	4,059	1,961	4,172
2025 DS- DM	-55	-39	-48
2025 DS- DM % difference	-1.3%	-2.0%	-1.1%
2040 DM	6,095	2,764	6,298
2040 DS	6,070	2,734	6,254
2040 DS- DM	-25	-30	-44
2040 DS- DM % difference	-0.4%	-1.1%	-0.7%

7.7 Impact of the Scheme on the Local Road Network

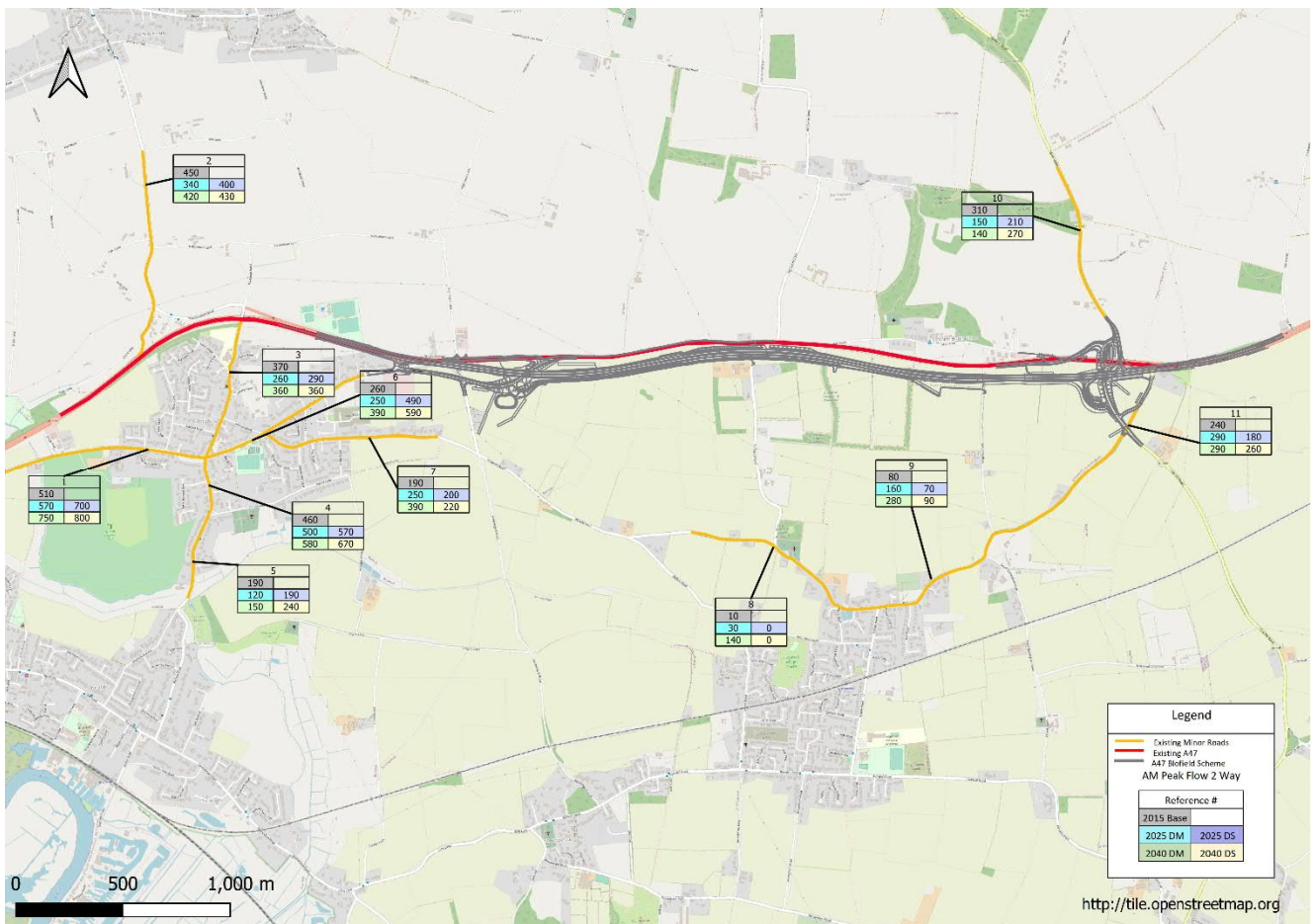
7.7.1 Figure 7-10 and Figure 7-11 show the local road network two-way peak hour traffic flows (PCU) to the nearest 10 for each forecast scenario. Table 7-14 lists the local road network links included in this assessment as well as the indicator reference numbers. The eleven sites identified in this list represent the local road network included in the NATS model. Other side roads, such as Lingwood Lane and High Noon Lane are not included in the NATS model as they are considered to be small minor roads.

7.7.2 The results of the NATs model indicate that the Scheme causes a relatively minor impact on traffic flows across the local road network. In general terms, the Schemes impact causes local road traffic flow increases in the range of 10-250 PCUs. Yarmouth Road East of North Street (3) experiences the largest traffic flow increase, across the local road network, of around 200-250 PCUs in the AM peak. Along Woodbastwick Road (2) the Scheme creates an increase in traffic of approximately 130-210 PCUs in the PM peak. Traffic along the B1140 south of A47 (11) is forecasted to decrease by around 30-100 PCUs, this is due to traffic being diverted across the overbridge included in the Scheme proposals.

Table 7-14: 2040 Local road network traffic delay results

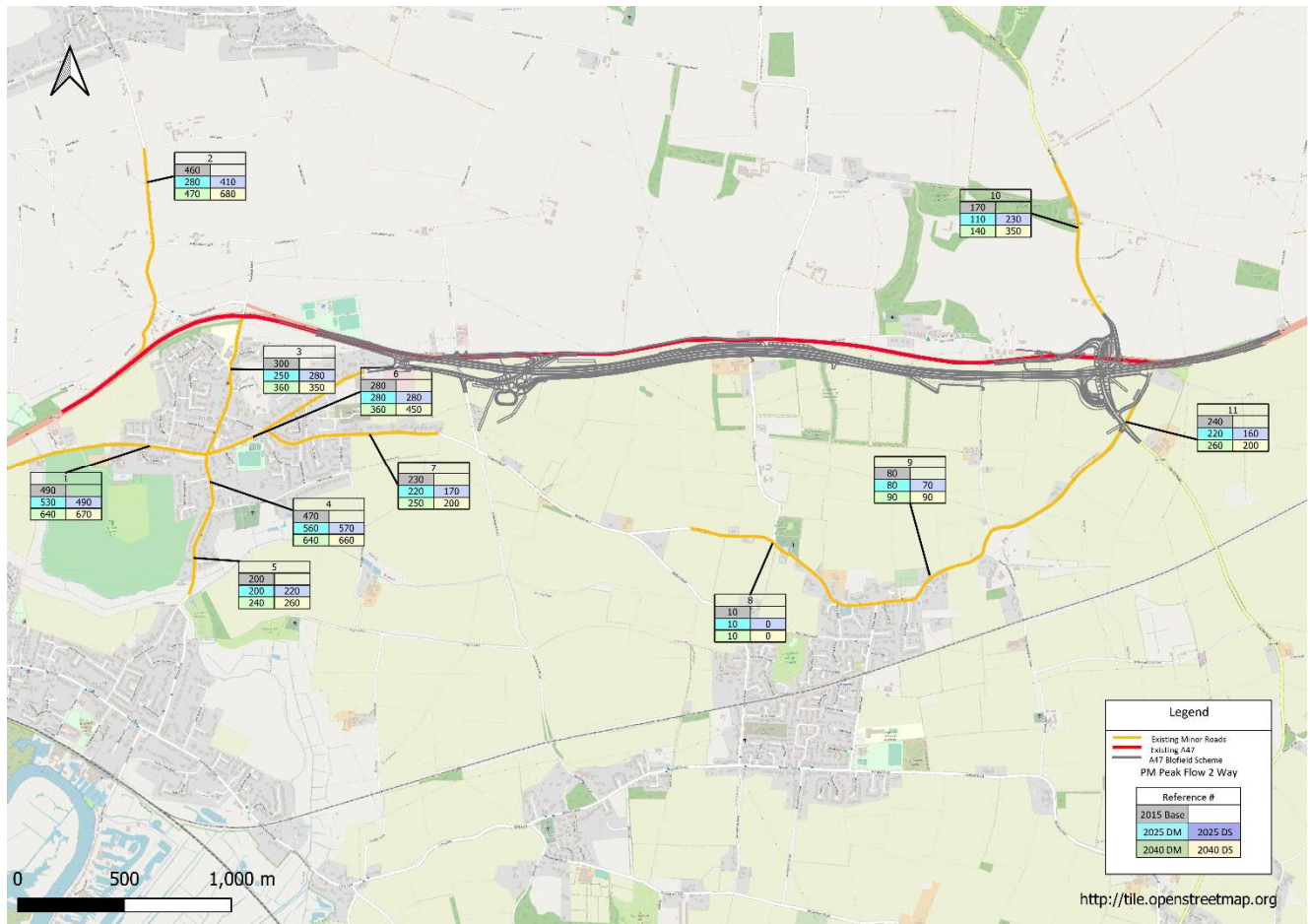
Reference #	Links
1	Yarmouth Road West of Blofield
2	Woodbastwick Road
3	North Street, Blofield
4	Stocks Lane
5	Brundall Road
6	Yarmouth Road East of North Street, Blofield
7	Lingwood Road East of Blofield
8	Heater Ln
9	Acle Road
10	South Walsham Road north of A47
11	B1140 south of A47

Figure 7-10: AM Peak Side Road Traffic Flows (PCU 2-way) – Base and Do-Minimum and Do-Something



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Figure 7-11: PM Peak Side Road Traffic Flows (PCU 2-way) – Base and Do-Minimum and Do-Something



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7.7.3 Overall model analysis indicates that the change in traffic flow, brought about by the Scheme, has a negligible impact on the delays across the local road network. In summary, the relatively small increase in flow across the local network (Figure 7-10 and Figure 7-11) has minimal impact on its operational performance.

7.8 Impact on Junctions, Queuing and Delay

A47 Mainline and A47/B1140 Junction

- 7.8.1 The VISSIM operational model has been adopted to undertake a detailed assessment of the Scheme's performance across the A47 mainline Scheme section and the upgraded B1140 junction. Average vehicle delay was selected as the key performance indicator for the VISSIM model analysis. The average vehicle delay is obtained by subtracting the theoretical (ideal) travel time from the actual travel time. The theoretical travel time is the free flow minimum time which could be achieved if no other vehicles or other impediments were present. It should be noted that this analysis is presented in seconds, rather than minutes, due to the low level of delay at the scheme junction in the 2040 design year.
- 7.8.2 Table 7-15 shows the AM and PM average vehicle delay (seconds) outputs for the A47/B1140 junction. It should be noted that this analysis is presented in seconds, rather than minutes, due to the low level of delay at the scheme junction in the 2040 design year.

Table 7-15: Design year 2040 peak hour node delay at merge and diverge on A47 mainline

Location	Delay Mainline AM (s)	Delay Slip AM (s)	Delay Mainline PM (s)	Delay Slip PM (s)
EB Merge	0.2	0.4	0.2	0.4
EB Diverge	0.4	1.8	0.3	1.7
WB Diverge	0.3	1.4	0.1	1.3
WB Merge	0.2	0.7	0.2	0.4

- 7.8.3 Analysis of Table 7-15 clearly shows that there is minimal delay on all merges and diverges. This indicates that in the 2040 design year the grade separated Scheme junction is operating satisfactorily. Furthermore, it can be seen that the current design is suitable even during the British Sugar PLC peak season where there is a large increase in HGV demand.

A47/Brundall Roundabout

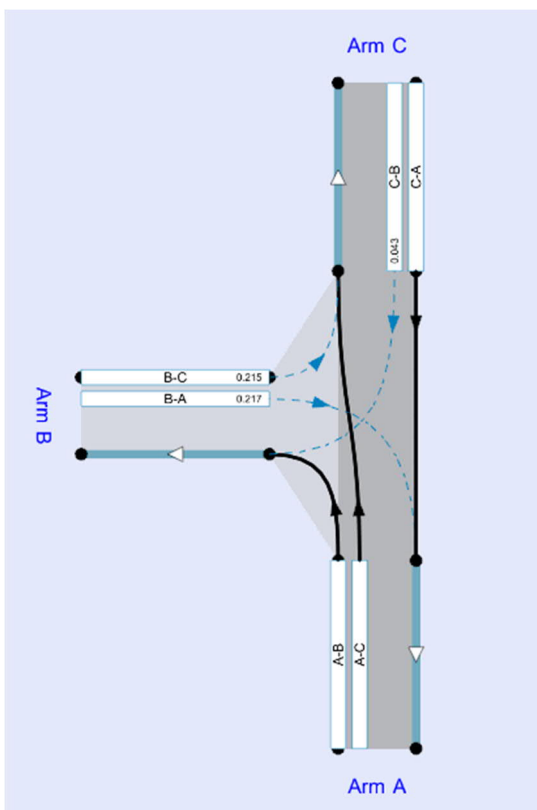
- 7.8.4 The A47/Brundall roundabout is located, approximately 1.5 kilometres to the west of Blofield village, outside of the Scheme boundary. The roundabout provides access to the A47 for the local village of Brundall via Cucumber Lane. In addition to this a retail park, including parking and a shell garage, is located along Yarmouth Road.
- 7.8.5 The traffic impacts of the Scheme on the roundabout have been assessed using the NATS model, for the base year and the future year 2025 and 2040 scenarios. Analysis of the NATS model indicates that vehicles already experience congestion on the A47 westbound (AM peak 90% V/C) and A47 eastbound (PM peak 103% V/C) approach arms to the junction.
- 7.8.6 In summary, analysis of the Do-Minimum scenario indicates that the A47/ Brundall roundabout is operating over capacity. The largest delay results from the base year modelling assessment are along the A47 eastbound approach arm in the PM peak. Based on the traffic flow volume to capacity ratios at the junction, congestion is focused on the A47 rather than the local roads. In the Do-Something scenario, additional pressure will be placed on the operation of the roundabout due to the

proposed dual carriageway improvement. This causes an increase in delay along the A47 eastbound and westbound approach arms in the AM and PM peaks (A47 WB – AM DS: 2025 111, 2040 174. A47 EB PM DS: 2025 160, 2040 187).

South Walsham Road Junction

7.8.7 South Walsham Road is the Scheme junction connecting de-trunked A47 east to B1140 South Walsham Road on the northern side of the A47. In order to assess the operational performance of the South Walsham Road Junction PICADY analysis was undertaken. Figure 7-12 shows the junction layout in PICADY.

Figure 7-12: B1140 South Walsham Road junction layout



7.8.8 Table 7-16 shows the summary of junction performance extracted from PICADY. Analysis of the Scheme junction performance indicates that all arms will operate well within the available capacity and that on average minimal delays of around 6-10s will be experienced. Furthermore, it can be seen that the junction is operating satisfactorily even during the British Sugar PLC peak season where there is a large increase in HGV demand.

Table 7-16: PICADY summary of junction performance

Stream	AM				PM			
	Max RFC	Max delays (mins)	Max Queue (veh)	Max LOS	Max RFC	Max delays (mins)	Max Queue (veh)	Max LOS
B-C	0.33	0.2	0.5	A	0.15	0.1	0.2	A
B-A	0.33	0.2	0.5	B	.0.18	0.2	0.2	A
C-A								
C-B	0.07	0.1	0.1	A	0.15	0.1	0.2	A
A-B								
A-C								

Acle: A1064/A47/New Road Roundabout

7.8.9 The A1064/A47/New Road roundabout is located, outside of the boundaries of the Scheme, just south east of the village of Acle. The roundabout connects the A47 to Acle, via the New Road side-arm. A retail park along New Road, including a Travelodge, M&S and Starbucks is located just to the north of the roundabout. The A1064 provides access to the north and connects Acle to the surrounding villages of Fleggburgh and Martham.

7.8.10 Based on the NATS 2040 forecast assessment, the Scheme's wider area impact results in an increase in traffic flow along the A47 and A1041 approach arms. This reduces the available capacity, and increases delays, for traffic accessing the roundabout from New Road. However, as there are low traffic flows along the New Road side-arm, the Scheme only has a minor impact on total delays at the junction. If a flow weighted average is taken across the delays of the junction, the Scheme's impact results in an increase in delay of approximately 0.1-0.2 minutes (AM peak average delay (mins): DM 0.6, DS 0.7. PM peak average delay (mins): DM 0.6, DS 0.7).

7.9 Impact of the Scheme on Walking and Cycling

7.9.1 The Scheme will affect a number of existing walking, cycling and horse-riding facilities along the section of the A47 to be improved. The changes include:

- severance of the PRow Burlingham FP3 at its northern end to accommodate the new A47 alignment. This will prevent users crossing the new A47 at this location to access North Burlingham.
- loss of northern sections of the permissive routes which form circular routes that currently run immediately south of the existing A47 alignment from PRow Burlingham FP3.

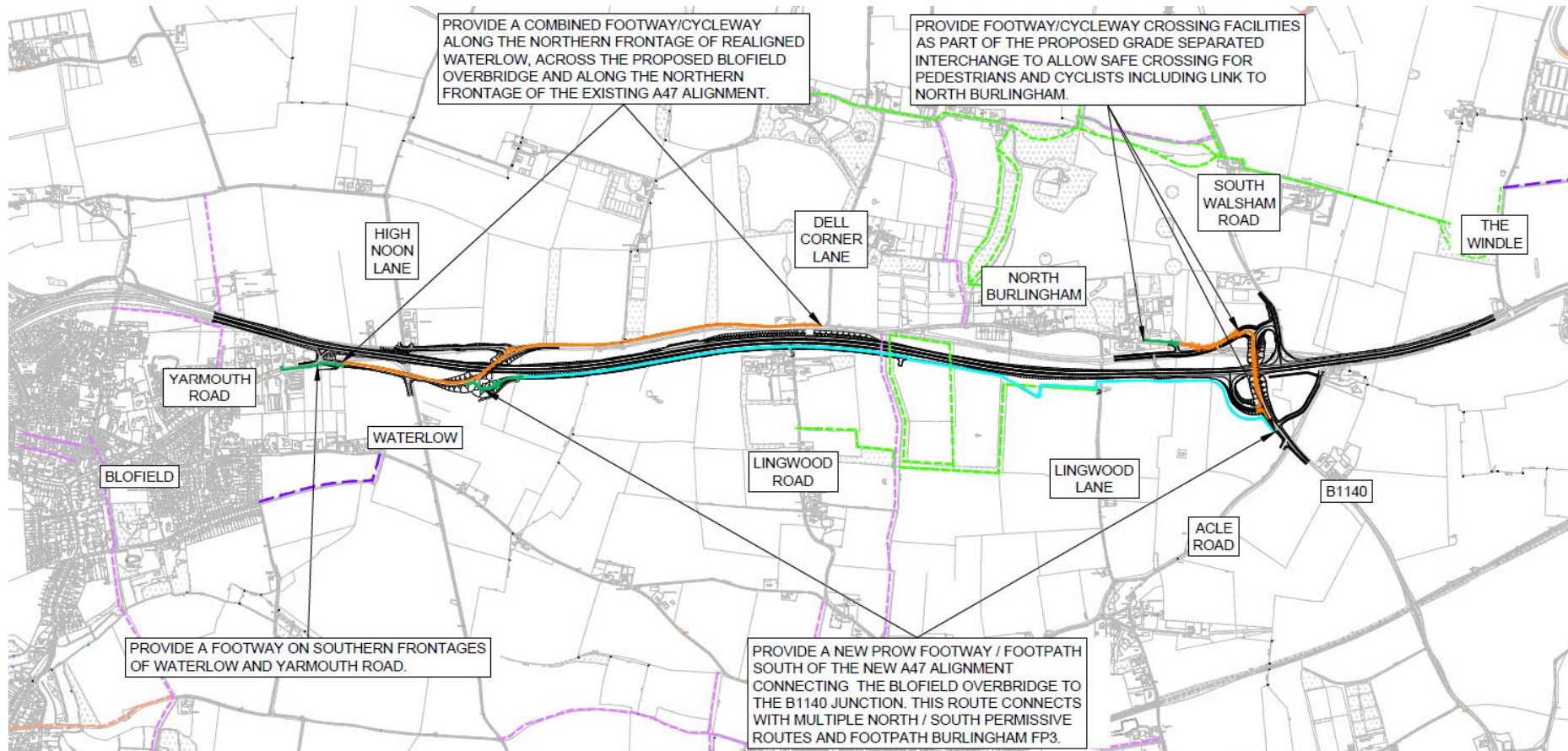
7.9.2 To mitigate the impacts of the Scheme, the discontinuous sections of footway provided along the existing A47 alignment, that will be downgraded, will be retained and incorporated into the walking and cycling infrastructure to be provided as part of the Scheme. The proposed improvements are shown in Figure 7-13 and summarised in section 7.9.4. No improvements to existing horse-riding facilities are proposed due to the limited activity in the area of the Scheme.

7.9.3 A Walking, Cycling and Horse-riding (WCHR) assessment of was undertaken and the outcome is provided in Chapter 12 Population and Human Health of the ES (TR010040/APP/6.1).

7.9.4 The proposed improvements are shown in Figure 7-13 and comprise:

- a new section of footway is proposed on Yarmouth Road to connect the existing footway and allow pedestrians to walk along Yarmouth Road to the allotment gardens.
- Where the existing A47 is unaffected by the dualling, it is proposed to be dr-trunked and serve as a local access road for residents. This will include a new combined footway/cycleway adjacent to the eastbound carriageway connecting Yarmouth Road at Blofield to the existing footway, which commences at the Dell Corner Lane junction via the Blofield Overbridge. This route will provide a link between Blofield and North Burlingham for pedestrians and cyclists.
- a new PRoW consisting of an unbound footpath running east to west:
 - adjacent to the proposed agricultural track passing Lingwood Road to FP3
 - adjacent to the agricultural access track and then the maintenance track from FP3 to Burlingham Woodland Walks
 - adjacent to the existing Burlingham Trails Network (bridleway) to Lingwood Lane with a short diversion of approximately 50m round the proposed soakaway
 - a new footpath from Lingwood Lane to the B1140
- new footway/cycleway crossing facilities to be provided as part of the proposed grade separated interchange allowing safe crossing of the new A47 for pedestrians and cyclists between South Walsham Road and the B1140. The new provision will also include a footway/cycleway link into North Burlingham via the existing A47 (to be downgraded) and Main Road.

Figure 7-13: Locations of proposed improvements to walking and cycling provision (Extract from ES Figure 12.2 (TR010040/APP6.3))



7.9.5 In summary, the Scheme provides support to walking, cycling and other vulnerable users by incorporating safe, convenient, accessible and attractive routes for pedestrians and cyclists to improve connectivity in area local to the Scheme. The results of the modelling assessment also show that the traffic flows on the downgraded existing A47 road will be reduced by the Scheme resulting in amenity benefits to pedestrians and cyclists using the route.

7.10 Impact of the Scheme on Public Transport

7.10.1 There are no proposed alterations to rail public transport services as part of the Scheme, therefore any impacts are judged to be insignificant.

7.10.2 No alterations to bus public transport services are included in the Scheme. It is considered the Scheme's impact on bus transport users will be beneficial due to the congestion relief provided for all highway traffic.

7.11 Impact of the Scheme on Accidents

Scheme Section

7.11.1 The 5-year 2014-2018 collision data, derived from STATS-19 accident records, was analysed to derive evidence of 'hotspot' locations along the Scheme section. The Scheme section accident record data, shown in Table 7-17 showing the number of accidents) and Table 7-19 (showing the number of casualties resulting from these accidents), indicates that in total 42 accidents have occurred. The 42 accidents have resulted in 63 slight injuries (91%) and 6 serious injuries over the 5 years.

7.11.2 Traffic collisions resulting from junction movements at the side arm intersections along the A47 Scheme section are shown in Table 7-19. In total 11 accidents were recorded at the B1140 South Walsham Road and 19 accidents were recorded at the B1140 south junction. A further 9 accidents have occurred at the Lingwood road junction.

7.11.3 In summary, the STATS-19 data shows a number of accidents occurring along the A47 single carriageway section and at the A47/B1140 North and South junctions. The Scheme reduces the number of accidents by increasing the capacity of the A47 mainline and by providing an overbridge which connects the B1140 North and South roads. The provision of the overbridge removes conflicting movements from the A47/B1140 junction and hence reduces the potential for accidents.

Table 7-17: A47 Scheme section accidents

Year	Fatal	Serious	Slight	Total
2014	0	1	9	10
2015	0	2	4	6
2016	0	2	10	12
2017	0	1	8	9
2018	0	0	5	5
Total	0	6	36	42

Table 7-18: A47 Scheme section casualties

Year	Fatal	Serious	Slight	Total
2014	0	1	13	14
2015	0	2	8	10
2016	0	2	20	22
2017	0	1	15	16
2018	0	0	7	7
Total	0	6	63	69

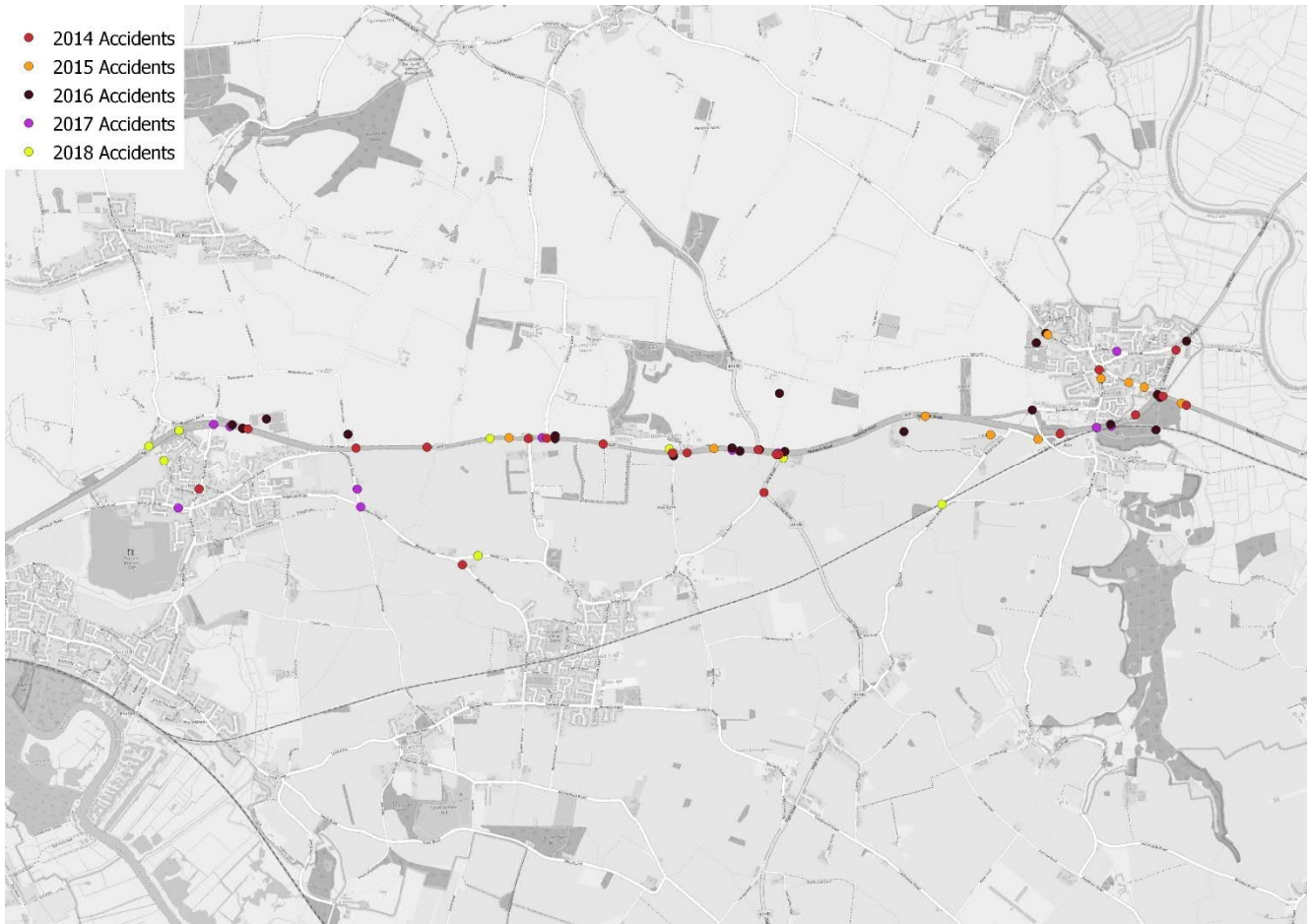
Table 7-19: A47 side arm junction collisions

Junction	Fatal	Serious	Slight	Total
Yarmouth Road	0	0	1	1
Lingwood Road	0	1	2	3
Dell Corner Lane	0	1	4	5
Lingwood Lane	0	0	9	9
B1140 South Walsham Road	0	1	10	11
B1140 South	0	2	17	19

COBA-LT Scheme Impact Area

7.11.4 A COBA-LT modelling assessment has been undertaken to capture the accident impacts of the Scheme. As part of the modelling assessment a Scheme impact area, of approximately 1 km either side of the A47 between High Noon Lane and South Walsham Road, was developed to capture accidents on the local road network. The locations and years of the STATS 19 observed accidents, within the impact area, are shown in Figure 7-14. Figure 7-15 shows the severity of these accidents.

Figure 7-14: COBA-LT Scheme impact area observed accidents between 2014 and 2018 – by year



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Figure 7-15: COBA-LT Scheme Impact Area observed accidents between 2014 and 2018 – by severity



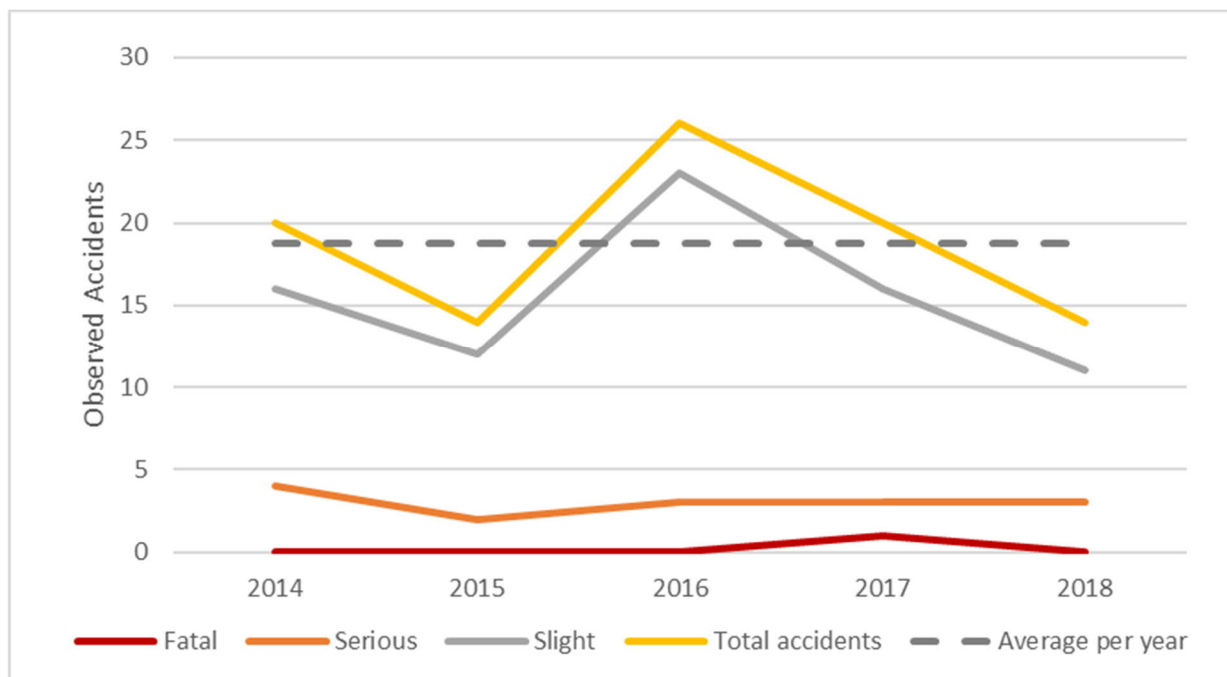
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7.11.5 Table 7-20 and Figure 7-16 present the split by severity and year for the reported accidents across the wider Scheme impact. Over the 5-year period, about 83% were slight and 16% were serious. One fatal accident was recorded at the A1064/A47 roundabout. In total 96 accidents were recorded across the Scheme impact study area. These 96 accidents resulted in 137 casualties, giving an average of 1.5 casualties per accident. The number of annual accidents in a year ranges between 14 to 26 with approximately 19 accidents observed per year over the 5-year analysis period.

Table 7-20: Scheme impact area accidents by year and severity

Year	Fatal	Serious	Slight	Total accidents
2014	0	4	16	20
2015	0	2	12	14
2016	0	3	23	26
2017	1	3	16	20
2018	0	3	11	14
Total	1	15	78	94

Figure 7-16: Scheme impact area accidents by year and severity



Walking and Cycling Users

7.11.6 An additional assessment on the number of collisions involving pedestrians and cyclists has been completed based on 2014-2018 data from Crashmap. Table 7-21 and Table 7-22 show the total number of accidents across the study area for cyclists and pedestrians respectively.

7.11.7 In total there were 2 slight accidents, one involving a cyclist and one involving a pedestrian, both located in Acle. One serious pedestrian accident was identified on Globe Lane in Blofield.

Table 7-21: Study area pedal cycle collisions

Year	Fatal	Serious	Slight	Total accidents
2014	0	0	0	0
2015	0	0	0	0
2016	0	0	0	0
2017	0	0	1	1
2018	0	0	0	0
Total	0	0	1	1

Table 7-22: Study area pedestrian collisions

Year	Fatal	Serious	Slight	Total accidents
2014	0	0	0	0
2015	0	0	1	1
2016	0	0	0	0
2017	0	0	0	0
2018	0	1	0	1
Total	0	1	1	2

Expected Collision Changes Resulting from the Scheme

- 7.11.8 The Scheme is designed to result in a reduction of accidents through introducing several operational improvements including upgrading the B1140 interchange and reducing congestion along the A47.
- 7.11.9 The economic appraisal of the Scheme's accident benefits, derived from the COBA-LT modelling assessment, is outlined in Section 5 of the Case for the Scheme (**TR010040/APP/7.1**). A summary of the accident savings is presented in Table 7-23. These accident savings are derived across the 60-year appraisal time period for the wider COBA-LT model study area which is based on a sub area of the NATS model.

Table 7-23: Predicted accident reductions

Severity	DM	DS	Savings
Fatal	119	116	3
Serious	964	937	28
Slight	5708	5548	160
Total	6791	6602	190
KSI	1045	1016	29

7.12 Impact of the Scheme on Abnormal Load Vehicles

- 7.12.1 The A47 is not classified by Highways England as a Heavy Load Route or a High Load Route between Kings Lynn and Acle. Therefore, the use of the route by Abnormal Loads faces existing restrictions in carriageway width and headroom along the route. The existing single carriageway section between Blofield and North Burlingham is an example of such a constraint.
- 7.12.2 The Scheme will provide a consistent standard of dual carriageway with the adjacent existing sections of dual carriageway. The new structures proposed to carry traffic over the Scheme at Blofield and the B1140 are designed in accordance with headroom requirements of at least 5.3m as set out in the DMRB.
- 7.12.3 The Scheme will have no negative impact on Abnormal Load Vehicles and may provide some benefit for Abnormal Load Vehicles able to navigate the existing route constraints through the provision of a wider carriageway in each direction.

7.13 Impact on Network Resilience and Journey Time Reliability

- 7.13.1 Resilience is defined as the capacity to recover quickly. Therefore, network resilience is the ability of the road network to be able to deal and recover quickly from events. This is closely linked to reliability. The term reliability refers to variation in journey times that are unable to be predicted (journey time variability, or JTV). Such variation could come from recurring congestion at the same period each day (day-to-day variability, or DTDV) or from non-recurring events, such as incidents. It excludes predictable variation relating to varying levels of demand by time of day, day of week, and seasonal effects which travellers are assumed to be aware of.
- 7.13.2 The implementation of the Scheme will generate reliability benefits as dual carriageways are more reliable than single carriageways. Road capacity is increased, delays are shortened and accidents (and their impacts) are reduced, all

of which contribute to improved reliability. It can then be concluded that the improved reliability of the A47 as a result of dualling will also then lead to increased network resilience. Furthermore, the Scheme provides some additional route options by allowing traffic to use the existing A47 road alignment. This improves the resilience of the network and provides additional access for short distance local movements.

- 7.13.3 Journey time reliability analysis has been undertaken to assess the economic impacts of the Scheme. The economic assessment of the Scheme is outlined in the Case for the Scheme (**TR010040/APP/7.1**). This analysis shows that the Scheme will generate a positive journey time reliability improvement benefit of £3.3m.

7.14 Overall Benefits of the Scheme

- 7.14.1 Implementation of the Scheme will remove the gap in A47 dual carriageway provision between the villages of North Burlingham and Blofield. Observed data indicates that this section of the A47 acts as a bottleneck. Analysis of WebTRIS data indicates that 2015 base year traffic flows are approaching the reasonable capacity limitations of the road (Figure 7-4) and that average weekday traffic speeds are below the roads free flow speed limit (Table 7-1 and Table 7-3).
- 7.14.2 The NATS traffic model analysis shows that strategic traffic growth across the A47 corridor, as well as local traffic from the villages of Blofield, Brundall and Acle, will cause an approximate increase in peak hour traffic flows of approximately 37% to 48% (Table 7-5). This traffic growth will further exacerbate the existing capacity issues along the Scheme section, resulting in increased delays and longer journey times.
- 7.14.3 The results of the modelling assessment show that the Scheme improves the overall operation of the network (Table 7-11) as well as improving A47 peak hour journey times (approximately 15% to 32% depended on direction and time period, see Table 7-10). Based on both the operational and strategic modelling assessments the Scheme will remove all the single carriageway overcapacity delays (Table 7-9 and Table 7-15). In terms of overall AADT the Scheme provides enough additional capacity to allow traffic flows to increase in the order of 17to 18% on the Scheme section (Figure 7-9)
- 7.14.4 The Scheme therefore provides additional capacity to the highway network, improves travel times and encourages economic growth across the region. In the villages of Brundall and Blofield a number of residential developments, including two sizeable developments along Yarmouth road, are identified in the Scheme's uncertainty log. The improvements to the capacity of the A47 between Blofield and North Burlingham will support these developments. In addition to this the Scheme will provide additional capacity to support strategic traffic growth across the A47 corridor between Great Yarmouth and Norwich. Evidence of this is provided in the wider economic analysis.
- 7.14.5 The appraisal of the Scheme's wider economic benefits, which represents an individual component of the Scheme's total economic appraisal, is outlined in Section 5 of the Case for the Scheme (**TR010040/APP/7.1**). As part of the wider economic benefits analysis, it is estimated the Scheme will provide a long-term positive impact of £40.6m. This indicates that businesses will benefit from the enhanced connectivity and congestion reductions brought about by the Blofield Scheme.

- 7.14.6 The implementation of the Scheme will improve reliability and network resilience as dual carriageways are more reliable than single carriageways. Road capacity is increased, delays are shortened and accidents (and their impacts) are reduced, all of which contribute to improved reliability. In addition to this the Scheme provides additional route options, which avoid the A47, for traffic travelling between Blofield and North Burlingham as well as an overpass for B1140 north-south traffic. This improves the resilience of the network and provides additional access for short distance local movements.
- 7.14.7 The Scheme provides support to walking, cycling and other vulnerable users by incorporating safe, convenient, accessible and attractive routes for pedestrians and cyclists. This includes downgrading of the existing A47 alignment to local road status and the provision of new cycling and walking infrastructure. This will allow safer passage along the route, away from the upgraded A47 dual carriageway. The results of the modelling assessment shows that the traffic flows on the downgraded existing A47 road will be reduced as a result of the Scheme (Table 7-8 and Figure 7-9).
- 7.14.8 In addition to the safety improvements the Scheme provides for walking, cycling and other vulnerable users and will reduce the total number of road traffic accidents. The Scheme improves safety along the A47 by providing upgraded dual carriageway alignment and a improved B1140 interchange junction upgrade. In total, COBA-LT analysis indicates that, over a 60-year timeframe the Scheme's improvements will save a total of 190 accidents and 29 KSIs (killed or seriously injured) (Table 7-23).
- 7.14.9 In summary the Scheme fulfils its objectives by providing additional capacity, relieving congestion, improving journey times and reliability as well as network resilience. Furthermore, it provides additional infrastructure which helps walking, cycling and other vulnerable users as well as reducing the predicted accident rates along the A47 corridor and surrounding network.

8 MITIGATION OF TRANSPORT IMPACTS

8.1 Introduction

8.1.1 This section details the application of mitigation measures to reduce the severity of any identified adverse transport impacts resulting from the Scheme. The mitigations required for the Scheme involves adopting an appropriate signage strategy and monitoring the performance of the road network.

8.2 Adjacent Junctions

8.2.1 Liaison with Norfolk County Council, with respect to the development, modelling and appraisal of the Scheme has been on going throughout the development of the Scheme. Details of the salient issues identified during this liaison are summarised in the section below.

8.2.2 The traffic modelling assessment has identified ongoing issues with the operational performance of the A47/Brundall and Acle roundabouts.

8.2.3 With the Scheme, an increase in delay across the A47/Brundall roundabout is forecasted. Highways England are committed are working with Norfolk County Council regarding this junction to identify potential mitigation measures that can be accommodated within the existing highway boundary at this location.

8.3 Signage Strategy

8.3.1 A signage strategy has been completed for the Scheme to inform the overall design. The strategy has been designed to be compliant with national guidance including the DMRB and Traffic Signs Manual.

8.4 Liaison with Local Highway Authority

8.4.1 Highways England has engaged with Norfolk County Council throughout the development of the Scheme design and the Development Consent Order application including the development of the traffic model and its assumptions. HE also provides regular updates to the A47 Alliance which is a wider stakeholder group that represents the business community, local authorities, MPs and stakeholders along the whole of the trunk road route between Peterborough and Lowestoft.

8.4.2 Throughout the development of the Scheme meetings have taken place between the two parties on specific items such as the development of a WCHR strategy, transport modelling and development of the project drainage strategy to ensure the Scheme is not developed in isolation from the Local Planning Authority or NCC's wider service and asset development.

9 SUMMARY AND CONCLUSIONS

9.1 Policy Context

- 9.1.1 In terms of adherence to national policy requirements, the Scheme demonstrates compliance with the Government's strategic vision for the development of the national road network. The benefits of the Scheme are demonstrated by its inclusion within the RIS and within national, regional and local transport and planning policy. Section 3(6) of the Infrastructure Act 2015 places a duty on the SoS to comply with the provisions of the RIS.
- 9.1.2 By increasing capacity and removing many of the constraints associated with the existing single carriageway between Blofield and North Burlingham, the Scheme meets the objectives contained in the transport and economic strategies for the area as well as policies within the Broadland local development Plans. The Scheme is strongly supported at a county level, such as within in the Norfolk County Council Local Transport Plan and improvements to the SRN are considered to be key priorities for the delivery of economic growth in Norfolk and the East of England as a whole.
- 9.1.3 The Scheme will help to support economic growth by encouraging inward investment in business and residential development and will tackle a range of identified issues including congestion, safety and journey times along this stretch of the A47. It also provides for the improvement of green infrastructure for sustainable transport modes. Table 3.1 of this Case sets out how the Scheme has been designed to meet the objectives of the NNNPS in the above regards as well as protecting the environment, ensuring a more accessible and integrated network which represents value for money.

9.2 The Impact of the Scheme on Traffic Conditions

- 9.2.1 The results of the modelling assessment show that the Scheme improves the overall operation of the network as well as improving A47 peak hour journey times (approximately 15% - 32% depended on direction and time period). Based on both the operational and strategic modelling assessments the Scheme will remove all the single carriageway overcapacity delays. In terms of overall AADT the Scheme provides enough additional capacity to allow traffic flows to increase in the order of 17-18% on the Scheme section.

9.3 The Impact of the Scheme on Walking and Cycling

- 9.3.1 The Scheme provides support to walking, cycling and other vulnerable users by incorporating safe, convenient, accessible and attractive routes for pedestrians and cyclists. Where the existing A47 is unaffected by the dualling, it is proposed to be de-trunked and serve as a local access road for residents. This will include a new combined footway/cycle. A new section of footway is also proposed on Yarmouth Road to connect to the existing footway and allow pedestrians to walk along Yarmouth Road to the allotment gardens. These new sections of infrastructure will provide improved connectivity between Blofield and North Burlingham for WCH. The Scheme also provides a new Public Right of Way (PRoW) footpath, to the south of the new A47 mainline, connecting from the Blofield Overbridge to the B1140 junction. This route connects with multiple existing north / south permissive routes and footpath Burlingham FP3. The results of the modelling assessment show

that the traffic flows on the downgraded existing A47 road will be reduced as a result of the scheme.

9.4 The Impact of the Scheme on Accidents

9.4.1 From de-trunking the existing A47 alignment to local road status and the provision of new cycling and walking infrastructure the Scheme provides safety improvements for walking, cycling and other vulnerable users. It also improves safety along the A47 for road users by providing an upgraded dual carriageway alignment and a upgraded A47/B1140 interchange junction. In total, COBA-LT analysis indicates that, over a 60-year timeframe the Scheme improvements will save a total of 190 accidents and 29 KSIs.

9.5 The Impact of the Scheme on Network Resilience and Journey Time Reliability

9.5.1 The implementation of the Scheme will improve reliability and network resilience as dual carriageways are more reliable than single carriageways. Road capacity is increased, delays are shortened and accidents (and their impacts) are reduced, all of which contribute to improved reliability. In addition to this the Scheme provides additional route options, which avoid the A47, for traffic travelling between Blofield and North Burlingham as well as an overpass for B1140 north-south traffic. This improves the resilience of the network and provides additional access for short distance local movements.

9.6 Conclusions

9.6.1 In conclusion, the Scheme fulfils its objectives by providing capacity, relieving congestion, improving journey times and reliability as well as network resilience.

9.6.2 The modelling analysis indicates that the forecasted local and regional traffic growth will cause the A47 single carriageway section to be over capacity. This will in turn create an increase in delays along the section. The Scheme, however, provides the required capacity improvements to allow for the forecasted traffic growth.

9.6.3 In terms of operational traffic impacts on the highway network, the local junction modelling assessment show the Scheme is operating in almost free-flow conditions with 2040 forecasted demand. The junction improvements provided by the Scheme generate benefits with respect to congestion relief as well as road safety. Further information on the Scheme's environmental and economic impacts can be found in ES Chapters 5-15 (**TR010040/APP/6.1**) and Section 5 of the Case for the Scheme (**TR010040/APP/7.1**) respectively.

9.6.4 In summary it is considered that the Scheme achieves the following objectives:

- Provide additional capacity and improved journey times to encourage economic growth in the local area as well as across the A47 corridor between Great Yarmouth and Norwich
- Improve safety operational issues by upgrading to dual carriageway and providing an overpass for the B1140
- Operational modelling shows traffic operating with minimal delays in approximate free-flow condition supporting a smooth flow of traffic
- Road traffic congestion is reduced by the Scheme, with journey times

reducing in the 2040 Do-Something scenario to be approximately equivalent or better than 2015

- The Scheme will improve reliability and network resilience as dual carriageways are more reliable than single carriageways. Road capacity is increased, delays are shortened and accidents (and their impacts) are reduced, all of which contribute to improved reliability
- The Scheme provides improvements to cycling, walking and other vulnerable users by providing new cycling and walking infrastructure as well as downgrading the existing A47 alignment to a local road status

9.6.5 Assessment of the local roads in the vicinity of the Scheme shows that any revised traffic routing through the area will have a negligible operational impact. Outside of the Scheme bounds, with the Scheme in place, congestion is forecasted to increase at the A47/Brundall roundabout. However, the roundabout has existing traffic congestion issues in the 2015 base year scenario. These base year traffic congestion operational issues will be exacerbated by forecasted traffic growth. Therefore, the implementation of the Scheme is not the underlying reason for the capacity related operational issues at the junction. To prevent adverse impacts to the committed programme for the current package of A47 schemes, Highways England envisage any potential congestion relief schemes taken forward will need to be progressed independently.

9.6.6 The Government has highlighted the express need for further growth and improvements to the national networks within the NNNPS. The Road Investment Strategies support the Scheme as a required improvement to the SRN.

9.6.7 The Scheme itself complies with national planning policy within the NNNPS and NPPF in reducing congestion-related delay, improving journey time reliability, increasing the overall capacity of the A47 and improving road safety and traffic flow. These improvements mean that the Scheme will contribute towards making the eastern region more attractive for business and will help in promoting a competitive regional economy.

9.6.8 The Scheme supports the objectives of the various sub regional policy documents in delivering the required improvements to the A47 while the Broadland Development Plan specifically identified the single lane carriageway between Blofield and Acle as requiring improvement to dual status to support local demand and growth aspirations on the corridor. It accordingly restricted the development of land adjacent to the single carriageway sections to maintain its availability for potential future improvements. The Scheme is also supported by the local transport plans in terms of improving the A47 corridor and therefore complies with Planning and transport at national, regional and local levels