Norwich Western Link Transport Assessment (TA) Part 2 of 2

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Foreword

This Transport Assessment (TA) has been prepared to accompany the planning application for a new link road scheme being proposed to the west of Norwich, known as the Norwich Western Link (NWL) and referred to in this TA as the Proposed Scheme.

The TA considers the effects of the Proposed Scheme on all users of the local transport network within the scope of assessment as well as relevant A47 junctions on the Strategic Road Network (SRN). The TA adopts a multi-modal approach to assessment and considers the scheme to include a proposed set of transport mitigation measures as well as the new highway link itself.

This document should be read in conjunction with the **Sustainable Transport Strategy (STS)** (Document Reference 4.02.00) which explains a package of local transport improvements which are proposed to support sustainable travel patterns within the study area west of Norwich once the Proposed Scheme is in place. Elements of the Proposed Scheme are defined as follows:

- The highway mainline element of the new proposed dual carriageway within the Proposed Scheme is referred to as the “Classified Road”;
- The interventions in the surrounding highway network, including the provision of new public rights of way, the diversion and reclassification of existing roads and rights of way and improvements to side roads that will enhance non-motorised user provision as an integral part of the Proposed Scheme and in relation to which planning permission is sought. These measures are referred to as the “Proposed Scheme’s Non-Motorised User Provision”; and
- The package of Complementary Sustainable Transport Measures (CSTM) are a range of complementary sustainable transport measures that would be brought forward in the wider west of Norwich region complementary to, but distinct from, the Proposed Scheme. The CSTM comprises two categories of measures; the cycle friendly routes described in section 7.2 of the STS and the bus strategy described in sections 7.3 and 7.4 of the STS. The cycle friendly routes would be brought forward by the Applicant within the bounds of existing

highways under its highway authority powers and seek to take advantage of the reduction in traffic on local roads as a result of the operation of the Proposed Scheme to make such routes more attractive for journeys by bicycle. The bus strategy comprises the promotion of bus routes and bus stop enhancements to the west of Norwich which would be supported by the redistribution of traffic arising from the operation of the Proposed Scheme. The bus strategy would be implemented by the Applicant in partnership with bus operators. The CSTM do not form part of the Proposed Scheme but are complementary measures that would be brought forward to maximise the sustainable transport benefits flowing from the redistribution of traffic from local roads.

A pre-application public consultation for the Proposed Scheme was carried out from 15 August to 9 October 2022. Feedback received from this consultation has been reviewed and taken into account in this TA. In particular, the traffic mitigation proposals south of A47 and North of A1067 have been updated and the strategic traffic modelling which informed the TA has been amended to reflect the proposed mitigation changes.

The background traffic growth forecasting within the NATS strategic traffic model (Norwich Area Transport Strategy) has also been updated to include the latest DfT published information from the National Trip End Model version 8.0 (NTEM 8.0) which was published in August 2022. It should be noted that the traffic data published at the time of the public consultation in 2022 was based on an earlier version of the forecasting assumptions known as NTEM 7.2 which was developed in 2016.

The background traffic growth assumptions in the new NTEM 8.0 forecast includes relevant housing and employment growth locations identified within the adopted Greater Norwich Local Plan.

This TA focusses predominantly on the operation of the highway network at peak times of day and junction capacity, whereas all day movement and highways link flows, severance effects and Non-Motorised User impacts are considered in **Chapter 19** of the Environmental Statement (Document Reference 3.19.00).

Glossary of Abbreviations and Defined Terms

A

AADT - Annual Average Daily Traffic

AAWT – Annual Average Weekday Traffic

ATC - Automatic Traffic Count

ATE – Active Travel England

A47 TUD – North Tuddenham to Easton A47 dualling scheme

A&E – Accident and Emergency

B

BR – Bridleway

BEP – Broadway Enterprise Park

C

CO2e - Carbon Dioxide equivalent

CEMP – Construction Environment Management Plan

CL – Accident cluster site

CSTM – Complementary Sustainable Transport Measures

CTMP – Construction Traffic Management Plan

CPA – County Planning Authority

D

DCO – Development Consent Order

DEP - Dudgeon Offshore Wind Farm Extension Project

DfT - Department for Transport

DM - Do Minimum Scenario

DS - Do Something Scenario

DS+M – Do Something Scenario with Mitigation

DEFRA – Department of Environment, Food and Rural Affairs

E

EAST - Early Appraisal Sifting Tool

EqIA - Equality Impact Assessment

ES – Environmental Statement

ESDAL – Electronic Service Delivery for Abnormal Loads

F

FBC – Full Business Case

FP – Footpath

FEZ – Food Enterprise Zone

G

GB – Green Bridge

GIS - Geographical Information System

GNLP – Greater Norwich Local Plan

GNDP – Greater Norwich Development Partnership

H

HE – Highways England (now National Highways)

HGV – Heavy Goods Vehicle

J

JtW - Journey to Work

JR – Judicial Review

L

LGV – Light Goods Vehicle

LLG - Local Liaison Group

LTN - Local Transport Note

LTP – Local Transport Plan

LMVR – Local Model Validation Report

LDO – Local Development Order

LHA – Local Highway Authority

M

MCC - Manual Classified Count

MMQ – Mean Max Queue

MP - Member of Parliament

N

NATS - Norwich Area Transport Strategy Model

NB - Northbound

NCC - Norfolk County Council

NCN - National Cycle Network

NCN1 – National Cycle Network Route 1

NDR - A1270 Broadland Northway (previously known as Norwich Northern Distributor Road)

NH - National Highways

NMU - Non-Motorised User (this includes pedestrians, cyclists and horse riders)

NNUH - Norfolk & Norwich University Hospital

NPPF – National Planning Policy Framework

NRP - Norwich Research Park

MRN – Major Road Network

NSIDP – Norfolk Strategic Infrastructure Delivery Plan

NSIP – Nationally Significant Infrastructure Project

NTS - National Travel Survey

NWL - Norwich Western Link

O

OAR - Options Assessment Report

OBC - Outline Business Case

OCEMP – Outline Construction Environmental Management Plan

OD – Origin-Destination

ONS - Office for National Statistics

OSR - Option Selection Report

OGV – Other Goods Vehicle

P

PCT - Propensity to Cycle Tool

PCU – Passenger Car Unit

PIA – Personal Injury Accidents

P&R - Park and Ride

PROW – Public Right of Way

PSV – Public Service Vehicle

R

RFC – Ratio of Flow to Capacity

S

SAC - Special Area of Conservation

SATURN – Simulation and Assignment of Traffic in Urban Road Networks

SB – Southbound

SEP - Sheringham Shoal Offshore Wind Farm Extension Project

SOBC - Strategic Outline Business Case

SoCI – Statement of Community Involvement

STS - Sustainable Transport Strategy

SSSI – Site of Special Scientific Interest

SRN – Strategic Road Network

SRO – Side Road Order

T

TA – Transport Assessment

TAG – Transport Analysis Guidance

TAL – Traffic Advisory Leaflet

TCF - Transforming Cities Fund

TfN - Transport for Norwich

TM – Traffic Management

ToR - Terms of Reference

TRO - Traffic Regulation Order

U

UEA - University of East Anglia

UL – Uncertainty Log

W

WCHAR - Walking, Cycling & Horse Riding Assessment Report

WCHR - Walking, Cycling and Horse Riding (National Highways Assessment)

6 Existing Conditions

6.1 Introduction

6.1.1 This section of the TA sets out the existing site conditions and travel characteristics of the local population, along with the current accessibility by all relevant modes of travel.

6.1.2 A review has been carried out of the local highway network, PROW, cycling and public transport networks and road safety in the vicinity of the Proposed Scheme.

6.2 Site Location and Surrounding area

6.2.1 The Proposed Scheme is located to the west of Norwich, within the administrative boundary of Broadland District, in the area between the A1067 and A47. At its northern extent, the new Classified Road will connect to the A1067 and at its southern boundary would link with the A47, as shown in **Figure 6-1** below.

Figure 6-1 Site Location and Context

6.2.2 The route passes through predominantly agricultural land, with some sections of woodland. It crosses the River Wensum about 250m south of the A1067. The Proposed Scheme interfaces with several existing roads and Public Rights of Way that cross the scheme.

6.2.3 Norwich city centre is approximately 13km to the east of the Proposed Scheme, which provides a wide range of employment opportunities, leisure facilities, retail services and healthcare facilities. On the western edge of the Norwich urban fringe, key employment sites are located including the University of East Anglia and the Norfolk & Norwich University Hospital and Norwich Research Park. Norwich International Airport is located to the east of the Proposed Scheme and the A140 to the northeast connects Norwich to the North Norfolk coast.

6.3 Study Area Definition

6.3.1 The TA scope considers an agreed set of junctions which were identified from visual inspection of early traffic modelling outputs, where significant changes in flows were anticipated. It was discussed with the Local Highway Authority and NH Development Management teams that the main area of impact would cover key junctions on A1067, A1270 and A47 west of A140 junction with A1270, plus A1074/Longwater Lane junction and junctions in the immediate vicinity of the Proposed Scheme in the west of Norwich. The routes shown red in **Figure 6-1 above** illustrate this impact area.

6.4 Method of Travel to Work

6.4.1 Method of travel to work 2011 Census data was obtained from the Office for National Statistics (ONS) for the surrounding rural districts of Breckland, Broadland and South Norfolk, to establish the current travel patterns in the study area as shown in Table 6-1. Results included in the 'work mainly at or from home' and 'not in employment' have not been included in our analysis. Furthermore, results from the 'underground, metro, light rail or tram' category are included in the 'train' category. Table 6-1 shows that driving a car or van has the highest mode share for all districts, with a noticeable increase in the rural areas of the districts, the highest observed in south Norfolk at 78.6%.

Table 6-1 Census 2011 Method of Travel to Work

Mode Share	Breckland Rural	Broadland Rural	South Norfolk Rural

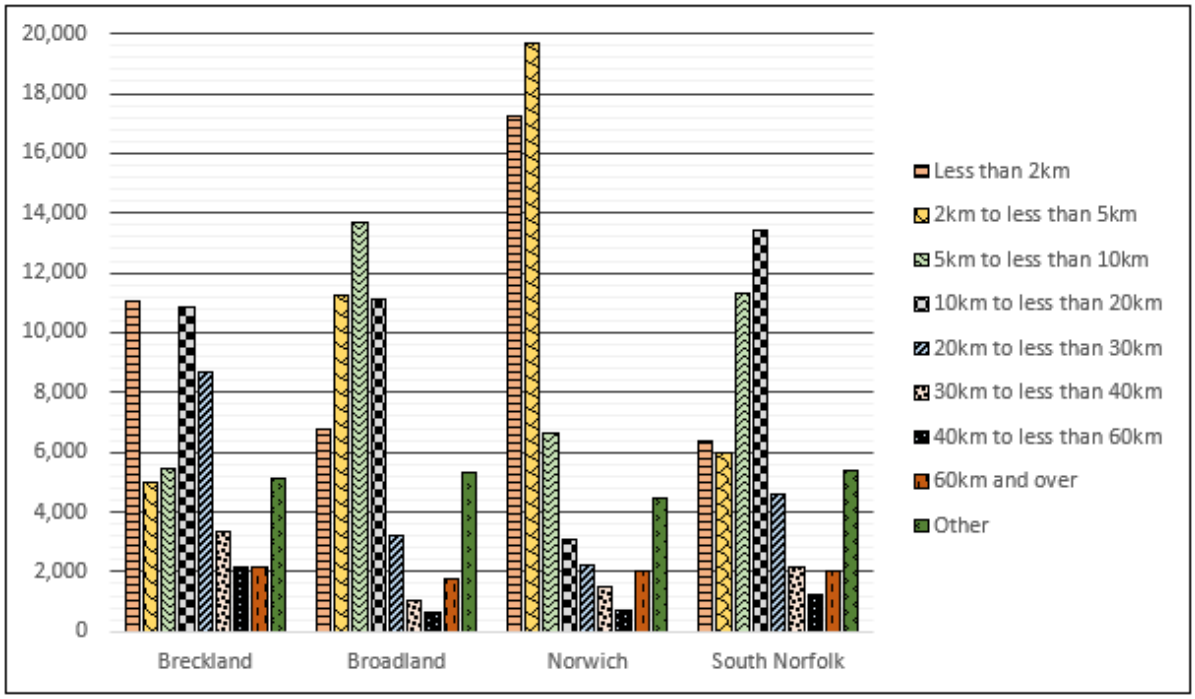
Train	0.9%	1.5%	1.3%
Bus, minibus or coach	1.7%	4.2%	4.3%
Taxi	0.2%	0.2%	0.2%
Motorcycle scooter or moped	1.0%	1.3%	1.1%
Driving a car/van	77.9%	77.7%	78.6%
Passenger in a car/van	5.5%	4.6%	4.8%
Bicycle	2.1%	2.7%	2.6%
On foot	9.9%	6.7%	6.3%
Other	0.8%	1.0%	0.8%

Source: Table QS701EW, Office for National Statistics, 2011

6.5 Distance Travelled to Work

6.5.1 2011 Census data for distance travelled to work has been gathered from NOMIS for the four administrative boundaries of Breckland, Broadland, Norwich and South Norfolk, to establish the current travel patterns across the study area. The category ‘work mainly at or from home’ has been removed from our analysis.

Figure 6-2 Distance Travelled to Work



Source: Table QS702EW, Office for National Statistics, 2011

6.5.2 The graph presented in **Figure 6-2** shows that 19% of total residents within the four districts travel between 2km and 5km to work. In total 38% of residents travel no more than 5km to work, so increased access to safe walking routes and cycling routes, combined with more frequent bus services, could allow for a reduction in personal vehicle use. However, where inclines are more pronounced, this may not be suitable for all users and trips by active modes also take longer or require higher levels of physical mobility.

6.6 Existing Accessibility Review

Walking

6.6.1 Walking is particularly suitable as an alternative to car trips in shorter distance bands and capable of integration with other modes for journeys further afield. In 2021 about 25% of all trips were less than 1 mile according to National Travel Survey (NTS) and 82% of trips under 1 mile were made on foot.

6.6.2 The Proposed Scheme is situated in the rural area to the west of Norwich, and therefore has a limited existing pedestrian network and formal pedestrian

facilities do not exist across the majority of the study area. Isochrones have been produced to show the walking accessibility from different origins (key settlements) within the study area. The analysis has been used to assess accessibility, both with and without the Proposed Scheme (including the Non-Motorised User Provision), to see how accessibility will change as a result of the proposed development and benefits that can be brought by new access routes through the site. For walking, a 30-minute catchment, based on an average walking speed of 4.6km/h has been assumed, with isochrones shown in 5-minute bands.

6.6.3 The isochrone outputs are included in **Appendix 3** (Document Reference 4.01.03) and a summary of existing accessibility without the Proposed Scheme is included below.

6.6.4 From Attlebridge, pedestrians can travel into Morton Hall, Weston Longville and Upgate within 30 minutes; further travel to the east and west of the A1067 is hindered by the lack of safe pedestrian infrastructure;

6.6.5 From Costessey, within a 30-minute walk is New Costessey, Costessey Park, the Marriott's Way and Taverham, showing that a number of amenities are easy to access for local residents.

6.6.6 From Drayton, which is centrally located and so a number of key settlements and amenities can be reached, including the outskirts of Costessey. Taverham, Thorpe Marriott and the outskirts Horsford and Hellesdon;

6.6.7 From Hockering, travel is not possible along the existing A47 by sustainable modes and so travel is constrained to the north and south of the arterial road. Within 30 minutes Mattishall, Whitford and Hockering Heath can be reached;

6.6.8 From Horsford, only Drayton and the neighbouring woodland are accessible on foot within 30 minutes;

6.6.9 From Lenwade, which is constrained to the west by the limited provision of pedestrian infrastructure along the A1067, however pedestrians can still travel to Pockthorpe, Weston, Great Witchingham;

6.6.10 From Mattishall, within a 30-minute walk travel can be achieved in all directions to Welbourne, the outskirts of East Tuddenham' Mattishall Burgh and Clippings Green;

6.6.11 Ringland, is located towards the north portion of the Proposed Scheme and current routes would allow for pedestrians to cross the route. Ringland Hills, Taverham and the outskirts of Attlebridge, Morton Hall and Weston can be reached;

6.6.12 From Taverham, similar to Drayton, is constrained by the A1067 to the west and east and so travel is only possible to Costessey and the outskirts of Thorpe Marriott; and

6.6.13 Weston Longville, is located to the to the north-west of the Proposed Scheme, and so within a 30-minute walk, pedestrians cross the route. Within 30 minutes Morton Hall, Weston Green and the outskirts of Morton and Attlebridge.

6.6.14 In summary, walking can cover a wide area and the delivery of the Proposed Scheme can enhance the level of pedestrian use and open up new routes for local residents and enthusiasts to enjoy for predominantly recreational purposes. However, distances between settlements around the Proposed Scheme are often beyond a 30-minute walking time, so pedestrian usage of the rural network beyond settlement boundaries is expected to remain relatively low for day to day commuting and other specific journey purposes with walking relatively slow and uncompetitive in comparison with other modes.

Cycling

6.6.15 Cycling also has the potential to be a substitute for short car trips, further facilitating sustainable travel. National Travel Survey 2018-19 data indicates in NTS Table Q01006 that in the East of England the average cycling trip distance was about 3 miles which is approximately 15 minutes at a typical speed of 19.2km/h. However, for rural villages across the UK the average

cycle trip distance increased to 4.6 miles which indicates a typical travel time of about 23 minutes.

6.6.16 The study area encompasses a number of cycling routes and facilities, including those of the Norfolk Trails, discussed further below. Furthermore, there are a number of local cycling groups active in the study area.

6.6.17 National Cycle Network Route 1 is located to the north and east of the Proposed Scheme, known as the Marriott's Way, discussed in more detail in **Section 6.7**.

6.6.18 Cycling isochrones have been produced to show the existing cycling accessibility from different origins, key settlements, within the study area. For cycling, a 25-minute catchment has been assumed, based on average cycle speeds of 19.2km/h.

6.6.19 The isochrone outputs are included in **Appendix 4** (Document Reference 4.01.04) and a summary of destinations accessible from various locations based on the existing network is included below.

6.6.20 From Attlebridge, the northern part of the study area can be travelled to within a 30-minute cycle, with further travel possible via the Marriott's Way trail; areas also include East Tuddenham, Colton, New Costessey, Felthorpe, Lenwade and Hockering.

6.6.21 From Costessey, central Norwich can be reached within 30-minutes and areas such as Cringleford, Sprowston, Horsham St Faith, Barford and Colton;

6.6.22 From Drayton, Norwich City Centre can be accessed to the south-east of the origin, including Norwich Airport and its Park and Ride facility, Cringleford, Horsford and Weston Green.

6.6.23 Hockering, is to the west of the study area on the existing A47. Within 15 minutes Mattishall and East Tuddenham can be reached, whilst in 30 minutes, half of the study area can be reached including Runhall, Colton, North Tuddenham, Yaxham, Lenwade Weston Green and Lyng;

6.6.24 Horsford, is located to the north east of the study area, where a 30-minute cycle enables a number of key destinations to be reached: Spixworth, Felthorpe, Attlebridge, Taverham, Drayton, Costessey, Hellesdon and Norwich City Centre;

6.6.25 Lenwade, located to the north-west of the study area, within 30 minutes are: Honingham, Lyng, Sparham. Lenwade, Morton, Swannington, Taverham, Reepham and Hockering;

6.6.26 Mattishall, to the south-west of the study area, is well placed for travel by bike, where a 30-minute cycle time enables users to reach Dereham, Barnham Broom, Barford, Colton, Hockering and Lyng;

6.6.27 Ringland, is located in the centre of the study area, enabling cyclists to travel to Costessey, Bawburgh, Barford, Taverham, Drayton, Hockering, Felthorpe and Lenwade;

6.6.28 From Taverham, Norwich City Centre, can be reached within a 30-minute cycle journey, as well as Easton, Bawburgh, Hellesdon, Weston Green, Swannington and Horsford; and

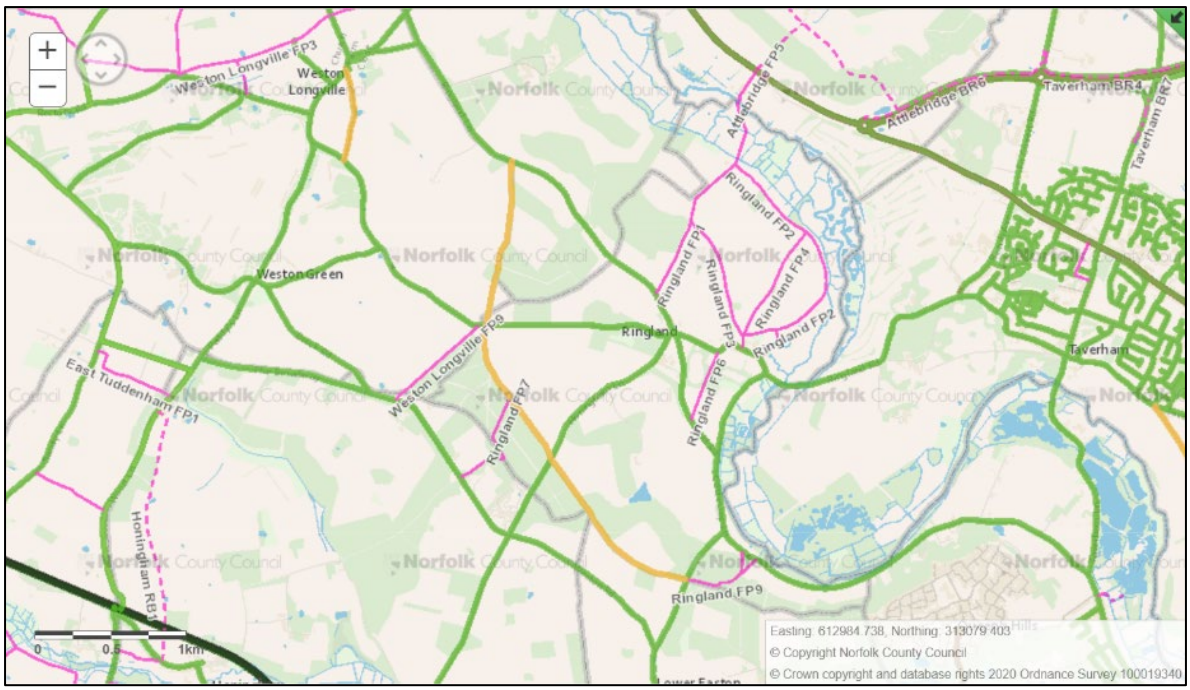
6.6.29 Weston Longville, located to the north-west of the preferred route option, enables cyclists to reach Weston Green, Ringland and Morton within 15 minutes, as well as Mattishall, Colton, Taverham, Drayton and Reepham in 30 minutes.

6.6.30 In summary, key settlements within the study area are within a feasible cycling distance of each other so there are opportunities for mode shift to active travel, with enhancements to cycle routes and reduced traffic on the surrounding road network.

6.7 Public Rights of Way

6.7.1 The study area is located to the west of Norwich, in a more rural part of Norfolk, where there are a number of PROWs available for use. Through interrogation of NCC's online mapping tool, the location of PROWs though the study area has been identified, as shown in **Figure 6-3**.

Figure 6-3 Public Rights of Way



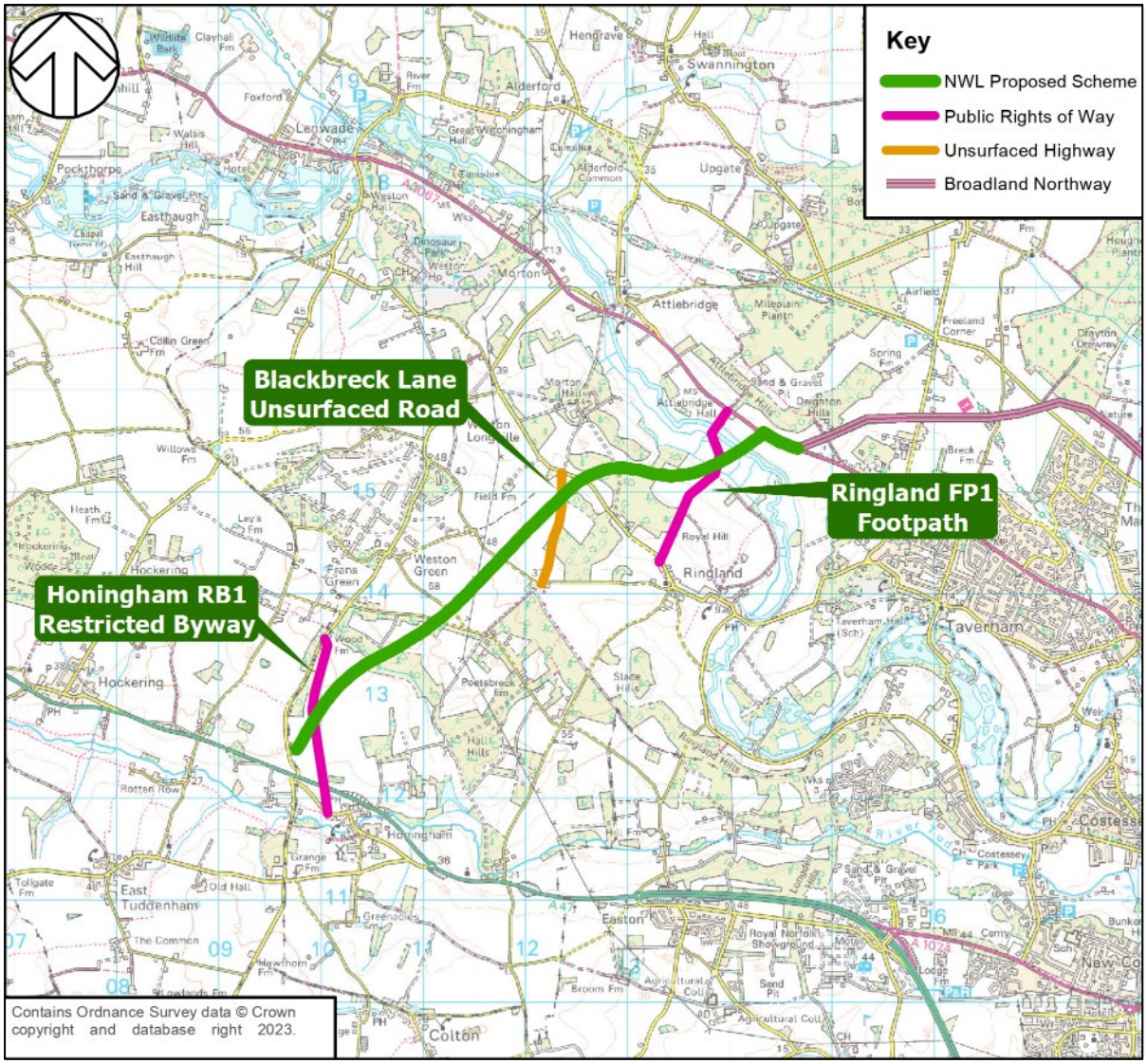
Source: Norfolk County Council, 2023

6.7.2 The Proposed Scheme alignment and that of the A47 TUD scheme will sever some of the existing PROWs and Green Lanes:

- Honingham RB1 – the restricted byway will be severed twice, once by the Proposed Scheme and again by the A47 TUD scheme
- Blackbreck Lane (Ringland Lane to Weston Road), Green Lane – The unsurfaced public highway maintained by Norfolk County Council will be severed;
- Ringland FP1 – will be severed near Attlebridge Hall.

6.7.3 The PROWs crossed by the Classified Road are shown in **Figure 6-4**.

Figure 6-4 Public Rights of Way and Unsurfaced Highway Crossed by the NWL



Honingham Restricted Byway 1

6.7.4 The Restricted Byway RB1 is accessed directly from the B1535, which has a speed limit of 50mph and 40mph in the vicinity of the scheme. There is no footway or onward NMU provision along the B1535 connecting to the Restricted Byway, users therefore need to walk along a narrow highway verge or use the carriageway to access the route.

6.7.5 The route is unsurfaced and has no existing signage to indicate the location of the RB1 route on the ground. A kissing gate enables entrance to pedestrians but is not easily accessible for cyclists and equestrians. During a site visit there was no obvious signs of recent use of RB1 (**Figure 6-5)**. The route

through the fields was overgrown, and it was not clear if users would be trespassing on private property or travelling on the RB1 (**Figure 6-6**).

6.7.6 The RB1 onward route towards Honingham is also currently severed by the A47 mainline which carries high volumes of traffic which is intimidating for users.

Figure 6-5 Honingham RB1 Entrance from B1535 Wood Lane

Figure 6-6 Honingham RB1 looking south toward A47 from Wood Lane

Blackbreck Lane

6.7.7 Blackbreck Lane is an NCC maintained, unsurfaced public highway, that will be severed by the Classified Road and diverted. The route connects to Church Hill Lane (Weston Road), where the track is at its narrowest. The route begins to widen and there are clear signs of use by pedestrians, equestrians and cyclists, which continues to Ringland Lane (**Figure 6-7**).

Figure 6-7 Blackbreck Lane looking south from Ringland Lane

Ringland FP1

6.7.8 Access to the FP1 Footpath is gained via the busy junction on the A1067 Fakenham Road and follows a route that leads down the Old Hall Farm driveway, across two timber planks over a watercourse, to a gated field, which contains livestock.

6.7.9 There is an existing timber footbridge, crossing the River Wensum which is not accessible for all users. However, the onward routes are also unmade public footpaths which cross undulating ground within the floodplain, so the route connecting to the bridge is not fully accessible for wheelchair users or mobility impaired users and is often inaccessible at times of flood.

6.7.10 Beyond the footbridge, the route links towards Ringland village via a series of fields and gates, connecting with FP2 and FP3 which provide circular routes south of the River Wensum. The onward routes are unmade rural footpaths and do not appear to be well used.

6.8 Usage of Routes Crossing the Proposed Scheme

6.8.1 To understand existing usage of the routes which cross the Classified Road, traffic surveys were carried out in October 2019 (during school term time). The results for the routes which cross the Proposed Scheme are shown below in **Table 6-2**. This indicates that these existing east-west routes are in low usage by motor vehicles with less than 1,000 vehicles per day using all routes in total. Ringland Lane is wider and better quality, so is naturally more well used. This route also links the two parishes of Weston Longville and Ringland.

6.8.2 There is evidence of existing use by NMUs with about 60 users per day on average observed. Ringland Lane was more well used than other routes during the survey period.

Table 6-2 October 2019 Traffic Surveys - Side Roads

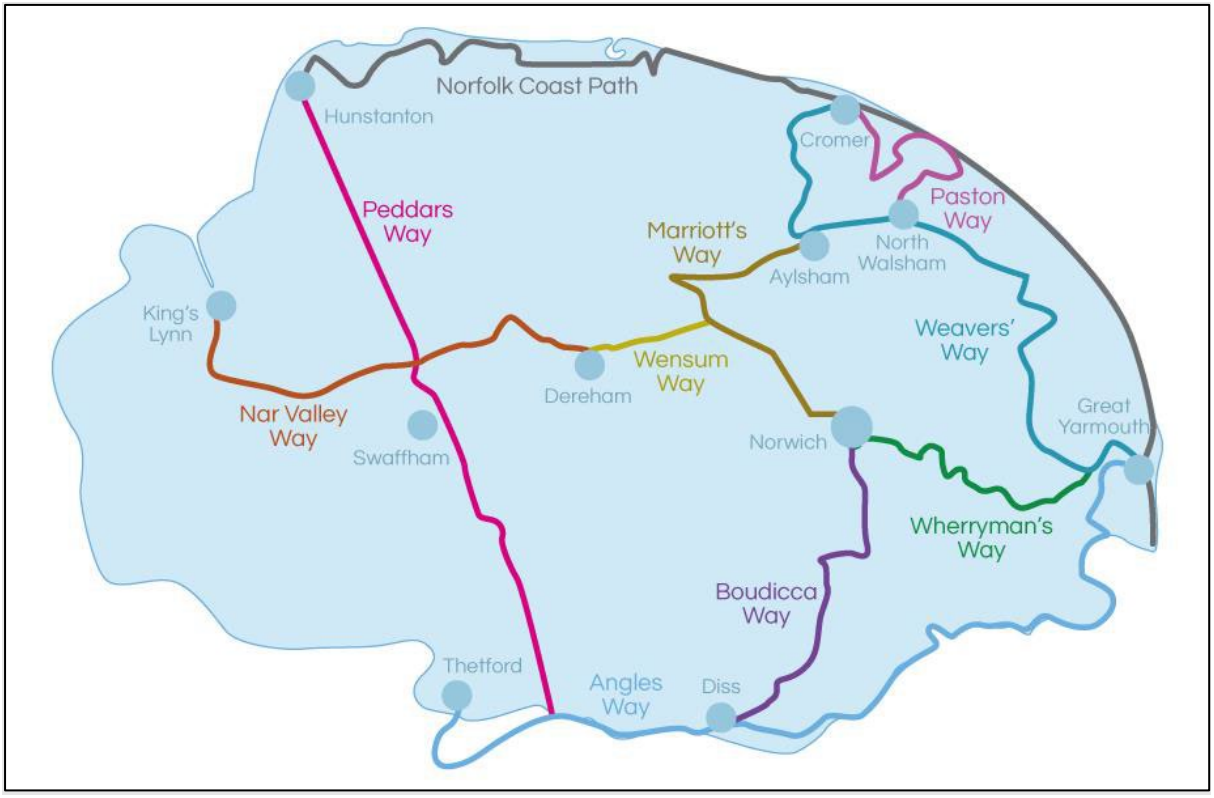
Mode	The Broadway	Breck Lane	Church Hill Lane	Blackbreck Lane	Ringland Lane
Pedal Cycle	0	5	7	0	32
Equestrian	0	0	3	1	0
Motorcycle	0	0	1	0	2
Car - 2019 Base Year	13	66	60	0	260
LGV, OGV & PSV	6	13	17	0	63
Pedestrians – lone adult	1	3	4	0	2
Pedestrian – adult+dog	1	0	1	1	0
Pedestrian – adult+child	0	0	0	0	0
Wheelchair / mobility scooter	0	0	0	0	0

Note: The figures above show the average daily two-way flows over a four-day survey period.

6.9 Marriott's Way

6.9.1 The Marriott's Way forms part of the National Cycle Network as (NCN1) and is located to the north of the Proposed Scheme, creating a 26-mile footpath, bridleway and cycle track following the route of two disused railway lines from Aylsham to Norwich and connecting to the west with the Wensum Way towards Dereham. **Figure 6-8** shows the location of the Marriott's Way and other Norfolk Trails that can be used to explore the wider Norfolk area.

Figure 6-8 Norfolk Trails



Source: Norfolk County Council, 2022

6.9.2 In 2017, the Marriott's Way was audited for potential accessibility difficulties along the route. Maps are provided on NCC's Norfolk Trails website at Access Tested trails - Norfolk County Council

6.9.3 The site walkover provided strong evidence of excellent wayfinding signage and high levels of use by pedestrians, cyclists and equestrians (**Figure 6-9**).

Figure 6-9 Marriott's Way Equestrian Use

6.9.4 There was good wayfinding signage across the route, including at sections that were directed onto the carriageway (**Figure 6-10**).

Figure 6-10 Marriott's Way Signage on Costessey Lane

6.9.5 During a survey by Norfolk County Council, during 2014-2015 there were 134,866 visits to the Marriott's Way, with the proportion of cyclists increasing significantly in the section between Thorpe Marriott and Norwich (*Marriott's Way Improvement and Delivery Plan 2015-2025*, Norfolk County Council, 2015).

6.10 Public Transport

Bus

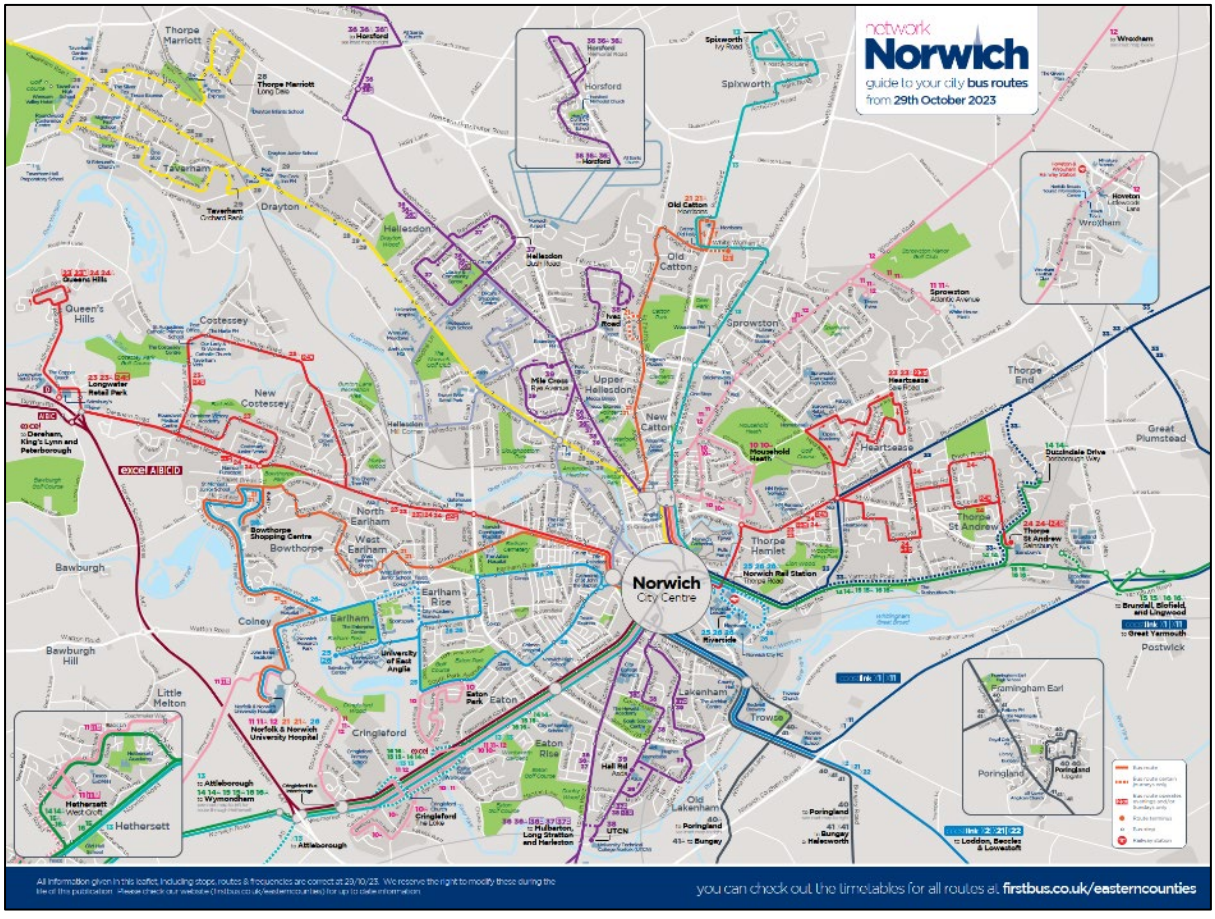
6.10.1 A review has been undertaken of the existing bus services and facilities that operate and exist in the local area, particularly at each end of the Proposed Scheme. There are bus services available throughout the study area, with the greatest concentrations located within the key residential areas, which reduce in the more isolated, rural zones.

6.10.2 Along the Proposed Scheme alignment, there are no bus stops, with the nearest facilities located on Norwich Road and A1067 Fakenham Road. **Figure 6-11** below shows the bus network for the Greater Norwich area, the map highlights the lack of connections to the study area. The nearest services are to the north-east of the study area on the Yellow Line, by the bus operator First Bus Norfolk, or the Excel services to Fakenham and Dereham, King's Lynn and Peterborough.

6.10.3 Norwich Bus Station is located in Norwich City Centre, off Surrey Street and Queens Road, which is managed and operated by Konectbus. A summary of the services is provided in **Table 6-3**.

6.10.4 Konectbus provide the 3 and 4 services to the west of Norwich, connecting Barnham Broom, Barford, Mattishall, East Tuddenham, Honingham, Easton and Hockering.

Figure 6-11 Greater Norwich Bus Network Map



Source: First Bus (2023)

Table 6-3 Local Bus Services

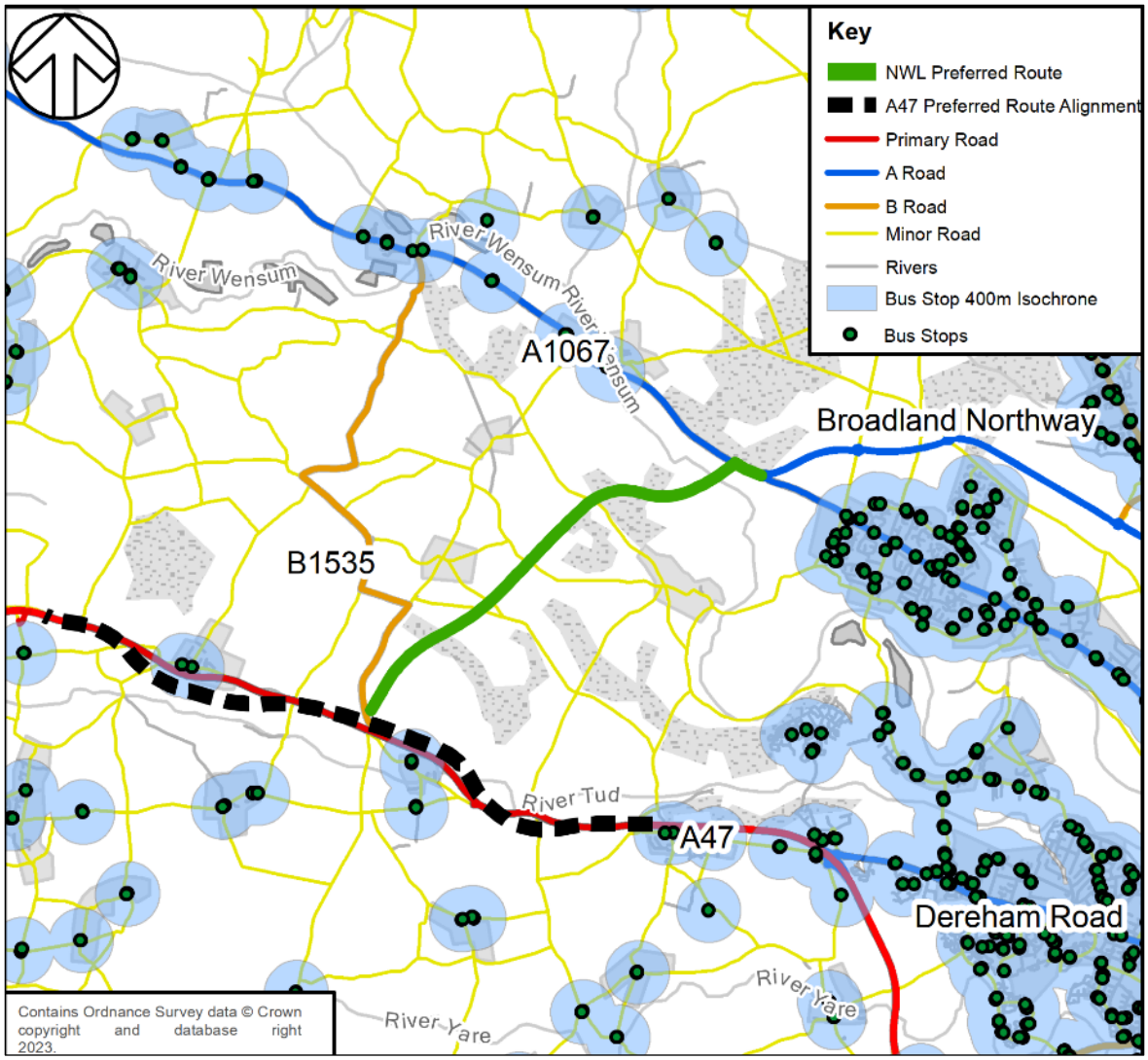
Route and service number	Nearest bus stop	Weekday frequency (per hour)	Saturday frequency (per hour)	Sunday frequency (per hour)	Weekday hours of operation	Operator
EXCEL Peterborough, Wisbech, Kings Lynn, Swaffham, Dereham and Norwich	The Street, Hockering	1	1	1	06:53 - 22:17	First Bus
EXCEL Norwich, Dereham, Swaffham, Kings Lynn, Wisbech and Peterborough	The Street, Hockering	1	1	1	07:58 - 23:18	First Bus
X29 Fakenham, Lenwade, Taverham, Norwich	St Faith's Close, Lenwade	1	1	0	06:57 – 21:12	First Bus
X29 Norwich, Taverham, Lenwade and Fakenham	St Faith's Close, Lenwade	1	1	0	08:12 – 23:23	First Bus
3 Watton and Norwich	Cock Inn, B1108, Barford	1	1	0	07:03 - 17:18	Konectbus
3 Norwich and Watton	Cock Inn, B1108, Barford	1	1	0	07:30 – 21:10	Konectbus
4 Norwich, Dereham and Swanton Morley	Pump, East Tuddenham	1	1	0	07:49 – 21:45	Konectbus
4 Swanton Morley, Dereham and Norwich	Pump, East Tuddenham	1	1	0	06:27 – 20:25	Konectbus

Source: First Bus and Konectbus (2023)

6.10.5 **Figure 6-12** shows the location of bus stops around the Proposed Scheme with a 400m typical walking distance buffer around their locations. It is clear that there is a lack of bus facilities to the west of Norwich, with bus stops only located along key radial routes into central Norwich (i.e. the A47 and A1067).

6.10.6 Due to the sparsely distributed settlement pattern in the rural area west of Norwich, the area is not able to be efficiently served by bus other than for those travelling directly into central Norwich. As set out in Chapter 4 above, the existing road network is geometrically constrained with narrow alignments and tight bends. This makes it difficult to operate large vehicles such as buses and with higher number of trips in the longer distance bands, bus options would also not be able to intercept sufficient numbers of trips to make a noticeable difference to travel patterns on the surrounding road network.

Figure 6-12 Bus Accessibility to the West of Norwich



Rail

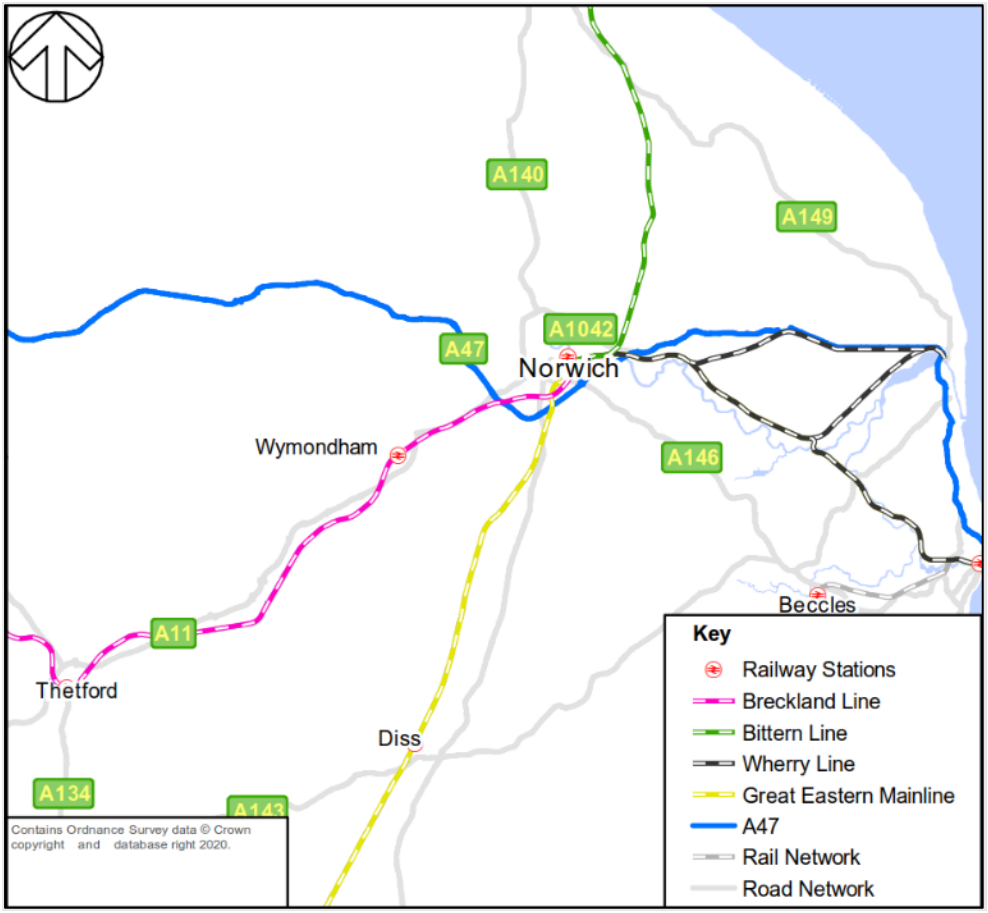
6.10.7 A review has been undertaken of the existing rail services and facilities in the local area surrounding the proposed scheme.

6.10.8 Approximately 11km south of the A47, the nearest station at Wymondham is located on the Breckland Line. About 15km to the southeast is Norwich Railway Station, on the Wherry Line. Further services on the Bittern Line (Norwich to Cromer) and Great Eastern Mainline (Norwich to London Liverpool Street) provide Norwich city with good connectivity to key destinations (**Figure 6-13**). However, rail services are more remote and less accessible from the rural area to the west of Norwich. Both of the nearest

stations are beyond an easy walking and cycling distance. A vehicle trip is therefore required to access the nearest stations in the surrounding area.

6.10.9 Norwich and Wymondham Railway Stations are operated by Greater Anglia and received 4.04 million and 196,000 passengers in 2019/2020 respectively (Office for Rail and Road, 2021). Statistics for 2020/2021 have not been used as there was reduced public transport patronage due to the COVID-19 pandemic.

Figure 6-13 Local Rail Network Map



6.10.10 The majority of services from Wymondham are to Cambridge and Norwich, with stops to Attleborough, Thetford, Brandon, Ely and Cambridge North creating an average journey time of 1 hour 7 minutes. Greater Anglia have now included an hourly service to Stansted Airport from Norwich, following the Norwich to Cambridge route.

6.10.11 From Norwich Station, a number of key destinations can be accessed, namely to London Liverpool Street, Lowestoft, Great Yarmouth, Liverpool Lime Street and Sheringham. **Table 6-4** below summarises the weekday services available from Norwich Station, operated by Greater Anglia.

Table 6-4 Weekday Direct Rail Services from Norwich Station

Destination	Calling points	Weekday Frequency	First service	Last service	Average journey time
Ipswich	Diss and Stowmarket	Half hourly	05:00	23:05	40 minutes
London Liverpool Street	Diss, Stowmarket, Ipswich, Manningtree, Colchester and Stratford	Half hourly	05:00	22:02	1 hour 45 minutes
Great Yarmouth	Brundall	Hourly	05:06	23:00	30 minutes
Lowestoft	Brundall, Brundall Gardens, Cantley, Reedham, Hadiscoe, Somerleyton and Oulton Broad	Hourly	05:36	22:40	40 minutes
Cromer & Sheringham	Salhouse, Hoveton & Wroxham, Worstead, North Walsham, Gunton, Roughton Road, Cromer and West Runton	Hourly	05:10	23:05	1 hour

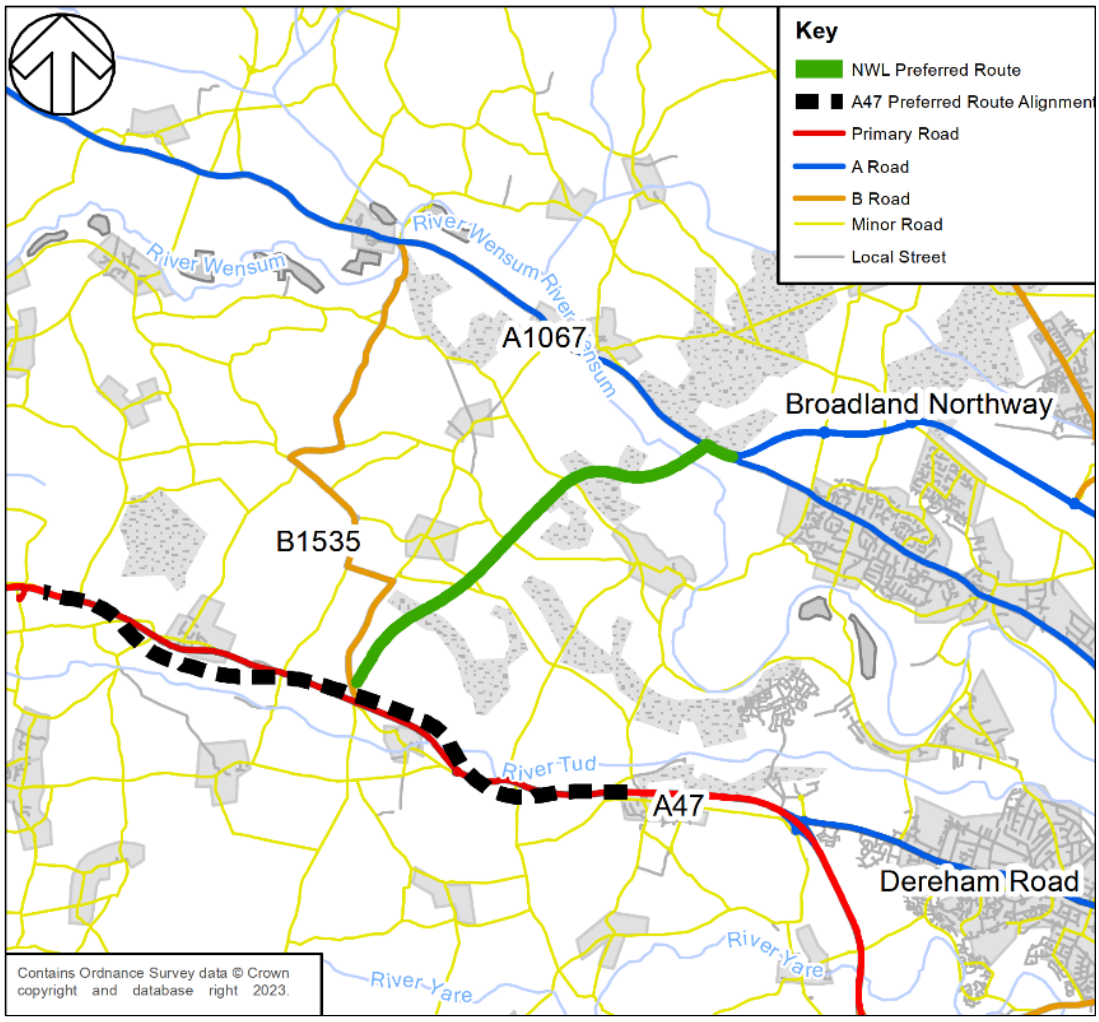
Destination	Calling points	Weekday Frequency	First service	Last service	Average journey time
Ely & Cambridge	Wymondham, Attleborough, Thetford, Brandon, Ely and Cambridge North	Hourly	05:33	22:40	1 hour 20 minutes

Source: Timetable 4, Timetable 8, Timetable 9, Greater Anglia (2022)

6.11 Surrounding Highway Network

6.11.1 The local highway network in the vicinity of the Proposed Scheme is illustrated in **Figure 6-14** and the most relevant links described below.

Figure 6-14 Local Highway Network Surrounding the Proposed Scheme



A1270 Broadland Northway

6.11.2 The Broadland Northway, formally known as the Norwich Northern Distributor Road, was fully opened to traffic in April 2018. The route is of dual carriageway standard that covers 12 miles around the north of Norwich, from the A47 junction at Postwick in the east, to the A1067 Fakenham Road in the west.

A1067 Fakenham Road

6.11.3 The A1067 a single carriageway route that connects to the Broadland Northway on the western edge of Taverham and is one of the main radial routes into Norwich. This is a rural road subject to a 50mph speed limit in the vicinity of Marl Hill Road and National Speed Limit elsewhere. It carries bus services and HGV movement to the west of its junction with A1270 at Taverham. It becomes more urban in character into Norwich, with reduced speed limits through Taverham and Drayton towards the city centre.

A47

6.11.4 The A47 is part of the Strategic Road Network (SRN) managed and operated by National Highways. It is the main strategic route linking Norfolk to the Midlands and the North. The existing A47 intersects with the Proposed Scheme at Wood Lane/Berry's Lane crossroads at Honingham to the south, where the route is currently of single carriageway standard. However, National Highways has DCO approvals in place for wider improvements to the A47 with work to include dualling the sections of North Tuddenham to Easton, Blofield to North Burlingham and Thickthorn junction with A11.

6.12 Highway Operation

6.12.1 A number of traffic surveys were undertaken in October 2019 prior to the COVID-19 pandemic to identify existing traffic flows on the surrounding highway network. This section summarises those that were recorded.

6.12.2 The traffic surveys were added to the NATS model 2019 update; the model results used to highlight which junctions would need further assessment using standalone modelling software.

Automatic Traffic Counts

6.12.3 Automatic Traffic Count (ATC) surveys were primarily undertaken to obtain traffic flows for the peak hour on an average weekday for model calibration and validation. The ATC data was also used for identifying the peak period and for deriving 16-hour, 18-hour, Annual Average Daily Traffic (AADT) and Annual Average Weekly Traffic (AAWT) conversion factors.

6.12.4 ATC data was collected at 179 sites (as shown in the location plan included in **Appendix 6** (Document Reference 4.01.06); the data collection area encompasses the Norwich urban area and includes the A47 and the A1270 Broadland Northway. The majority of traffic counts outside of the Norwich urban area are located close to the Proposed Scheme. This is to the west of the city between A1067 Fakenham Road and the A47. The traffic model will therefore have sufficient traffic data to accurately represent traffic movements within the city and between Fakenham Road and the A47 that are likely to be impacted by the Proposed Scheme.

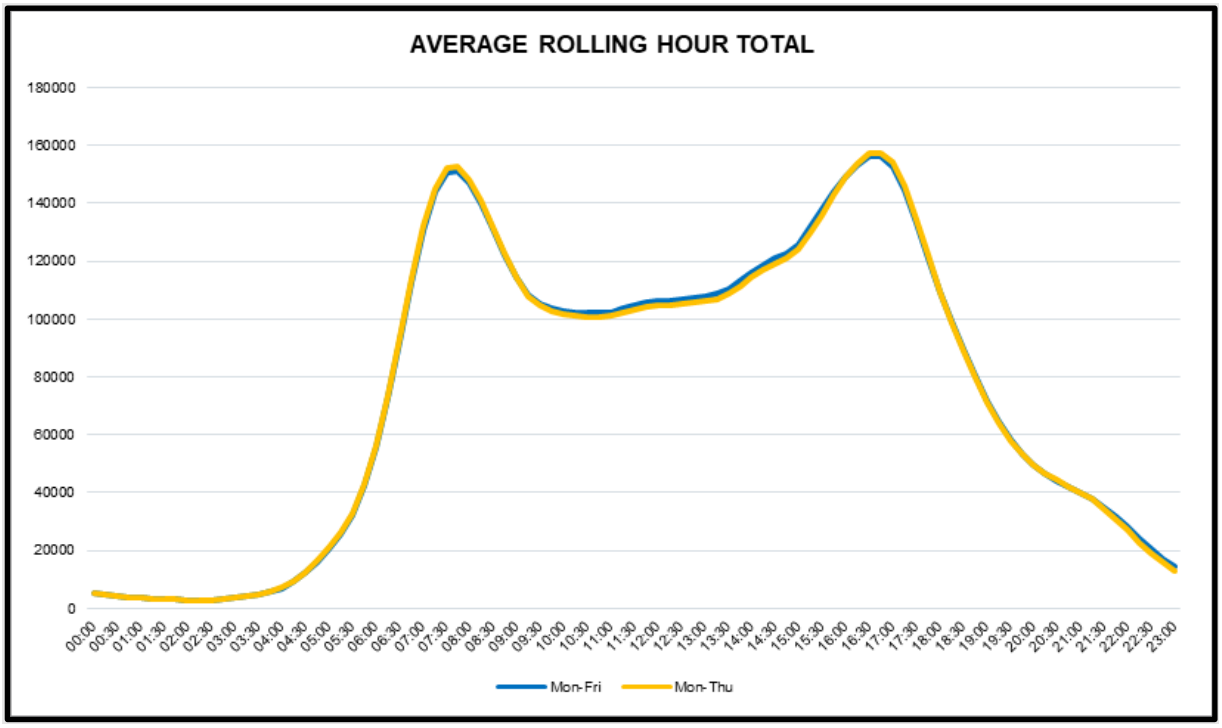
6.12.5 ATC surveys were undertaken between 2nd October 2019 to the 15th October 2019 to provide continuous data over a 2-week period. The ATC surveys reported traffic flows grouped into 12 vehicle classifications. For modelling purpose, these classifications were split between light vehicles (Cars/LGV) and heavy vehicles (OGV1/OGV2/PSV). A separate classification represented motorcycles and pedal cycles, allowing these vehicle types to be excluded from the traffic flows used in the traffic model development.

6.12.6 The ATC datasets underwent a process of data cleaning in accordance with DfT TAG requirements to exclude anomalous data.

6.12.7 **Figure 6-15**represents the daily traffic profile comparison between the total traffic flow (sum of 179 sites' post-cleaning count data) of Monday to

Thursday and Monday to Friday. This showed that there was only marginal difference between Monday to Thursday and Monday to Friday daily profile.

Figure 6-15 24-Hour Flow Profile Comparison



6.12.8 From the flow profile, it can be clearly seen that the peaks in traffic flow range between the hours of 07:00 and 10:00 and 16:00 and 19:00. These were considered to represent the AM peak and the PM peak periods respectively. The period between 10:00 and 16:00 is defined as the inter-peak period.

6.12.9 The average traffic profile for Monday to Thursday has been chosen for the calibration/validation of the traffic model. This is because Friday data can be skewed by retail trips and tourist trips which may not be representative of a typical weekday. The cleaned ATC data is presented in **Appendix 6** (Document Reference 4.01.06)

6.12.10 The NATS model covers the AM peak hour (8am-9am), PM peak hour (5pm-6pm) and an average Inter Peak (IP) hour representative of a typical hour within the 10am-4pm period. Since the NATS model covers the whole of Norwich and surrounding area, the modelled peak is representative of the entire study area.

6.12.11 In the local area to the west of Norwich, the AM peak hour was found to occur slightly sooner in the time period 7.30am-8.30am. Comparing the observed data for the local ATC sites west of Norwich and those across the wider network shows that an uplift factor of 1.0659 should be applied to convert the strategic modelled AM peak flows to the local peak equivalent in the west of Norwich.

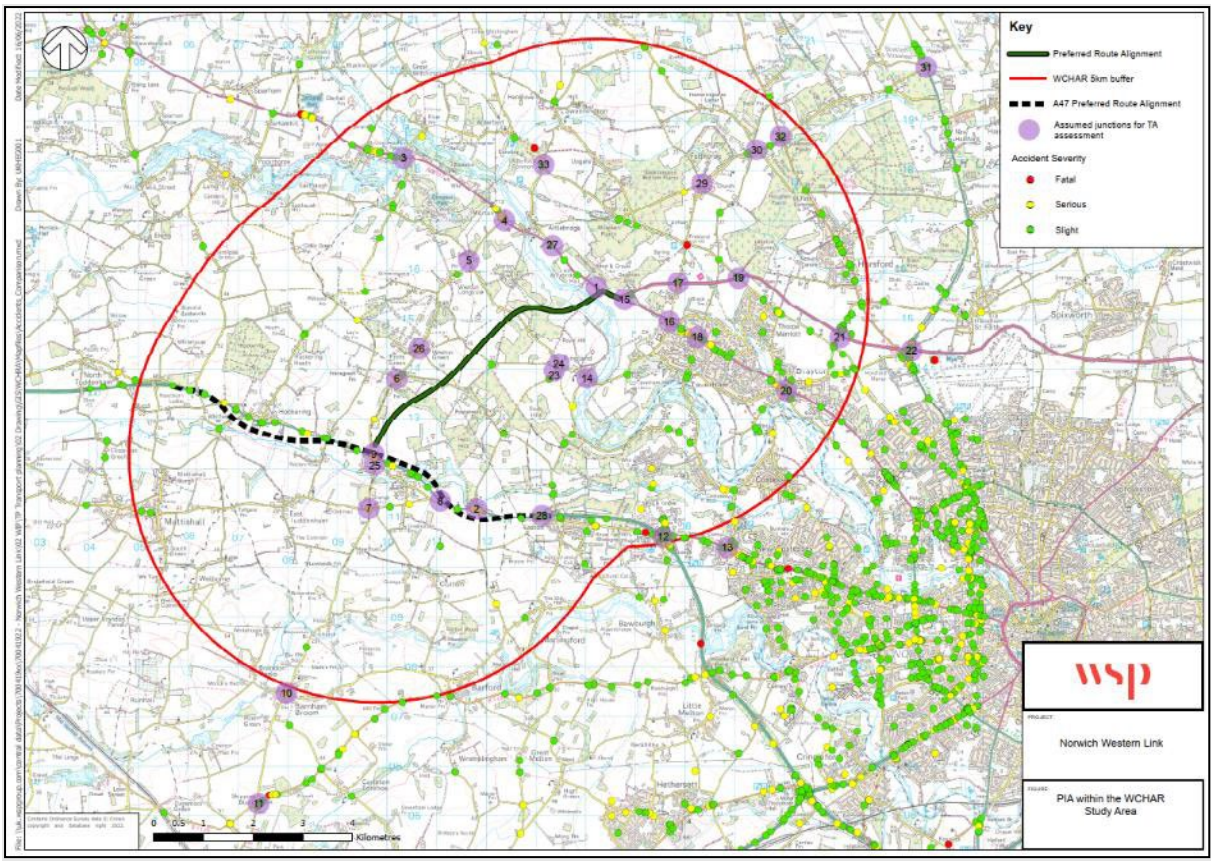
Manual Classified Turning Counts

6.12.12 Manual Classified Turning Count (MCTC) data provides vehicle turning movements at some of the key junctions within the core study area. The surveys were commissioned at 47 sites on 15th-16th October 2019, between 7am – 7pm. The locations of the surveys are shown in **Appendix 5** (Document Reference 4.01.05).and cleaned data is presented in **Appendix 7** (Document Reference 4.01.07).

6.13 Network Capacity

6.13.1 This section of the TA sets out the existing operation of the local road network. Based on a review of the strategic modelling results (prior to traffic mitigation), traffic impacts were considered relevant at 31 junctions in the west of Norwich as shown in **Figure 6-16**.

Figure 6-16 Junctions for Further Assessment



6.13.2 Capacity assessment have been undertaken for the AM and PM peak hours. Traffic flows have been entered as PCUs (Passenger Car Units) – a uniform measure where all vehicles are considered on an equivalent basis according to vehicle size. Conversion factors are applied to larger vehicles to provide a car unit equivalent for example a bus is usually 2.0 PCUs and an HGV is 2.4 PCUs at 15-minute intervals using the direct profile setting using Junctions 9 software for the priority and roundabout junctions and LinSig software for the signalised junctions.

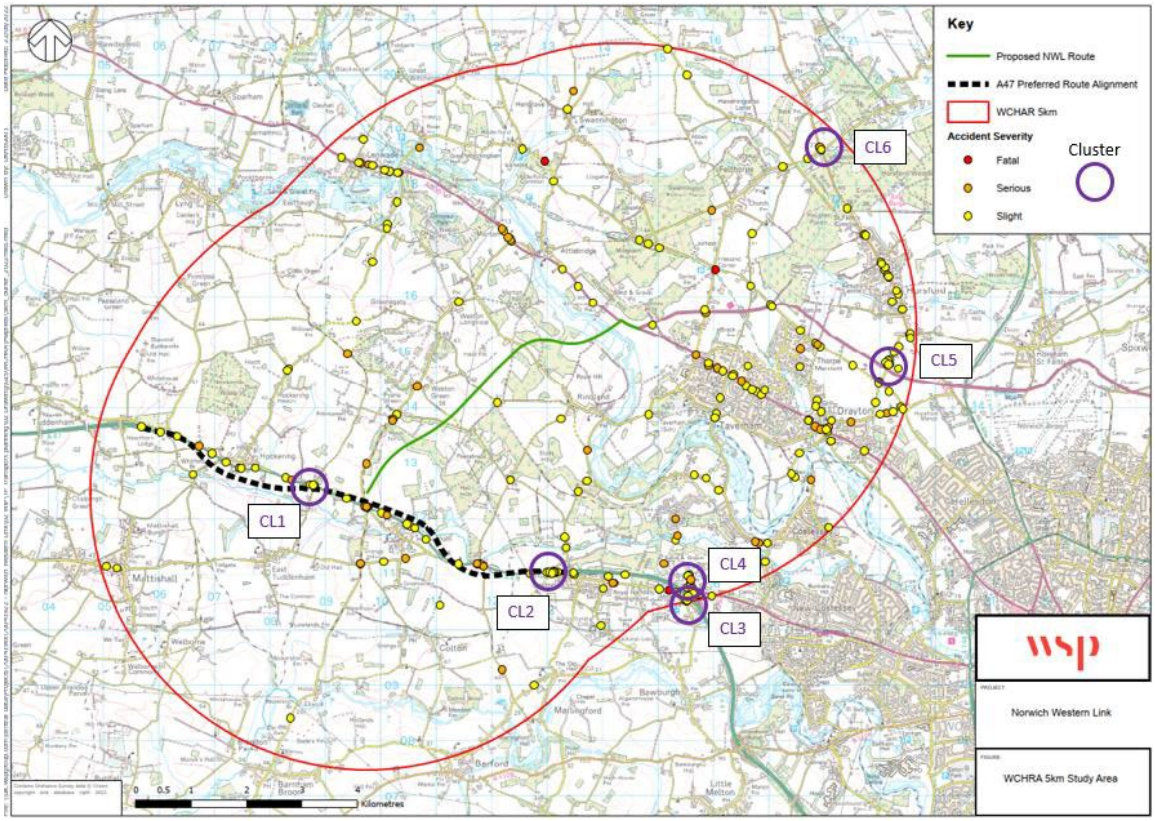
6.13.3 Junction model calibration is set out in **Appendix 17** (Document Reference 4.01.17). The process involves entering the highway geometry details of the junction into the modelling software and reviewing the resultant patterns of queues and delays output from an initial calibration run of the model for comparison with observed queue length data. Where the model results are closely matched to observed data no changes are made to the coding. Some

refinements to the model coding were needed to improve the fit of modelled queues to observed data before the models were suitable for use in this assessment.

6.14 Personal Injury Accident Data

6.14.1 Personal Injury Accidents (PIA) data has been obtained from Norfolk County Council (NCC) covering the period from 1st April 2017 to 26th March 2022 at key locations within a 5km radius of the Proposed Scheme route (**Figure 6-17**).

Figure 6-17 Personal Injury Accident Study Area



6.14.2 **Figure 6-18** shows the available details of the PIAs that occurred at these locations 1st April 2017 to 26th March 2022, which included 277 collisions. Of the 277 collisions three were fatal, 62 were serious and 212 were slight. For analysis of the data, six 'accident clusters' have been identified (shown as CL1-6). NCC as Local Highway Authority define an 'accident cluster' is where five or more PIAs have occurred in a 3-year period within a 50m radius

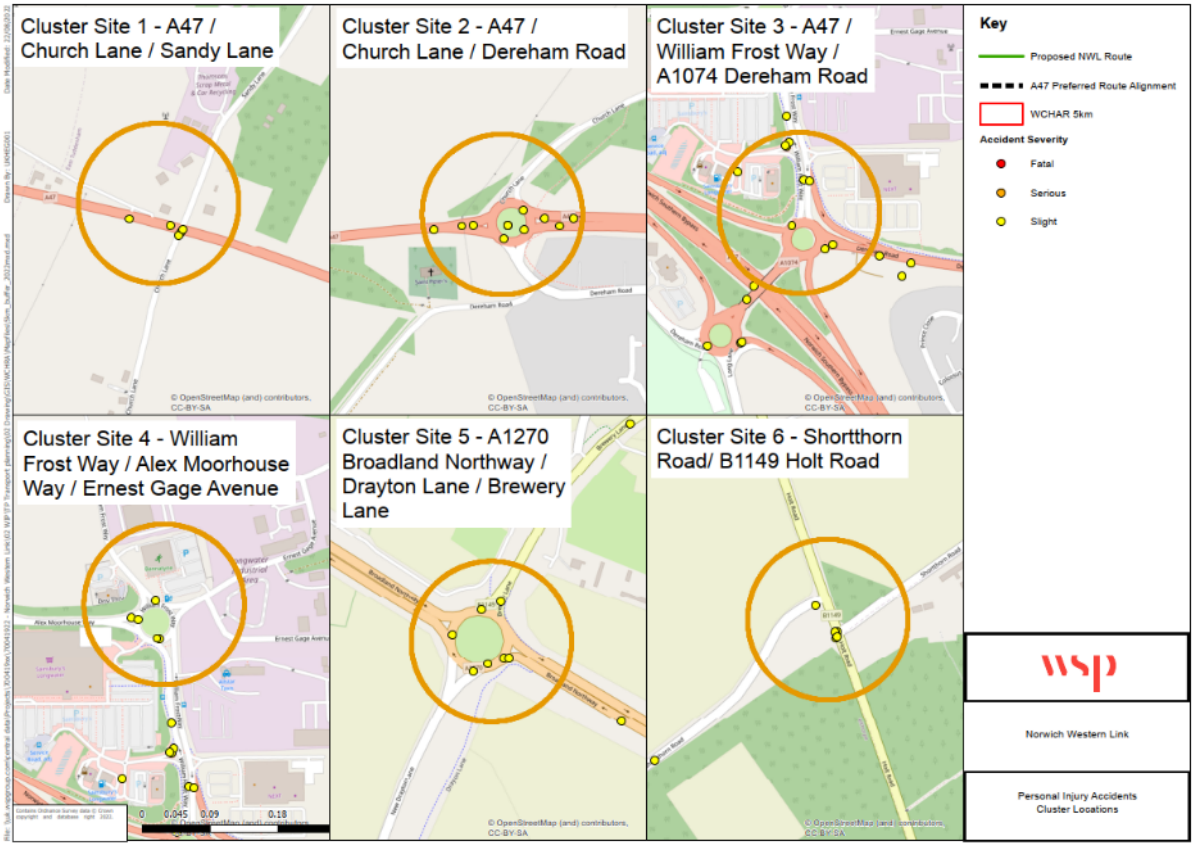
(urban) and 100m radius (rural). An 'urban' area is defined as an area with a 40mph speed limit or less; a 'rural' area is where there is a speed limit of 50mph or more.

6.14.3 A 'high risk accident area' is a route with higher-than-normal accident rate that NCC has identified for an 'Accident Reduction Scheme' or 'Route Safety Scheme'. Following discussions with NCC as Local Highway Authority, there are no such schemes within the vicinity of the site. However, there is signage in place on A1067 between Attlebridge and Lenwade noting a high casualty route. This includes the Marl Hill Road junction with A1067 and also B1535 Weston Hall Road junction with A1067 and Porter's Lane. Both of these junctions are expected to benefit from significantly reduced turning movements as a result of the Proposed Scheme. The junction capacity effects are shown in Chapter 8 for these junctions.

6.14.4 There have also been several recent accidents at the existing A47 junctions with B1535 Wood Lane and Berry's Lane plus Taverham Road/Blind Lane and Easton and Honingham roundabouts. However, these junctions would be removed or grade separated as part of the National Highways A47 North Tuddenham to Easton dualling works.

6.14.5 **Figure 6-18** shows the locations which meet the NCC accident cluster definition. The six locations are also shown in **Figure 6-18**.

Figure 6-18 Accident Cluster Locations



6.14.6 Of the six locations, only slight accidents were recorded, and through analysis of the contributory factors, no accidents were the result of poor road or junction design. The accidents are presented in more detail in **Table 6-5**.

Table 6-5 Accident Cluster Details

Accident Cluster Location	Slight Severity	Serious Severity	Fatal Severity	No. of Vehicles	No. of Casualties
1 – A47/Church Lane/Sandy Lane	5	0	0	12	8
2 – A47/Church Lane/Dereham Road	12	0	0	19	17

Accident Cluster Location	Slight Severity	Serious Severity	Fatal Severity	No. of Vehicles	No. of Casualties
3 – A47/William Frost Way/A1074 Dereham Road	9	0	0	18	14
4 – William Frost Way/Alex Moorhouse Way/Ernest Gage Avenue	5	0	0	10	5
5 – A1270 Broadland Northway/Drayton Lane/Brewery Lane	7	0	0	10	9
6 – Shortthorn Road / B1149 Holt Road	6	0	0	14	12

6.14.7 The above accident cluster sites have been reviewed and considered in the development of the Proposed Scheme. It is noted that Sites 1 and 2 will either be removed or significantly alleviated from traffic as a result of the A47 TUD scheme. Site 3 is to be considered as part of a separate intervention scheme for Longwater Interchange being pursued as a separate project by NCC. Site 4 is not a junction within the TA scope of assessment and is unlikely to be significantly affected as a result of the Proposed Scheme. Site 5 is currently the subject of a separate study which involves developing a capacity enhancement scheme by NCC (as Local Highway Authority) outside of the scope of the Proposed Scheme; and Site 6 is a junction already being proposed for mitigation as part of the Proposed Scheme. This junction would have right-turning movements restricted, in the event that monitoring shows that traffic flows have increased significantly as a result of the Proposed

Scheme. The mitigation proposals would minimise conflicts at the junction by preventing right turns from the east and west arms, this should enhance the safety performance of the junction.

6.14.8 The above review highlights that all of the junctions identified as accident clusters, with the exception of Site 4 will either be addressed as part of the NWL project or another baseline highway scheme, so would not continue to pose a constraint on the local highway network. Site 4 would not be affected significantly by the Proposed Scheme, so it is not anticipated that there would be adverse impacts on highway safety as a result of the Proposed Scheme.

6.14.9 Overall, the Proposed Scheme is expected to improve safety for all users by offering a new high standard Classified Road which has a straighter and more suitable alignment geometry than existing minor roads in the west of Norwich. NMU provision would be enhanced and joined-up providing a more extensive network of off-road routes. A new segregated cycle route and NMU crossing facility would be provided on the A1067 connecting to Attlebridge and onward routes to the NCN1 Marriott's Way. A reduction in traffic on minor roads would also assist NMUs with safer travel opportunities and existing routes will become more attractive and less intimidating for users.

7 Future Baseline Conditions

7.1 Introduction

7.1.1 This section sets out the baseline transport conditions forecasting to the future design year of assessment (2039) and explains how background growth and committed developments are modelled in the Do Minimum (DM) scenario within the strategic traffic model.

7.2 Norwich Area Transportation Strategy Model

7.2.1 The Norwich Area Transportation Strategy Model (NATS) strategic SATURN model has been updated by the Applicant to a 2019 base year. The model update and revalidation were based on extensive surveys collected in October

2019 to validate the model outputs against observed travel conditions. The NATS model has been derived from an earlier version used for the DCO application for the A47 TUD scheme. With updated 2019 Mobile Network Data used to populate the OD matrix based on 1,000s of observed trips across the network. INRIX data on journey times has also been used to calibrate the model so that it closely replicates observed travel patterns.

7.2.2 The model has been developed to be compliant with DfT TAG guidance (TAG Unit M4 contains the Department for Transport's guidance on the conduct of transport appraisal studies) and forms the basis for the scheme appraisal.

7.2.3 The update involved a complete review of and update to the coded highway network to check that appropriate link lengths and speeds are selected for each roue within the study area.

7.2.4 The model is split into zones which broadly define settlement locations. The zone boundaries and connector locations have been refined. Zone centroid connectors are locations where trips generated by a given model zone load onto the highway network within the model. Extra development zones have been added to account for major planned future land-use changes within the study area to align with the background housing and employment growth assumptions which are set out within the Uncertainty Log (UL). A copy of the UL has been included within **Appendix 8** (Document Reference 4:01:08).

7.2.5 The NATS model allows for the testing of interventions in the highway across the following time periods:

- Morning peak hour (AM) 08:00-09:00
- Average inter-peak hour (IP) 10:00-16:00
- Evening peak hour (PM) 17:00-18:00

7.2.6 A conversion factor of 1.065 is applied to the AM period during post processing of model results so that the data can be used within the individual junction models for this TA.

7.2.7 The Trip Matrix (defining trips between origins and destinations by zone) has been developed utilised a combination of Telefonica mobile phone data and journey time data from INRIX.

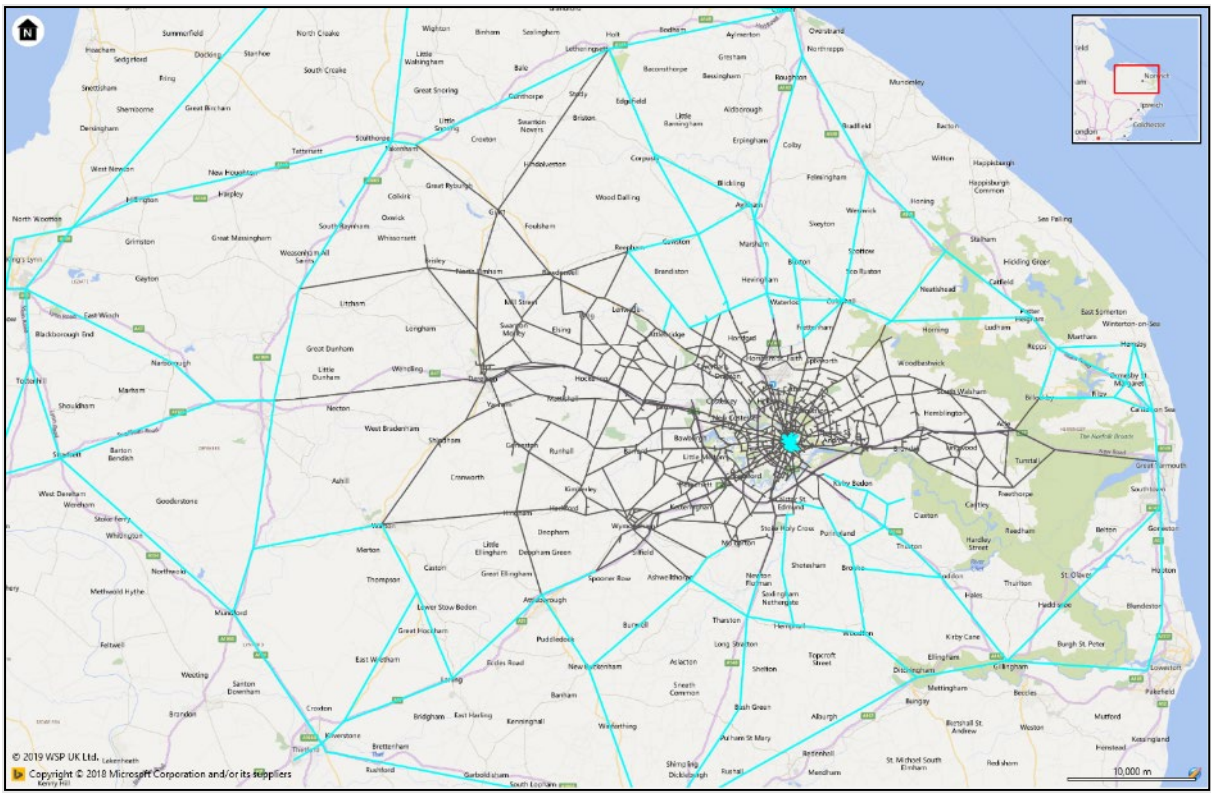
7.2.8 To update the model to 2019 highway conditions, a data collection exercise was required to collate traffic volumes within the study area. The following types of survey were undertaken to update the model:

- Link-based Automatic Traffic Counts (ATCs);
- Manual Classified Junction Turning Counts (MCCs)
- DfT TrafficMaster Origin Destination and Journey Time Data;
- Telefonica Mobile Network Data; and
- INRIX Journey Time Data.

7.2.9 The survey data is used for model calibration and validation, and the link and junction turning counts are used within the trip estimation process to refine the model to match observed traffic volumes. In order for the model to be suitable for scheme assessment, the model is required to replicate the observed highway conditions and the criteria as set out in DfT TAG Unit M3.

7.2.10 The modelled zoning system and coded highway network encompasses the area of Norfolk between King's Lynn in the west and towards Lowestoft in the south-east and represents the full detail of the highway network within the Norwich urban and surrounding areas. The highway network is represented in less detail the further away from Norwich, with only the strategic links represented on the periphery of the model. The full modelled area is shown in **Figure 7-1**.

Figure 7-1 NATS Model Highway Network Extents



7.2.11 Traffic loads onto the model network from zones via centroid connector links; the centroid zone connectors in the NATS model within the NWL study area have been reviewed and refined to determine how best to position the loading points to replicate observed data. This process is part of the model validation.

7.2.12 The highway assignment model groups traffic into 'user classes', which differentiate between the characteristics of road users, both in terms of their use and physical attributes. Heavy Goods Vehicles (HGVs), for example are physically larger than cars, and therefore, take up more road space per vehicle.

7.2.13 The user classes are summarised as follows:

- User Class 1: Cars used for employer's business;
- User Class 2: Cars used for commuting;
- User Class 3: Cars used for other purposes;

- User Class 4: Light Goods Vehicles (LGV); and
- User Class 5: Heavy Goods Vehicles (HGV).

7.2.14 The forecasting includes a 'core' central growth scenario developed with district-wide demographic growth constrained to TEMPro version 8.0. TEMPro and NRTF factors have been assigned to the origin and destination totals for each base year zone and increased appropriately in accordance with TAG Unit M4: Forecasting and Uncertainty. This enables the model to take into account the most recent available information in relation to the forecast growth in traffic published by DfT.

7.2.15 Forecast models have been produced for 2029 (proposed NWL opening year) and 2044 (Design Year) with core growth demand matrices. The 'Do Minimum' (DM) scenario for 2029 and 2044 contains a future highway network without the Proposed Scheme infrastructure but includes the proposed National Highways A47 upgrade schemes. Modelling a future design year 15 years after opening of the Proposed Scheme is typically used in economic modelling for business case purposes.

7.2.16 A ‘Do Something’ (DS) scenario has also been developed which includes the proposed NWL highway link in addition to the DM assumptions.

7.2.17 The proposed link flow traffic mitigation measures set out in **Chapter 9** are also included in the Do Something + Mitigation scenario (referred to as the DS+M Scenario within this TA).

7.2.18 DfT have reviewed the 2019 updated NATS model as part of the Outline Business Case development process. DfT comments have been addressed in the model variant used for this planning application.

7.2.19 Data has been extracted from the NATS model for each of the junctions within the TA scope, which have been modelled in more detail as agreed with Local Highway Authority and NH Development Management team. The individual junction model results are reported in chapter 8 of this TA for DM, DS and DS+M scenarios in 2039.

7.3 Committed Developments and Committed Infrastructure

7.3.1 This section of the TA considers the major developments in close proximity, as set out in the Uncertainty Log (UL) for the NATS model 2019 update. The UL sets out the committed developments in the study area for the strategic model. The relevant Local Planning Authorities have provided input to the development of the UL as the project has progressed and the status of the developments included in the model have been amended to suit the most likely scenario as of August 2023. The nearby significant developments have been included in the baseline forecast of the updated NATS model with the extent of anticipated growth at major development sites that are 'near certain' or 'more than likely' in 2029 and 2044 as listed in **Appendix 8** (Document Reference 4.01.08).

Traffic Growth

7.3.2 TEMPro version 8.1 forecasting is used to control the district-wide growth totals for each local authority area. The NTEM (National Trip End Model, traffic forecasts as published by DfT) v8.0 is taken as the basis for the District wide totals with the core planning assumptions for houses and jobs as the basis for applying a constraint on background development growth across the NATS model areas. For the future years of 2029 and 2044 the specific major development sites to be considered have been added separately with new development zones and centroid connectors added where necessary, so that traffic is loaded onto the network in the immediate vicinity of the site. The NTEM forecast totals of houses and jobs for each District have been adjusted to exclude these specific sites to avoid double counting.

Committed Development

7.3.3 The key development growth locations specifically coded within the model in the vicinity of the Proposed Scheme include the following sites (but not limited to):

- Marriott's Park development in Taverham; included within the GNLP as policy GNLP0337R 'Land between Fir Covert Road and Reepham

Road residential development.' The site was also recently approved through Broadland District Council Planning committee for up to 1,530 new homes a new primary school, medical care facility and local centre in December.

- New dwellings at Easton; included within the GNLP as policy EAS1 'Land South and East of Easton' which also encompasses continued expansion of Easton College and the Royal Norfolk Showground, new village centre, expanded primary school, alongside new vehicular accesses for development to the south of the village.
- Broadway Enterprise Park (BEP), A140 Cromer Road junction with A1270; Policy GNLP0466R/HNF2 'Land east of the A140 and north of Norwich International Airport, Horsham St Faith' seeks to achieve a range of employment uses across the 35ha site for land use E(g), B2 and B8.
- Norwich Airport expansion; Policy GNLP1061R 'Land known as Site 4, Norwich Airport' has been safeguarded for aviation-related employment and educational uses.
- Norwich Research Park expansion; and Policy COL1 'Land adjacent to Norwich Research Park, Colney' is allocated for E(gii) Science Park development, hospital expansion and other proposals ancillary, across the 38.8ha site.
- Food Enterprise Zone (FEZ) at Easton. The FEZ is a 100-acre development site, promoted as part of the government initiative introduced by DEFRA through a Local Development Order. The aims of the FEZ is to create a site that combines commercial food production facilities, with food research, education and ancillary businesses.
- Land at North Rackheath Up to 3,000 dwellings and employment units on a former airfield site at the Broadland Growth triangle between Wroxham Road and Salhouse Road on the east side of Norwich.

Committed Infrastructure

7.3.4 Committed highway schemes to be considered within this TA are as follows:

A47 TUD scheme

7.3.5 This would double the capacity of the stretch of A47 to the south of the Proposed Scheme from North Tuddenham to Easton, with two new grade separated junctions – one at Blind Lane/Taverham Road junction and another at Wood Lane/Berry's Lane (which would also provide connectivity with the Scheme). This would also improve safety and efficiency of operation by removing existing at grade crossroad junctions and remove the Easton roundabout. The A47 TUD scheme would lead to an increased volume of traffic on A47 to the south but would enhance journey times for strategic traffic. The scheme is fully funded and the DCO was approved in August 2022. All scenarios for the Proposed Scheme are therefore modelled with the A47 TUD scheme in place within the baseline forecast in 2029 and 2039. Subsequently, following the DCO approval, and subsequent delays caused by legal challenges the scheme has a revised expected start date of early 2025.

A11/A47 Thickthorn Junction improvements-

7.3.6 This scheme offers a direct link from A11 Eastbound traffic to A47 north avoiding the existing roundabout which is operating at capacity. The DCO was approved for this scheme in October 2022 by the Secretary of State.

A47 North Burlingham to Blofield dualling scheme

7.3.7 This also has DCO approval in place and is due to commence construction in late 2024/early 2025.

Signalisation of Fir Covert Road / Beach Avenue junction

7.3.8 This is linked to the adjacent food store development which was recently constructed on site and now open to traffic.

Schemes associated with the Transport for Norwich Strategy

7.3.9 The Transport for Norwich strategy was adopted in December 2021 and considers the Long Stratton Bypass, Norwich Western Link, A47 Blofield to

North Burlingham dualling, A47 Thickthorn Interchange improvements and A47 North Tuddenham to Easton proposals as strategic schemes. Along with public transport proposals and active mode enhancements, it seeks to maximise the uptake of non-car travel within the shorter distance bands. Three radial corridors into central Norwich including Dereham Road corridor are identified for enhancement within the strategy. For avoidance of doubt, it should be noted that the Norwich Western Link scheme (i.e. the Proposed Scheme) is omitted from the DM scenario as this TA tests the impact of the Proposed Scheme. The Proposed Scheme is only considered in the Do-Something scenarios.

7.3.10 There are also a number of other committed highway improvements which are considered as baseline schemes within this TA as they are near certain or more than likely at the time the strategic model forecasting and Uncertainty Log in **Appendix 8** (Document Reference 4.01.08) was updated . These are as follows:

- A140/A1270 junction improvements to add an extra arm to the northern roundabout for access to the Recycling Centre which opened in December 2020 – this would also provide access to the Broadway Enterprise Park (BEP) site.

7.3.11 Following the UKs ambitions to expand renewable energy generation in the form of offshore wind farms, there are several committed and planned projects that are being progressed within the greater Norfolk area. The projects listed below are considered in relation to their construction phase only as once installed they will have very little ongoing operational impacts so have not been considered as a committed development for the Proposed Scheme's operational assessment periods and are therefore not included in the strategic transport modelling. These schemes are as follows:

- The Hornsea Three project by Orsted for up to 231 offshore wind turbines off the north coast of Norfolk has received its DCO in December 2020. The planned onshore cable route between Cromer

and National Grid Norwich Main Substation in Dunston, south of Norwich is proposed to intersect the Proposed Scheme to the south of Ringland Lane.

- Extensions to the existing Sheringham Shoal and Dudgeon (SEP and DEP) offshore wind farm project by Equinor are planned, with the application for DCO assessment to the Planning Inspectorate accepted in October, 2022 and the examination closed in July 2023. The planned onshore cable route between Weybourne and National Grid Norwich Main Substation in Dunston, south of Norwich is proposed to intersect the Proposed Scheme immediately north of Church Hill Lane (Weston Road).

7.4 Greater Norwich Local Plan (GNLP) Growth

7.4.1 The GNLP is considered to be adopted at the time of preparing this TA. This identifies a housing need of 40,541 dwellings in the Local Plan period to 2038.

7.4.2 The background growth assumptions for district wide totals of future housing and jobs used within the modelling have been updated to match the recently published NTEM 8.0 datasets for forecasting. The Data Report that accompanies the NTEM forecast notes that for Norwich City, Broadland and South Norfolk, the housing and employment growth assumptions are consistent with the July 2021 Draft GNLP.

7.4.3 The majority of major development locations included within the GNLP have been included in the modelling as specific developments and most of these have live planning applications being considered at the time of writing. An Uncertainty Log was produced in consultation with the Local Planning and Highway Authorities in August 2023 to inform the assumptions taken into account within the strategic modelling that has informed this assessment.

7.5 Cumulative Effects of Other Developments

7.5.1 A wide range of other committed development sites which are required to be considered in terms of in combination effects are also listed and discussed

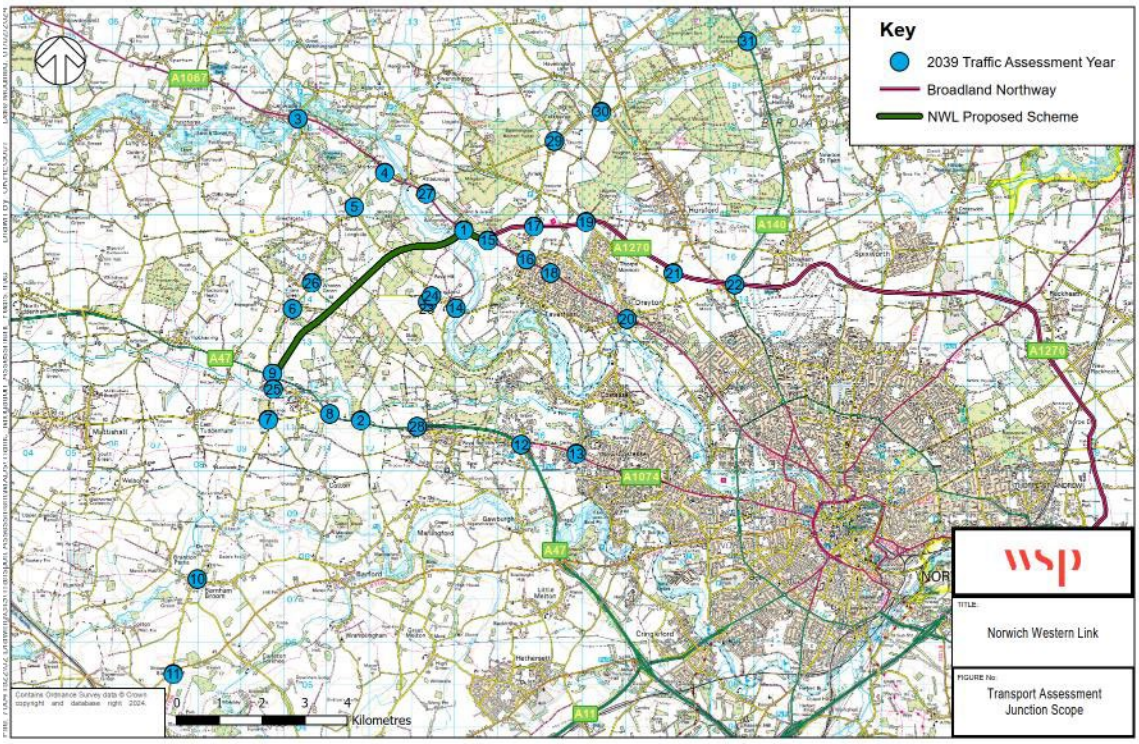
within the **ES Chapter 20 – Cumulative Effects** (Document Reference 3.20.00).

8 Impact Assessment

8.1 Methodology

8.1.1 Following discussions with NCC (in its capacity as the Local Highway Authority) and consideration of the NATS traffic model forecasting results considering the area of influence of the Proposed Scheme, the study area for junction assessment was determined to include the following junctions shown in **Figure 8-1** and described below. This was based on a visual assessment of flow difference plots from the NATS model, which indicated more pronounced changes in traffic flows west of the A140 and north of the A11, including the A1067, A47, A1270, B1535, and routes through the villages of Weston Longville, Ringland, Barnham Broom, Felthorpe, Attlebridge and Honingham.

Figure 8-1 Junctions within the Scope of Traffic Impact Assessment



8.1.2 The junctions included for traffic impact assessment are the following:

(1) Northern Proposed Scheme/ A1067 Fakenham Road roundabout;

(2) Taverham Road/Blind Lane/A47 future dumbbell roundabout;

(3) B1535 Western Hall Road/ A1067 Fakenham Road/ Porter's Lane crossroads;

(4) B1535 Marl Hill/ A1067 Fakenham Road 'T' junction;

(5) B1535 Marl Hill/ B1535 Church Street/Morton Lane (Weston Longville) crossroads;

(6) Paddy's Lane / The Broadway / Access Road staggered Junction;

(7) Berrys lane/ Barnham Broom Road/ Mattishall Road crossroads (Honingham);

(8) Norwich Road/Former A47 (Honingham Roundabout);

(9) Berry's Lane/ Wood Lane/ Upgraded A47 Junction;

(10) Mill Road/Honingham Road/ Norwich Road/ Bell Road crossroads (Barnham Broom);

(11) B1108 Norwich Road/ Bell Road Priority Junction;

(12) A47 Norwich Southern Bypass/ A1074 Dereham Road/ William Frost Way/ Long Lane grade separated junction;

(13) Longwater Lane/ A1074 Dereham Road/ Bawburgh Lane signalised crossroads;

(14) The Street/ Weston Road/ Field Road crossroads (Ringland);

(15) A1067 Fakenham Road/ A1270 Broadland Northway roundabout;

(16) A1067 Fakenham Road/ Fir Covert Road/ Beech Avenue staggered crossroads;

(17) A1270 Broadland Northway/ Fir Covert Road roundabout;

(18) A1067 Fakenham Road/ Sandy Lane/ Breck Farm Lane crossroads;

(19) A1270 Broadland Northway/ Reepham Road roundabout;

(20) A1067 Fakenham Road/ Costessey Lane/ School Road signalised junction;

(21) A1270 Broadland Northway/ B1149 Brewery Lane/ Drayton Lane roundabout;

(22) A1270 Broadland Northway/ A140 Holt Road grade separated junction;

(23) Weston Road / Honingham Lane priority junction;

(24) The Street / Field Road / Weston Road crossroads;

(25) Berrys Lane / Dereham Road;

(26) Honingham Road / Paddy's Lane / Weston Green Road crossroads;

(27) A1067 Fakenham Road / Old Fakenham Road priority junction;

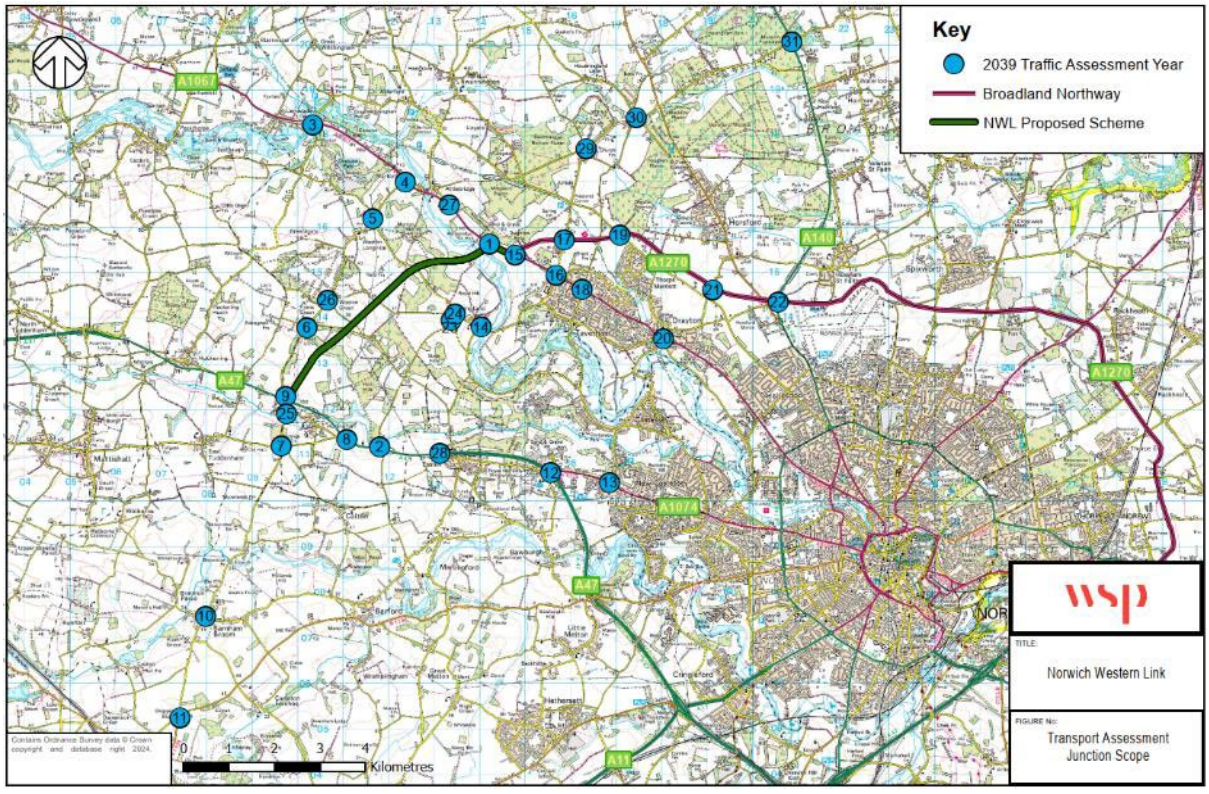
(28) A47 / Dereham Road / Church Lane roundabout;

(29) Taverham Road / The Street / Mill Lane staggered crossroads;

(30) The Street / Haveringland Road / Shortthorn Road crossroads;

(31) Shortthorn Road / A140 Cromer Road / Parish Road staggered crossroads;

Figure 1-2 Junction Assessment Scope



8.1.3 In pre-application discussions with NCC acting in its capacity as the Local Highway Authority it was agreed that impact assessment should be carried

out for the future year 10 years after opening of the Proposed Scheme for a new primary road such as this. A forecast year of 2039 has been used as a robust approach for all TA junctions which is 10 years after opening. This is consistent with the Norfolk County Council adopted LTP4 horizon year of 2039 and is expected to coincide with the completion of major developments in the west of Norwich which have submitted Transport Assessments in support of planning applications which are being considered by NCC in its capacity as the Local Highway Authority.

8.1.4 Forecast year networks have been created within the strategic NATS model for 2029 and 2044 and an interim year of 2039 has been interpolated to arrive at a forecast horizon 10 years after opening. This approach is sufficiently robust to consider the foreseeable future and also avoid over design of junctions within the scope of assessment. The traffic flow diagrams are included within **Appendix 9** (Document Reference 4:01:09).

8.2 Junction Capacity Assessment

8.2.1 Capacity assessments have been undertaken for the AM and PM peak hours, traffic flows have been entered in PCUs (Passenger Car Units) at 15-minute intervals using the direct profile setting using Junction 9 software for the priority and roundabout junctions and LinSig software for the signalised junctions.

8.2.2 Each junction model has been set up using geometric inputs obtained from Ordnance Survey mapping and on-site observations. The full Junctions 9 and LinSig outputs are provided in **Appendix 11** (Document Reference 4.01.11).

8.2.3 The results for each junction are reported in terms of Mean Maximum Queue (MMQ) lengths in PCUs and RFC (Ratio of Flow to Capacity). The absolute capacity of a junction is expected to be equivalent to an RFC of 1.0 with junctions exceeding 0.85 RFC considered to be approaching capacity.

8.2.4 Once RFCs exceed 0.85 queues and delays start to form. Once a junction exceeds an RFC of 1.0, the performance of the junction deteriorates, with the

junction unable to fully process the full extent of demand arising within a typical peak hour, leading to longer queues and delays.

Junction 1 - A1067 Norwich Western Link Roundabout

8.2.5 The predicted RFC and queue length results are summarised in **Table 8-1** and **Table 8-2** for the 2039 Do Something (DS) and Do Something + Mitigation (DS+M) scenarios at the A1067 Norwich Western Link roundabout for the AM and PM peak hours. This junction will be newly constructed as a part of the Proposed Scheme, hence there are no DM scenario results for either the AM or PM peak hour.

Table 8-1 Junction 1 2039 AM Peak Hour (07:30-08:30)

J1 AM	Fakenham Road (West)	Fakenham Road (East)	Norwich Western Link
2039 Do Something - RFC	0.62	0.62	0.45
2039 Do Something + Mitigation – RFC	0.57	0.62	0.42
2039 Do Something - Queue	2	2	1
2039 Do Something + Mitigation – Queue	2	2	1

8.2.6 The DS results predict a maximum RFC of 0.62 on Fakenham Road (E) and Fakenham Road (W), which is below the design RFC of 0.85, and a maximum queue length of 2 PCUs. Hence the junction should operate well in the AM peak hour in 2039. The results for the DS+M scenario are very similar with slightly lower RFCs and no change in queueing.

Table 8-2 Junction 1 2039 PM Peak Hour (17:00-18:00)

J1 PM	Fakenham Road (West)	Fakenham Road (East)	Norwich Western Link

2039 Do Something - RFC	0.49	0.53	0.45
2039 Do Something + Mitigation - RFC	0.48	0.52	0.42
2039 Do Something - Queue	1	2	1
2039 Do Something + Mitigation - Queue	1	1	1

8.2.7 In the PM peak hour, the RFCs are slightly lower than the AM peak hour, with 1-2 vehicles queuing on any arm in both scenarios.

8.2.8 The modelling of the proposed new roundabout demonstrates that it remains within theoretical capacity and does not exceed RFC of 0.85 in either the AM or PM peak hour. The queues predicted are very short and remain within acceptable levels, so the junction is expected to work acceptably 10 years after opening in 2039.

Junction 2 - A47 / Taverham Road / Blind Lane

8.2.9 This junction will be converted from its current staggered crossroads layout where the A47 meets Taverham Road and Blind Lane, to a grade separated dumbbell interchange as part of the A47 TUD scheme to upgrade the A47 to a dual carriageway. Once the A47 TUD scheme has been implemented the junction will consist of two new roundabouts north and south of the future A47 dual carriageway with a single carriageway link connecting the two. The proposed layout is shown in **Appendix 15** (Document Reference 4.01.15).

8.2.10 National Highways have provided modelling results for their proposed new grade separated junctions as part of their DCO Case for the Scheme document which takes into account the NWL future year traffic in 2040. The NH assessment is considered to be robust as the timeframe for modelling is beyond the 2039 assessment year used within this TA and the NH modelling uses higher background traffic and development growth from NTEM 7.2 than the latest published DfT forecasts (NTEM 8.0) used for this TA.

8.2.11 For the northern roundabout the junction model results from Table 4.20 of the NH assessment are summarised below in **Table 8-3** and **Table 8-4** and the relevant pages from the DCO Case for the Scheme document are shown in **Appendix 16** (Document Reference 4.01.16).

Table 8-3 Junction 2A 2040 AM Peak Hour (08:00-09:00)

J2A AM	Internal Link	Eastbound off slip	A47 link to Church Farm
2040 Do Something 0 - RFC	0.18	0.09	0.02
2040 Do Something 0 - Queue	0.2	0.1	0

8.2.12 The proposed northern roundabout is predicted to operate with spare capacity in the future year of 2040 in the AM peak hour with the Proposed Scheme in place, with a maximum RFC of 0.18 with virtually no queues and delays. Based on these results the junction is expected to operate well within capacity in 2039.

Table 8-4 Junction 2A 2040 PM Peak Hour (17:00-18:00)

J2A PM	Internal Link	Eastbound off slip	A47 link to Church Farm
2040 Do Something 0 - RFC	0.15	0.08	0.02
2040 Do Something 0 - Queue	0.2	0.1	0

8.2.13 In the PM peak, the proposed northern roundabout is expected to operate with spare capacity in 2040 with the Proposed Scheme in place, with a maximum RFC of 0.15 and maximum queue of 0.2 PCUs. Hence should also operate acceptably in 2039.

8.2.14 For the southern roundabout, the junction model results from Table 4.21 of the NH assessment are summarised below in **Table 8-5** and **Table 8-6** and the relevant pages from the DCO Case for the Scheme document are shown in **Appendix 16** (Document Reference 4.01.16).

Table 8-5 Junction 2B 2040 AM Peak Hour (08:00-09:00)

J2B AM	Internal Link	Westbound off slip	A47 link to Dereham Rd Easton	Link to Honingham
2040 Do Something 0 - RFC	0.11	0.11	0.16	0.17
2040 Do Something 0 - Queue	0.1	0.1	0.2	0.2

8.2.15 In the AM peak, the proposed southern roundabout is expected to operate with spare capacity in 2040 with the Proposed Scheme in place, with a maximum RFC of 0.15 and maximum queue of 0.2 PCUs, so should also operate well within capacity in 2039.

Table 8-6 Junction 2B 2040 PM Peak Hour (17:00-18:00)

J2B PM	Internal Link	Westbound off slip	A47 link to Dereham Rd Easton	Link to Honingham
2040 Do Something 0 - RFC	0.10	0.15	0.23	0.12
2040 Do Something 0 - Queue	0.1	0.2	0.3	0.1

8.2.16 In the AM peak hour, the proposed southern roundabout is expected to operate with spare capacity in 2040 with the NWL in place, with a maximum RFC of 0.15 and maximum queue of 0.2 PCUs. It would therefore be expected to operate within capacity in 2039 also.

8.2.17 The predicted results prepared by National Highways for their DCO application for the assessment year of 2040, show the two new roundabouts at Taverham Lane/Blind Lane junction to work well within capacity in both the AM and PM peak hours. Hence it can be inferred that they would also operate acceptably in the TA assessment year of 2039 with the Proposed Scheme in place.

Junction 3 – A1067 Fakenham Road / B1535 Weston Hall Road / Porter's Lane

8.2.18 **Table 8-7** and **Table 8-8** summarise the predicted RFC and queue length results for the 2039 DM and DS scenarios at the A1067 Fakenham Road / B1535 Weston Hall Road / Porter's Lane junction for the AM and PM peak hours respectively.

Table 8-7 Junction 3 2039 AM Peak Hour (07:30-08:30)

J3 AM	A1067 (East)	B1535 (south)	A1067 (West)	Porter's Lane
2039 Do Minimum - RFC	0.01	0.54	0.14	0.32
2039 Do Something - RFC	0.01	0.05	0.08	0.05
2039 Do Something + Mitigation - RFC	0.06	0.09	0.08	0.07
2039 Do Minimum - Queue	0	1	0	1
2039 Do Something - Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.19 In the AM Peak, the DM results show that the RFC on the B1535 is predicted to be 0.54, with a corresponding queue of a maximum of 1 PCU, meaning that the junction is predicted to operate with spare capacity (compared to the design RFC of 0.85).

8.2.20 With the NWL in place (the DS Scenario) the RFCs and queues are predicted to be lower than in the DM scenario, suggesting that the Proposed Scheme

offers a benefit to the operation of Junction 3, with much lower traffic flows passing through the junction.

8.2.21 **Table 8-8** summarises the predicted junction performance at the A1067 Fakenham Road / B1535 Weston Hall Road/ Porter's Lane junction in the 2039 PM Peak.

Table 8-8 Junction 3 2039 PM Peak Hour (17:00-18:00)

J3 PM	A1067 (East)	B1535	A1067 (West)	Porter's Lane
2039 Do Minimum - RFC	0.01	0.49	0.23	0.11
2039 Do Something - RFC	0.01	0.06	0.16	0.00
2039 Do Something + Mitigation - RFC	0.08	0.09	0.16	0.03
2039 Do Minimum - Queue	0	1	1	0
2039 Do Something - Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.22 Similar to the AM peak, the DM results for the PM peak show that the maximum queue lengths predicted are on the B1535 and A1067 (W) arms of the junction with RFCs of 0.49 and 0.23 respectively. The maximum predicted queue length is 1 PCU on the B1535 arm. Meanwhile, the DS scenario predicts a lower RFC and a lower queue length than the DM scenario on all arms of the junction, indicating that the Proposed Scheme is beneficial to the operation of the junction.

8.2.23 It is therefore predicted that the Proposed Scheme would improve the operation of the A1067/ Porter's Lane junction, in 2039 with the junction operating with more free capacity with the scheme.

Junction 4 - Marl Hill Road / The Street / Fakenham Road

8.2.24 **Table 8-9** and **Table 8-10** summarise the predicted RFC and queue length results for the 2039 DM and DS scenarios at the Marl Hill Road / The Street / Fakenham Road junction for the AM and PM peak hours respectively.

Table 8-9 Junction 4 2039 AM Peak Hour (07:30-08:30)

J4 AM	Fakenham Road (East)	Marl Hill Road	Fakenham Road (West)	The Street
2039 Do Minimum - RFC	0.00	**1.10**	0.26	0.00
2039 Do Something - RFC	0.00	0.03	0.16	0.00
2039 Do Something + Mitigation - RFC	0.00	0.03	0.06	0.00
2039 Do Minimum - Queue	0	17	1	0
2039 Do Something - Queue	0	0	1	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.25 The DM scenario results in the AM Peak predict a maximum RFC of 1.10 in 2039, above the theoretical capacity of 1.0, with a queue length of 17 PCUs on the Marl Hill Road arm of the junction. This scenario indicates that the junction would operate beyond theoretical capacity without the Proposed Scheme in place.

8.2.26 However, in the DS scenario the RFC and queue lengths along the identified arm reduced substantially to 0.03 and 0 respectively. Therefore, the completion of the Proposed Scheme would alleviate the predicted capacity issues and significantly improve its operation.

8.2.27 **Table 8-10** summarises the predicted junction performance at the Marl Hill Road / The Street / Fakenham Road junction in the 2039 PM peak hour.

Table 8-10 Junction 4 2039 PM Peak Hour (17:00-18:00)

J4 PM	A1067 (East)	Marl Hill Road	A1067 (West)	The Street
2039 Do Minimum – RFC	0.00	**0.94**	0.05	0.00
2039 Do Something – RFC	0.00	0.07	0.03	0.00
2039 Do Something + Mitigation – RFC	0.00	0.07	0.03	0.00
2039 Do Minimum – Queue	0	7	0	0
2039 Do Something – Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.28 Again, in the PM peak hour the junction is likely to experience capacity issues, with the Marl Hill Road arm expected to approach capacity prior to the opening of the Proposed Scheme. The RFC reaches a maximum of 0.94 and queue length of 7 PCUs on the Marl Hill Road arm.

8.2.29 However, the DS scenario shows a dramatic reduction in RFC to 0.07, with the new road in place and a reduction in queue length on Marl Hill Road. The

predicted reduction in RFC would result in a beneficial outcome for the junction, as a result of the Proposed Scheme.

8.2.30 It is therefore predicted that the Proposed Scheme would benefit the operation of the Marl Hill Road / The Street / A1067 Fakenham Road junction, in 2039 with the junction requiring capacity intervention without the new road in place.

Junction 5 - Church Street / Marl Hill Road / Morton Street

8.2.31 **Table 8-11** and **Table 8-12** summarise the predicted RFC and queue length results for the 2039 DM and DS scenarios at the Church Street / Marl Hill Road / Morton Street junction for the AM and PM peak hours respectively.

Table 8-11 Junction 5 2039 AM Peak Hour (07:30-08:30)

J5 AM	Marl Hill Road	Morton Lane	Church Street	Access Road
2039 Do Minimum - RFC	0.00	0.19	0.00	0.02
2039 Do Something - RFC	0.00	0.02	0.00	0.00
2039 Do Something + Mitigation - RFC	0.00	0.02	0.00	0.00
2039 Do Minimum - Queue	0	0	0	0
2039 Do Something - Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.32 In the AM peak hour, the 2039 Do Minimum scenario findings show a maximum RFC of 0.19 and queue length of 0 on the Morton Lane arm of the junction. The predicted RFC falls below the specified design RFC of 0.85,

which indicates that the entire junction operates well within capacity in the DM scenario. Meanwhile, the junction modelling results for the DS scenario of the junction predicted an RFC of 0.02 and queue length of on the Morton Lane arm. Therefore, the construction and completion of the Proposed Scheme would provide a benefit to the operation of the junction through the stated reduction in RFC and queue lengths.

8.2.33 **Table 8-12** summarises the predicted junction performance at the Church Street / Marl Hill Road / Morton Street junction in the 2039 PM peak hour.

Table 8-12 Junction 5 2039 PM Peak Hour (17:00-18:00)

J5 PM	Marl Hill Road	Morton Lane	Church Street	Access Road
2039 Do Minimum - RFC	0.00	0.23	0.00	0.00
2039 Do Something - RFC	0.00	0.06	0.00	0.00
2039 Do Something + Mitigation - RFC	0.00	0.05	0.00	0.00
2039 Do Minimum - Queue	0	0	0	0
2039 Do Something - Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.34 Similar to the AM peak hour, the PM peak hour for the DM scenario predicts a maximum RFC and queue length on the Morton Lane arm of 0.23 and 0 respectively. These findings in the DM scenario corresponded to a reduction in the DS and DS+M scenarios equivalent to that predicted in the AM peak.

8.2.35 It is therefore predicted that the Proposed Scheme would improve the operation of the Church Street / Marl Hill Road / Morton Lane junction in 2039 with the junction operating more freely in the DS and DS+M scenarios as compared to the DM situation due to the predicted reduction in flow passing through the junction.

Junction 6 - Paddy's Lane / The Broadway / Access Road

8.2.36 Traffic flows and geometrical changes at this junction have been reviewed and were shown to be extremely low (observed flows of about 10 vehicles per day) at The Broadway, which is proposed to be closed as part of the Proposed Scheme. Therefore, with the Broadway arm removed, there would be no capacity constraint and no opposing flows at this junction with the Proposed Scheme in place. Hence this junction has not been individually modelled.

Junction 7 - Barnham Broom Road / Berry's Lane / Mattishall Road

8.2.37 **Table 8-13** and **Table 8-14** summarise the predicted RFC and queue length results for the 2039 DM and DS scenarios at the Barnham Broom Road / Berry's Lane / Mattishall Road junction for the AM and PM peak hours respectively.

Table 8-13 Junction 7 2039 AM Peak Hour (07:30-08:30)

J7 AM	Mattishall Road (East)	Barnham Broom Road	Mattishall Road (West)	Berry's Lane
2039 Do Minimum - RFC	0.00	0.11	0.00	0.00
2039 Do Something - RFC	0.00	0.17	0.00	0.00
2039 Do Something + Mitigation - RFC	0.00	0.09	0.00	0.00

J7 AM	Mattishall Road (East)	Barnham Broom Road	Mattishall Road (West)	Berry's Lane
2039 Do Minimum - Queue	0	0	0	0
2039 Do Something - Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.38 In all scenarios the Berrys Lane arm of the junction is closed as a result of the A47 TUD scheme. Hence, this arm of the junction has very low flows.

8.2.39 The 2039 DM scenario modelled in the AM peak resulted in a maximum RFC of 0.11, on the Barnham Broom Road arm, which is very low, with no queues on any arm of the junction.

8.2.40 The DS scenario, that includes the Proposed Scheme, produced an increased RFC of 0.17 on the Barnham Broom Road arm but queue lengths remain unchanged at 0 PCUs. The impacts at this junction are therefore expected to be negligible.

8.2.41 **Table 8-14** summarises the predicted junction performance at the Barnham Broom Road / Berry's Lane / Mattishall Road junction in the 2039 PM peak hour.

Table 8-14 Junction 7 2039 PM Peak Hour (17:00-18:00)

J7 PM	Mattishall Road (East)	Barnham Broom Road	Mattishall Road (West)	Berry's Lane
2039 Do Minimum - RFC	0.00	0.08	0.00	0.00

J7 PM	Mattishall Road (East)	Barnham Broom Road	Mattishall Road (West)	Berry's Lane
2039 Do Something - RFC	0.00	0.10	0.00	0.00
2039 Do Something + Mitigation - RFC	0.00	0.08	0.00	0.00
2039 Do Minimum - Queue	0	0	0	0
2039 Do Something - Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.42 Again, the PM peak hour experiences a maximum RFC and no queues on the Barnham Broom Road arm of 0.08 and 0 PCU respectively. Similar to the AM peak hour results, an increase reported in the worst arm of 0.02 RFC increasing to 0.10 with an unchanged queue length is negligible as compared to the DM scenario. There is also no increase in queue length and it remains well within capacity.

8.2.43 It is therefore predicted that the Proposed Scheme would have a negligible effect on the operation of the Barnham Broom Road / Berry's Lane / Mattishall Road junction, in 2039.

Junction 8 - A47 / Norwich Road roundabout

8.2.44 **Table 8-15** and **Table 8-16** summarise the predicted RFC and queue length results for the 2039 DM and DS scenarios at the A47 / Norwich Road junction for the AM and PM peak hours respectively.

8.2.45 This junction is to be retained with the existing geometry in the DM and DS scenarios, with the A47 TUD scheme in place. However, with the improved

A47 scheme in place, there will be limited use of this junction with the majority of traffic predicted to use the new dual carriageway in all scenarios.

Table 8-15 Junction 8 2039 AM Peak Hour (07:30-08:30)

J8 AM	A47 (West)	A47 (East)	Norwich Road
2039 Do Minimum - RFC	0.03	0.10	0.16
2039 Do Something - RFC	0.05	0.08	0.17
2039 Do Something + Mitigation - RFC	0.05	0.08	0.16
2039 Do Minimum - Queue	0	0	0
2039 Do Something - Queue	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0

8.2.46 The junction modelling findings in the AM peak for the A47 / Norwich Road roundabout predicted a maximum RFC of 0.16 and queue length of 0 PCU on the Norwich Road arm in the DM scenario. The predicted maximum RFC of 0.16 indicates that there would be significant spare capacity at the junction.

8.2.47 Meanwhile, the modelled DS scenario shows a negligible increase to the RFCs and queues for the A47 (W) and Norwich Road arms and a slight decrease to the RFC and queue length of the A47 (E) arm.

8.2.48 Table 8-16 summarises the predicted junction performance at the A47 / Norwich Road junction in the 2039 PM peak hour.

Table 8-16 Junction 8 2039 PM Peak Hour (17:00-18:00)

J8 PM	A47 (West)	A47 (East)	Norwich Road
2039 Do Minimum - RFC	0.01	0.03	0.11

J8 PM	A47 (West)	A47 (East)	Norwich Road
2039 Do Something - RFC	0.04	0.04	0.12
2039 Do Something + Mitigation - RFC	0.03	0.05	0.11
2039 Do Minimum - Queue	0	0	0
2039 Do Something - Queue	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0

8.2.49 In the PM peak, the junction modelling results to DM scenario presented a maximum RFC of 0.11 on the Norwich Road arm and no queues evident. In the DS scenario and DS+M the RFC increases to a maximum of 0.12 but queues remain at zero on all arms, so impacts of the Proposed Scheme would not be noticeable.

8.2.50 It is therefore predicted that the Proposed Scheme would have a negligible effect on the operation of the A47 / Norwich Road junction, in 2039.

Junction 9 - A47 / B1535 Wood Lane / Berry's Lane

8.2.51 This junction will be amended from its current staggered T-junction layout between the A47, Wood Lane (B1535) and Berry's Lane to a grade separated dumbbell interchange as part of the A47 TUD scheme to upgrade the A47 to a dual carriageway. Once the A47 TUD scheme has been implemented the junction will consist of two roundabouts north and south of the proposed A47 dual carriageway with a single carriageway link connecting the two via an underpass of the proposed A47 dual carriageway. The DCO proposals also include the closure of Berrys Lane as shown in **Appendix 15** (Document Reference 4.01.15)

8.2.52 National Highways have produced a modelling report for their proposed new grade separated junctions as part of their DCO scheme which takes into

account the Proposed Scheme future year traffic in 2040. The results were published in the DCO Case for the Scheme (Document 7.1 in Volume 7 of the DCO Application TR010038).

8.2.53 The NH assessment considered a timeframe for assessment beyond that required for this TA, so is taken as a robust assessment. The background traffic growth assumptions used by NH are also based on the earlier NTEM 7.2 dataset which has higher levels of district wide growth than the more recent NTEM 8.0 version used for the Proposed Scheme strategic modelling assessment.

8.2.54 The junction model results from the NH capacity assessments are summarised below in **Table 8-17** and **Table 8-18** for the northern roundabout and **Table 8-19** and **Table 8-20** for the southern roundabout. The junction model outputs are shown in more detail in Appendix 16 (Document Reference 4.01.16).

Table 8-17 Junction 9A (northern Roundabout) 2040 AM Peak Hour (08:00-09:00)

J9A AM	Roundabout Link Road	A47 off-slip Eastbound	A47 Link to B1535	NWL
2040 Do Something - RFC	0.33	0.42	0.25	0.69
2040 Do Something - Queue	1	1	1	3

8.2.55 The northern dumbbell roundabout at the new Wood Lane junction is predicted to operate within capacity with the Proposed Scheme in place. In the AM peak hour the junction works within capacity and has a maximum RFC of 0.69 and maximum average queue length of 3 PCUs on the Norwich Western Link arm of the junction in 2040 which is beyond the assessment year of 2039 for the Proposed Scheme.

Table 8-18 Junction 9A (northern Roundabout) 2040 PM Peak Hour (17:00-18:00)

J9A PM	Roundabout Link Road	A47 off-slip Eastbound	A47 Link to B1535	NWL
2040 Do Something - RFC	0.51	0.65	0.51	0.65
2040 Do Something - Queue	1	2	1	2

8.2.56 In the PM peak hour, the northern A47 roundabout at Wood Lane is also predicted to operate acceptably in the future year of 2040 (and hence 2039 also) with the Proposed Scheme in place. The junction is expected to have a maximum RFC of 0.65 and maximum average queue length of 2 PCUs on the Norwich Western Link arm of the junction and Eastbound A47 off-slip.

Table 8-19 Junction 9B (Southern Roundabout) 2040 AM Peak Hour (08:90-09:00)

J9B AM	Roundabout Link Road	A47 off-slip westbound	Dereham Road (SE)
2039 Do Something – RFC	0.57	0.23	0.20
2039 Do Something - Queue	2	1	1

8.2.57 The southern dumbbell roundabout at the A47 Wood Lane junction is expected to operate within capacity with the Proposed Scheme in place in 2040. In the AM peak hour the junction has a maximum RFC of 0.57 and maximum average queue length of 2 PCUs on the internal link road which connects the two roundabouts.

Table 8-20 Junction 9B (Southern Roundabout) 2040 PM Peak Hour (17:00-18:00)

J9B PM	Internal Link Road	A47 off-slip westbound	Dereham Road (SE)
2040 Do Something - RFC	0.54	0.33	0.29
2040 Do Something - Queue	2	1	1

8.2.58 In the PM peak hour, the southern proposed roundabout at Wood Lane is also predicted to operate acceptably in the future year of 2040 with the Proposed Scheme in place. The junction is predicted to have a maximum RFC of 0.54 and maximum average queue length of 2 PCUs on the Internal link road between the two dumbbell roundabouts.

8.2.59 With the A47 TUD scheme and the Proposed Scheme in place, the junction is shown to work acceptably in the AM and PM peak hours in 2040, therefore it is expected that in 2039 the junction will also work acceptably.

Junction 10 - Honingham Road / Norwich Road / Bell Road / Mill Road

8.2.60 **Table 8-21** and **Table 8-22** summarise the predicted RFC and queue length results for the 2039 DM and DS scenarios at the Honingham Road / Norwich Road / Bell Road / Mill Road junction for the AM and PM peak hours respectively.

Table 8-21 Junction 10 2039 AM Peak (07:30-08:30)

J10 AM	Norwich Road	Bell Road	Mill Road	Honingham Road
2039 Do Minimum - RFC	0.00	0.07	0.02	0.07
2039 Do Something - RFC	0.00	0.10	0.02	0.08

J10 AM	Norwich Road	Bell Road	Mill Road	Honingham Road
2039 Do Something + Mitigation - RFC	0.00	0.11	0.01	0.05
2039 Do Minimum - Queue	0	0	0	0
2039 Do Something - Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.61 In the AM peak hour, the junction operates within capacity. The maximum predicted RFC and queue length for the DM scenario were 0.07 and 0 PCU respectively on the Honingham Road arm. The junction modelling results for the DS scenario, with the Proposed Scheme in place, resulted in similar queue lengths with minor changes to the RFC of all arms.

8.2.62 **Table 8-22** summarises the predicted junction performance at the Honingham Road / Norwich Road / Bell Road / Mill Road junction in the 2039 PM Peak.

Table 8-22 Junction 10 2039 PM Peak Hour (17:00-18:00)

J10 PM	Norwich Road	Bell Road	Mill Road	Honingham Road
2039 Do Minimum - RFC	0.00	0.05	0.01	0.02
2039 Do Something - RFC	0.00	0.07	0.01	0.05
2039 Do Something + Mitigation - RFC	0.00	0.07	0.01	0.02

J10 PM	Norwich Road	Bell Road	Mill Road	Honingham Road
2039 Do Minimum - Queue	0	0	0	0
2039 Do Something – Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.63 The PM peak hour findings for the 2039 DM scenario show that the junction's maximum RFC and queue length were respectively 0.05 and 0 PCU recorded on Bell Road, so the junction operates with substantial spare capacity.

8.2.64 In the DS scenario the RFC remain very low. Therefore, with the Proposed Scheme in place, the junction would operate well within capacity.

8.2.65 It is therefore predicted that the Proposed Scheme would have a negligible impact on the operation of the Honingham Road / Norwich Road / Bell Road / Mill Road junction, in 2039. The junction is predicted to operate with no significant change in capacity with the Proposed Scheme as compared to the DM scenario.

Junction 11 - Bell Road / B1108 / Dark Lane

8.2.66 **Table 8-23** and **Table 8-24** summarise the predicted RFC and queue length results for the 2039 DM and DS scenarios at the Bell Road / Dark Lane junction for the AM and PM peak hours respectively. The existing junction has a non-standard layout with poor visibility at the Dark Lane arm but low flows on the Dark Lane arm.

Table 8-23 Junction 11 2039 AM Peak Hour (07:30-08:30)

J11A AM	Dark Lane	Bell Road	B1108 (East)
2039 Do Minimum - RFC	0.00	0.09	0.00
2039 Do Something - RFC	0.00	0.10	0.00
2039 Do Something + Mitigation - RFC	0.00	0.06	0.00
2039 Do Minimum - Queue	0	0	0
2039 Do Something - Queue	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0

8.2.67 The junction modelling results in the AM peak hour for the Bell Road / Dark Lane T-junction predicted a maximum RFC of 0.09 and queue length of 0 PCU on the Bell Road arm, without the Proposed Scheme. With the Proposed Scheme in place the RFC increases marginally to 0.11 and queues remain zero. With the mitigation measures in place in the DS+M scenario the RFC reduces to 0.06 and queues remain zero. For each of the scenarios modelled, the junction is predicted to operate with significant spare capacity. Hence the Proposed Scheme does not significantly affect the operation of this junction.

8.2.68 **Table 8-24** summarises the predicted junction performance at the Bell Road / Dark Lane junction in the 2039 PM peak hour.

Table 8-24 Junction 11 2039 PM Peak Hour (17:00-18:00)

J11A PM	Dark Lane	Bell Road	B1108 (East)
2039 Do Minimum – RFC	0.00	0.04	0.00
2039 Do Something – RFC	0.00	0.06	0.00
2039 Do Something + Mitigation – RFC	0.00	0.03	0.00
2039 Do Minimum – Queue	0	0	0
2039 Do Something – Queue	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0

8.2.69 As in the AM peak, the predicted maximum RFC occurs in the Bell Road arm in the PM peak with an RFC of 0.04. The predicted RFCs are low in all scenarios which indicates that there is spare capacity at this junction. Therefore, the Proposed Scheme has a negligible effect.

Junction 12A - A47 Southbound Slip / William Frost Way / Dereham Road

8.2.70 **Tables 8-25** and **8-26** summarise the predicted RFC and queue length results for the 2039 DM and DS scenarios at the A47 SB Slip / William Frost Way / Dereham Road junction for the AM and PM peak hours respectively.

Table 8-25 Junction 12A 2039 AM Peak Hour(07:30-08:30)

J12A AM	William Frost Way	Dereham Road	Connector Link	A47 Southbound Off Slip
2039 Do Minimum - RFC	0.63	**1.11**	0.25	0.39
2039 Do Something - RFC	0.61	**0.99**	0.23	0.41
2039 Do Something + Mitigation - RFC	0.61	**0.99**	0.23	0.40
2039 Do Minimum - Queue	2	95	0	1
2039 Do Something - Queue	2	22	0	1
2039 Do Something + Mitigation - Queue	2	25	0	1

8.2.71 The 2039 DM scenario for the AM peak hour shows a predicted maximum RFC of 1.11 and queue length of 95 PCUs on the Dereham Road arm. This exceeds the theoretical junction capacity of 1.0. However, with the DS Scenario place, the RFC at the Dereham Road arm reduces, so the Proposed Scheme offers an improvement with the Dereham Road arm RFC reducing to 0.99 in the DS scenario and DS+M scenarios.

8.2.72 **Table 8-26** shows the predicted junction performance at the A47 SB Slip / William Frost Way / Dereham Road junction in the 2039 PM peak hour.

Table 8-26 Junction 12A 2039 PM Peak Hour (17:00-18:00)

J12A PM	William Frost Way	Dereham Road	Connector Link	A47 Southbound Off Slip
2039 Do Minimum - RFC	0.50	**0.88**	0.26	0.28
2039 Do Something - RFC	0.49	0.80	0.23	0.31
2039 Do Something + Mitigation - RFC	0.48	0.80	0.23	0.30
2039 Do Minimum - Queue	1	7	0	0
2039 Do Something - Queue	1	4	0	0
2039 Do Something + Mitigation - Queue	1	4	0	0

8.2.73 In the PM peak hour, the maximum predicted RFC and queue length in the 2039 DM scenario occurs in the Dereham Road arm with an RFC of 0.88 and queue length of 7 PCUs. The 2039 DS scenario shows a reduction in the predicted RFCs, for example lowering the RFC in the Dereham Road arm to 0.80. The lower predicted flows and queue lengths suggest that the Proposed Scheme offers a benefit to the operation of the roundabout.

8.2.74 It is therefore predicted that the Proposed Scheme assists with improving the operation of the A47 southbound slip road / William Frost Way / Dereham Road roundabout, in 2039 with the junction operating with more free capacity with the scheme than without due to the predicted reduction in flow passing through the junction. Hence no mitigation is proposed at this junction as it improves in operation with the Proposed Scheme in place.

Junction 12B - A47 Southbound Slip / William Frost Way / Dereham Road

8.2.75 RFCs and queue length results for the 2039 DM and DS scenarios at the A47 SB Slip / William Frost Way / Dereham Road junction for the AM and PM peak hours are shown in **Tables 8-27** and **8-28** respectively.

Table 8-27 Junction 12B 2039 AM Peak Hour (07:30-08:30)

J12B AM	**Connector Link**	**A47 Northbound Off Slip**	**Long Lane**	**Dereham Road**
2039 Do Minimum - RFC	**0.90**	**0.88**	0.18	**0.92**
2039 Do Something – RFC	0.81	0.74	0.17	0.70
2039 Do Something + Mitigation – RFC	0.80	0.75	0.17	0.71
2039 Do Minimum – Queue	8	7	0	8
2039 Do Something – Queue	4	3	0	2
2039 Do Something + Mitigation – Queue	4	3	0	2

8.2.76 Junction modelling of the roundabout between the A47, Long Lane and Dereham Road indicates a maximum RFC of 0.92 and queue length of 8 PCUs on the Dereham Road arm in the AM peak for the DM scenario. With the Proposed Scheme in place, the RFC's and queue lengths are predicted to be lower than in the DM scenario, suggesting that the scheme offers some benefit to the operation of the roundabout, with reduced traffic flows passing through the junction with the new road in place. Hence no mitigation is proposed.

8.2.77 The predicted junction performance at the A47 SB Slip / William Frost Way / Dereham Road junction in the 2039 PM Peak are shown in **Table 8-28**.

Table 8-28 Junction 12B 2039 PM Peak (17:00-18:00)

J12B PM	Connector Link	A47 Northbound Off Slip	Long Lane	Dereham Road
2039 Do Minimum - RFC	0.49	0.62	0.72	0.43
2039 Do Something - RFC	0.44	0.59	0.66	0.40
2039 Do Something + Mitigation - RFC	0.44	0.59	0.66	0.39
2039 Do Minimum - Queue	1	2	3	1
2039 Do Something - Queue	1	1	2	1
2039 Do Something + Mitigation - Queue	1	1	2	1

8.2.78 The DM findings in 2039 for the PM peak show a maximum RFC of 0.72 and queue length of 3 PCUs on the Long Lane arm. The DS scenario predicts a decrease in RFC at the A47 off-slip arm. Queue lengths remain low at 2 PCUs. The findings from the DS and DS+M scenarios suggest that the Proposed Scheme improves the operation of the roundabout.

8.2.79 It is therefore predicted that the Proposed Scheme would not adversely affect the operation of the A47 southbound slip road / William Frost Way / Dereham Road junction. In 2039 the junction operates with more free capacity with the Proposed Scheme in the AM peak than the DM scenario and there is a marginal beneficial change in the PM peak hour.

Junction 13 - Dereham Road / Longwater Lane / Bawburgh Lane

8.2.80 RFCs and queue length results forecast for the 2039 DM and DS scenarios at the Dereham Road / Longwater Lane / Bawburgh Lane junction for the AM and PM peak hours are summarised in **Tables 8-29** and **8-30** respectively.

Table 8-29 Junction 13 2039 AM Peak Hour (07:30-08:30)

J13 AM	**Dereham Road (East)**	**Bawburgh Lane**	**Dereham Road (West)**	**Longwater Lane**
2039 Do Minimum - RFC	**1.15**	**1.16**	**1.01**	**1.16**
2039 Do Something – RFC	**1.09**	**1.07**	**0.98**	**1.05**
2039 Do Something + Mitigation - RFC	**1.09**	**1.07**	**0.94**	**1.08**
2039 Do Minimum – Queue	80	33	28	63
2039 Do Something - Queue	57	23	22	30
2039 Do Something + Mitigation - Queue	57	23	19	35

8.2.81 The junction modelling results for the 2039 DM scenario in the AM peak hour predict a maximum RFC of 1.16 on Longwater Lane and Bawburgh Lane, which is beyond the junction's theoretical capacity of 1.0. However this issue is a baseline problem that is not caused by the Proposed Scheme.

8.2.82 Since there is predicted to be a forecast baseline capacity issue in this location and the DS and DS+M scenarios improve the situation, no mitigation is proposed as part of the Proposed Scheme.

8.2.83 The predicted junction performance at the Dereham Road / Longwater Lane / Bawburgh Lane junction in the 2039 PM peak hour are shown below.

Table 8-30 Junction 13 2039 PM Peak Hour (17:00-18:00)

J13 PM	Dereham Road (East)	Bawburgh Lane	Dereham Road (West)	Longwater Lane
2039 Do Minimum – RFC	**1.11**	**1.12**	**0.98**	**1.12**
2039 Do Something – RFC	**1.09**	**1.05**	**1.02**	**1.09**
2039 Do Something + Mitigation - RFC	**1.09**	**1.05**	**1.02**	**1.10**
2039 Do Minimum - Queue	63	37	22	44
2039 Do Something – Queue	56	27	27	31
2039 Do Something + Mitigation - Queue	56	27	27	33

8.2.84 In the PM peak hour, the DM scenario predicts a maximum RFC of 1.12 on Bawburgh Lane, exceeding the junction's theoretical capacity, and a queue length of over 63 PCUs in the Dereham Road (E) arm. This indicates an existing capacity issue which is not caused by the Proposed Scheme.

8.2.85 With the Proposed Scheme in place, there is a small increase in RFC and queue length on the Dereham Road west arm but decreases in RFCs and queues at all of the other arms of the junction - Dereham Road (East), Bawburgh Lane and Longwater Lane. Hence no mitigation is proposed as there is a positive benefit shown to the junction overall.

Junction 14 - The Street / Ringland Road / Costessey Lane

8.2.86 The forecast RFC and queue length results for the 2039 DM and DS scenarios at The Street / Ringland Road / Costessey Lane junction for the AM and PM peak hours are shown in **Table 8-31** and **8-32** respectively.

Table 8-31 Junction 14 2039 AM Peak Hour (07:30-08:30)

J14 AM	The Street	Ringland Road	Costessey Lane
2039 Do Minimum - RFC	Not Applicable	0.40	0.37
2039 Do Something - RFC	Not Applicable	0.04	0.02
2039 Do Something + Mitigation - RFC	Not Applicable	0.02	0.01
2039 Do Minimum - Queue	Not Applicable	1	1
2039 Do Something - Queue	Not Applicable	0	0
2039 Do Something + Mitigation - Queue	Not Applicable	0	0

8.2.87 The T-junction between The Street, Ringland Road and Costessey Lane is predicted to have a maximum RFC of 0.40 and queue length of 1 PCU on the Ringland Road arm in the AM peak hour for the DM scenario. Therefore, the junction is predicted to operate well within capacity. With the Proposed Scheme in place, the RFCs and queue lengths are predicted to be lower than in the DM scenario, suggesting that the scheme offers a benefit to the operation of the junction, since traffic flows passing through the junction are lower in the DS and DS+M scenarios with the Proposed Scheme in place.

8.2.88 The below table summarises the predicted junction performance at The Street / Ringland Road / Costessey Lane junction in the 2039 PM peak hour.

Table 8-32 Junction 14 2039 PM Peak Hour (17:00-18:00)

J14 PM	The Street	Ringland Road	Costessey Lane
2039 Do Minimum - RFC	Not Applicable	0.54	0.15
2039 Do Something - RFC	Not Applicable	0.04	0.02
2039 Do Something + Mitigation - RFC	Not Applicable	0.01	0.02
2039 Do Minimum - Queue	Not Applicable	1	0
2039 Do Something - Queue	Not Applicable	0	0
2039 Do Something + Mitigation - Queue	Not Applicable	0	0

8.2.89 The DM findings in 2039 for the PM peak hour are similar to those for the AM peak hour. The model predicts a maximum RFC of 0.54 and queue length of 1 PCU on Ringland Road in the DM scenario. The DS and DS+M scenarios indicates a significant decrease in the RFC across all movements. Therefore, the findings above suggests that the Proposed Scheme offers a positive benefit to the operation of the junction.

8.2.90 It is therefore predicted that the proposed NWL scheme would improve the operation of The Street / Ringland Road / Costessey Lane junction, in 2039 with the junction operating with more free capacity with the scheme than without due to the predicted reduction in flow passing through the junction.

Junction 15 – A1270 Broadland Northway / A1067 Fakenham Road

8.2.91 The predicted RFC and queue length results for the 2039 DM and DS scenarios at the Broadland Northway / Fakenham Road junction for the AM and PM peak hours are shown in **Tables 8-33** and **8-34** respectively.

8.2.92 This roundabout is part of the Proposed Scheme with the A1067 Fakenham Road (west) arm approach being dualled with additional turning lanes on

approach to accommodate the increased traffic demand as a result of the Proposed Scheme. The junction has been designed to operate below the design capacity of 0.85 with minimal queues and delays.

Table 8-33 Junction 15 2039 AM Peak Hour (07:30-08:30)

J15 AM	A1270 Broadland Northway	A1067 Fakenham Road (East)	A1067 Fakenham Road (West)
2039 Do Minimum - RFC	0.28	0.08	0.34
2039 Do Something - RFC	0.69	0.17	0.64
2039 Do Something + Mitigation - RFC	0.71	0.16	0.66
2039 Do Minimum - Queue	0.4	0.1	0.5
2039 Do Something - Queue	2.2	0.2	1.8
2039 Do Something + Mitigation - Queue	2.5	0.2	2.0

8.2.93 In the AM peak hour, the 2039 DM results show that the RFC on the Fakenham Road (West) arm is predicted to be 0.34, with corresponding queues of up a maximum of 0.5 vehicles, meaning that the junction is predicted to operate with spare capacity.

8.2.94 In the DS scenario, with the Proposed Scheme in place and A1067 west arm dualling, the RFC's and queues are predicted to be higher than in the DM scenario. There is expected to be an increase in RFC at the A1270 Broadland Northway arm to a value of 0.71, but this remains below the design RFC of the roundabout. There are low levels of queuing at this junction slightly evident with an increase of 1.5 PCUs in the peak hour as a result of the Proposed Scheme, so the junction would operate acceptably with the Proposed Scheme in place in both DS and DS+M scenarios in 2039.

8.2.95 **Table 8-34** summarises the predicted junction performance at the Broadland Northway / Fakenham Road junction in the 2039 PM peak hour.

Table 8-34 Junction 15 2039 PM Peak Hour (17:00-18:00)

J15 PM	A1270 Broadland Northway	A1067 Fakenham Road (East)	A1067 Fakenham Road (West)
2039 Do Minimum - RFC	0.33	0.01	0.26
2039 Do Something - RFC	0.56	0.16	0.60
2039 Do Something + Mitigation - RFC	0.56	0.15	0.61
2039 Do Minimum - Queue	0.5	0	0.4
2039 Do Something - Queue	1.3	0.2	1.5
2039 Do Something + Mitigation - Queue	1.3	0.2	1.6

8.2.96 The PM peak hour results display a maximum RFC of 0.33 in the DM scenario along the Broadland Northway arm, which is substantially below the junction's design capacity of 0.85, and a corresponding queue length of 0.5 PCUs. The modelled DS and DS+M scenarios predict an increase in RFC and queue length on the A1270 Broadland Northway arm of the roundabout, but these are within acceptable levels. In the DS scenario, the Fakenham Road (W) arm is predicted to have an RFC of 0.61. This is acceptable as it is an existing junction with extra lanes added to the existing layout on the west arm. The inscribed circle diameter of the central island is constrained due to the proximity of the high pressure gas main and to minimise disruption during construction it is not proposed to make further significant amendments to the roundabout junction's central island geometry.

8.2.97 These findings suggest that the presence of the Proposed Scheme does not cause the junction to exceed capacity and with minimal queue lengths the situation in the future design year of 2039 is expected to be acceptable.

Junction 16 - Fakenham Road / Fir Covert Road / Beech Avenue

8.2.98 Predicted RFCs and queue length results for the 2039 DM and DS scenarios at the Fakenham Road / Fir Covert Road / Beech Ave junction for the AM and PM peak hours are illustrated in **Table 8-35** and **8-36** respectively.

Table 8-35 Junction 16 2039 AM Peak Hour (07:30-08:30)

J16 AM	Fakenham Road (West)	Fir Covert Road	Fakenham Road (East)	Beech Ave
2039 Do Minimum - RFC	0.69	0.79	0.80	0.76
2039 Do Something - RFC	0.68	0.71	0.73	0.68
2039 Do Something + Mitigation - RFC	0.60	0.74	0.73	0.70
2039 Do Minimum - Queue	10	9	13	11
2039 Do Something - Queue	11	10	11	5
2039 Do Something + Mitigation - Queue	10	10	11	6

8.2.99 The junction modelling results for the 2039 DM scenario in the AM peak hour predicted a maximum RFC of 0.80 on Fakenham Road (E), which is below the design capacity, and a queue length of 13 PCUs. In the 2039 DS scenario, the findings predict marginal changes on most of the junction's arms, with the Proposed Scheme offering a slight improvement in junction operation overall.

8.2.100 The junction performance results for the Fakenham Road / Fir Covert Road / Beech Road junction in the 2039 PM peak hour are shown in **Table 8-36** below.

Table 8-36 Junction 16 2039 PM Peak Hour (17:00-18:00)

J16 PM	Fakenham Road (West)	Fir Covert Road	Fakenham Road (East)	Beech Road
2039 Do Minimum - RFC	0.75	**0.89**	**0.89**	**0.87**
2039 Do Something - RFC	0.56	0.82	0.81	0.82
2039 Do Something + Mitigation - RFC	0.60	0.82	0.82	0.79
2039 Do Minimum - Queue	9	13	16	15
2039 Do Something - Queue	7	12	13	10
2039 Do Something + Mitigation - Queue	8	12	13	10

8.2.101 In the PM Peak, the DM scenario predicts a maximum RFC of 0.89, which is reaching capacity, but remaining within its theoretical capacity of 1.0 RFC. Queue lengths of 16 PCUs are expected to occur in the 2039 DM scenario on Fakenham Road (E). With the Proposed Scheme in place, Fakenham Road (E) was predicted to have a reduced RFC of 0.82 and slightly reduced queue length of 13 PCUs. The DS scenario predicts a reduction in RFC and queue lengths to Fir Covert Road and Beech Avenue. This indicates that the Proposed Scheme provides a positive impact on the junction's operation in the specified PM Peak, according to the LinSig model.

Junction 17 - Broadland Northway / Fir Covert Road

8.2.102 **Table 8-37** and **Table 8-38** summarise the predicted RFC and queue length results for the 2039 DM and DS scenarios at the Broadland Northway / Fir Covert Road junction for the AM and PM peak hours respectively.

Table 8-37 Junction 17 2039 AM Peak Hour (07:30-08:30)

J17 AM	Fir Covert Road (North)	Broadland Northway (East)	Fir Covert Road (South)	Broadland Northway (West)
2039 Do Minimum - RFC	0.30	0.30	0.48	0.33
2039 Do Something - RFC	0.73	0.45	0.61	0.65
2039 Do Something + Mitigation - RFC	0.77	0.49	0.64	0.66
2039 Do Minimum - Queue	1	1	1	1
2039 Do Something - Queue	3	1	2	2
2039 Do Something + Mitigation - Queue	4	1	2	2

8.2.103 In the AM peak hour, the DM results show that the RFC on the Fir Covert Road (S) is predicted to be 0.48, with corresponding maximum queue of 1 PCU, meaning that the junction is predicted to operate with some spare capacity.

8.2.104 For comparison, the DS scenario with the Proposed Scheme in place, predicts an increase in RFC to 0.73 on Fir Covert Road (N) and an increase in queue length to 3 PCUs on Fir Covert Road (N). There is a minor impact at this junction but with a maximum change in queue length to 3 PCUs on the Fir

Covert Road (N) arm in the AM peak it is unlikely to be a noticeable impact. In the DS+M scenario the queue lengths on this arm increase to 4 PCUs but this scenario will only occur if the full mitigation package is deployed. This situation is expected to be tolerable so no mitigation is proposed.

8.2.105 Junction performance results for the Broadland Northway / Fir Covert Road junction in the 2039 PM peak hour are shown below.

Table 8-38 Junction 17 2039 PM Peak Hour (17:00-18:00)

J17 PM	Fir Covert Road (North)	Broadland Northway (East)	Fir Covert Road (South)	Broadland Northway (West)
2039 Do Minimum - RFC	0.15	0.42	0.49	0.23
2039 Do Something - RFC	0.39	0.50	0.59	0.63
2039 Do Something + Mitigation - RFC	0.30	0.52	0.60	0.65
2039 Do Minimum - Queue	1	1	1	1
2039 Do Something - Queue	1	1	2	2
2039 Do Something + Mitigation - Queue	1	2	2	2

8.2.106 During the PM peak hour, the 2039 DM scenario predicts that the junction's maximum RFC and queue length occur on Fir Covert Road (S). The maximum RFC of 0.49 and queue length of 1 PCU increases from the DM to the DS scenario, changing to a maximum of 0.59 and queue length of 2 PCUs on the Broadland Northway (W) arm. Similar to the AM peak findings, the PM

peak results indicate a slight increase in queues and RFCs but the junction remains within capacity so no mitigation is proposed.

Junction 18 - Fakenham Road / Breck Farm Lane

8.2.107 **Tables 8-39** and **8-40** summarise the predicted RFC and queue length results for the 2039 DM and DS scenarios at the Fakenham Road / Breck Farm Lane junction for the AM and PM peak hours respectively.

Table 8-39 Junction 18 2039 AM Peak Hour (07:30-08:30)

J18 AM	Fakenham Road (East)	Sandy Lane	Fakenham Road (West)	Breck Farm Lane
2039 Do Minimum - RFC	0.00	0.32	0.53	0.00
2039 Do Something - RFC	0.00	0.29	0.32	0.00
2039 Do Something + Mitigation - RFC	0.00	0.28	0.31	0.00
2039 Do Minimum - Queue	0	1	1	0
2039 Do Something - Queue	0	0	1	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.108 The Fakenham Road / Breck Farm junction modelling results show an RFC of 0.53 and queue of 1 PCU on Fakenham Road (W) in the AM peak for the 2039 DM scenario. The predicted ratio of flow-to-capacity on Fakenham Road (W) reduced to 0.32 with virtually no change in queues in the DS scenario with the Proposed Scheme in place.

8.2.109 A summary of the predicted junction performance at the Fakenham Road / Breck Farm Lane junction in the 2039 PM peak hour is provided in **Table 8-40.**

Table 8-40 Junction 18 2039 PM Peak Hour (17:00-18:00)

J18 PM	Fakenham Road (East)	Sandy Lane	Fakenham Road (West)	Breck Farm Lane
2039 Do Minimum - RFC	0.00	0.39	0.41	0.00
2039 Do Something - RFC	0.00	0.14	0.34	0.00
2039 Do Something + Mitigation - RFC	0.00	0.14	0.33	0.00
2039 Do Minimum - Queue	0	1	1	0
2039 Do Something - Queue	0	0	1	0
2039 Do Something + Mitigation - Queue	0	0	1	0

8.2.110 The findings from the PM peak hour traffic model indicate an equivalent trend to that identified for the AM peak hour results with the DM maximum RFC of 0.41 reducing to 0.34 in the DS scenario and 0.33 in the DS+M scenario no reduction in queues at Fakenham Road (W). This trend is in line with that observed for the AM peak hour, displaying a marginal operational improvement with the Proposed Scheme in place.

Junction 19 - Broadland Northway / Reepham Road

8.2.111 **Tables 8-41** and **8-42** summarise the predicted RFC and queue length results for the 2039 Do Minimum and Do Something scenarios at the Broadland Northway / Reepham Road junction for the AM and PM peak hours respectively.

Table 8-41 Junction 19 2039 AM Peak Hour (07:30-08:30)

J19 AM	Reepham Road (North)	Broadland Northway (East)	Reepham Road (South)	Broadland Northway (West)
2039 Do Minimum - RFC	0.51	0.32	0.36	0.45
2039 Do Something - RFC	0.53	0.40	0.34	0.58
2039 Do Something + Mitigation - RFC	0.53	0.44	0.39	0.64
2039 Do Minimum - Queue	2	1	1	1
2039 Do Something - Queue	2	1	1	2
2039 Do Something + Mitigation - Queue	2	1	1	2

8.2.112 The AM peak hour findings for the Broadland Northway / Reepham Road junction predict a maximum RFC of 0.51 and queue of 2 PCUs on Reepham Road (North) in the 2039 DM scenario.

8.2.113 In the scenario with the Proposed Scheme in place (Do Something), the RFC and queue lengths on most arms of the junction increase with the maximum RFC of 0.58 predicted on Broadland Northway (West). Increasing to 0.64 in

the DS+M Scenario. However the junction remaining within capacity in all scenarios.

8.2.114 The predicted junction performance at the Broadland Northway / Reepham Road junction in the 2039 PM peak hour are shown in **Table 8-42.**

Table 8-42 Junction 19 2039 PM Peak Hour (17:00-18:00)

J19 PM	Reepham Road (North)	Broadland Northway (East)	Reepham Road (South)	Broadland Northway (West)
2039 Do Minimum - RFC	0.22	0.45	0.39	0.35
2039 Do Something - RFC	0.28	0.51	0.27	0.48
2039 Do Something + Mitigation - RFC	0.26	0.55	0.28	0.54
2039 Do Minimum - Queue	1	1	1	1
2039 Do Something - Queue	1	2	1	1
2039 Do Something + Mitigation - Queue	1	2	1	2

8.2.115 In the 2039 DM PM peak hour, the junction's maximum predicted RFC and queue length occurred on Broadland Northway (E) with an RFC of 0.45 and queue of 1 PCUs. Similarly, to the AM peak hour results, the inclusion of Proposed Scheme in the model, prompts an increase in RFC on most arms of the junction. The Broadland Northway (East) arm is predicted to have an RFC of 0.51 and the Broadland Northway (West) arm increases to an RFC of 0.48 in the 2039 DS, increasing to 0.55 and 0.54 respectively in the DS+M

Scenario. However, queue lengths remain in the region of 1-2 PCUs which are unlikely to be noticeable, so impacts are considered to be negligible.

Junction 20 - A1067 / Costessey Lane / School Road

8.2.116 RFCs and queue length results for the 2039 DM and DS scenarios at the A1067 / Costessey Lane / School Road junction for the AM and PM peak hours are shown below in **Tables 8-43** and **8-44** respectively.

Table 8-43 Junction 20 2039 AM Peak Hour (07:30-08:30)

J20 AM	School Road to A1067	A1067 Drayton High Road	Costessey Lane	A1067 Fakenham Road
2039 Do Minimum - DoS	**1.85**	0.38	**2.02**	0.45
2039 Do Something - DoS	**0.89**	**0.97**	**1.25**	**1.23**
2039 Do Something + Mitigation - DoS	**0.88**	**1.01**	**1.33**	**1.29**
2039 Do Minimum - Queue	239	3	151	5
2039 Do Something - Queue	12	21	55	84
2039 Do Something + Mitigation - Queue	11	28	65	98

8.2.117 In the AM peak hour, the DM results show that the Degree of Saturation on School Road to A1067 is predicted to be 2.02, with corresponding queue of up to 151 PCUs, indicating that the junction exceeds its theoretical capacity of 1.0 RFC without the Proposed Scheme. There are long queues predicted with a maximum of 239 PCUs on Costessey Lane.

8.2.118 Meanwhile, in the DS and DS+M scenarios there is a predicted decrease in RFCs and queue lengths on the worst arm with a maximum RFC of 1.33 on

Costessey Lane (still exceeding the junction's theoretical capacity but a reduction from the DM scenario of 2.02). The maximum queue lengths also reduce to 98 PCUs on A1067 Fakenham Road in the DS+M scenario. This suggests that the Proposed Scheme would have an overall positive impact on a future baseline capacity issue at the junction in the AM peak hour in 2039, with substantial reduction in queues and delays. Hence no mitigation is proposed at this junction.

8.2.119 However, the CSTM Cycle Friendly Routes include a new NMU crossing in the vicinity of this junction, which may alter the way the traffic uses the junction. Once a detailed scheme is worked up for the crossing, updated modelling can be carried out. The monitor and manage regime is also recommended to be applied to this junction.

8.2.120 The predicted junction performance at the A1067 / Costessey Lane / School Road junction in the 2039 PM peak hour are shown below.

Table 8-44 Junction 20 2039 PM Peak Hour (17:00-18:00)

J20 PM	School Road	A1067 Drayton High Road	Costessey Lane	A1067 Fakenham Road
2039 Do Minimum - RFC	0.57	**1.27**	**1.26**	**0.91**
2039 Do Something - RFC	0.64	**1.11**	**1.11**	0.53
2039 Do Something + Mitigation - RFC	0.63	**1.14**	**1.12**	0.55
2039 Do Minimum - Queue	6	122	57	15
2039 Do Something – Queue	8	81	34	9

J20 PM	School Road	A1067 Drayton High Road	Costessey Lane	A1067 Fakenham Road
2039 Do Something + Mitigation - Queue	8	92	36	9

8.2.121 The PM peak hour junction model findings for the 2039 DM predict a maximum RFC of 1.27 on A1067 Drayton High Road with a queue of 122 PCUs, similar to the AM peak hour results. With the Proposed Scheme in place there is a predicted decrease in RFC and queue length most significantly on A1067 Fakenham Road reducing its RFC by 0.38 to 0.53, still sub optimal but improved as a result of the new road. Hence no mitigation is proposed as part of the Proposed Scheme. However, the CSTM NMU crossing in the vicinity of this junction, may alter the way the traffic uses the junction with additional signals potentially creating more gaps in the traffic. Once a detailed scheme is worked up for the crossing, updated modelling can be carried out. The monitor and manage regime is also recommended to be applied to this junction.

Junction 21 - Broadland Northway / Drayton Lane

8.2.122 **Table 8-45** and **8-46** summarise the predicted RFC and queue length results for the 2039 DM and DS scenarios at the Broadland Northway / Drayton Lane junction for the AM and PM peak hours respectively.

Table 8-45 Junction 21 2039 AM Peak Hour (07:30-08:30)

J21 AM	Brewery Lane (North)	Broadland Northway (East)	Drayton Lane (South)	Broadland Northway (West)
2039 Do Minimum - RFC	**1.98**	0.46	**1.28**	0.66
2039 Do Something - RFC	**2.59**	0.51	**1.34**	0.78

J21 AM	Brewery Lane (North)	Broadland Northway (East)	Drayton Lane (South)	Broadland Northway (West)
2039 Do Something + Mitigation - RFC	**3.30**	0.52	**1.32**	0.84
2039 Do Minimum - Queue	407	1	210	2
2039 Do Something - Queue	502	2	233	4
2039 Do Something + Mitigation - Queue	554	2	219	5

8.2.123 The junction modelling for the Broadland Northway / Drayton Lane junction in the AM peak hour predicts that the junction will significantly exceed capacity in the DM scenario with RFCs beyond 1.0 and long queues of 407 PCUs on the north arm and 210 PCUs on the south arm.

8.2.124 In the DS scenario, the RFC on Drayton Lane (N) and Brewery Lane (N) increases to 2.59 and 0.78 respectively with additional PCUs joining the existing queues, as a result of the Proposed Scheme.

8.2.125 In the DS+M scenario, the RFC on Broadland Northway (W) and Brewery Lane (N) increases to 0.84, slightly above the junction's design capacity with a queue length increase of 2 PCUs from the DS scenario.

8.2.126 **Table 8-46** summarises the predicted junction performance at the Broadland Northway / Drayton Lane junction in the 2039 PM peak hour.

Table 8-46 Junction 21 2039 PM Peak Hour (17:00-18:00)

J21 PM	Brewery Lane (North)	Broadland Northway (East)	Drayton Lane (South)	Broadland Northway (West)
2039 Do Minimum - RFC	0.62	0.66	**1.52**	0.43
2039 Do Something - RFC	0.72	0.71	**1.56**	0.55
2039 Do Something + Mitigation - RFC	0.67	0.76	**1.82**	0.61
2039 Do Minimum - Queue	2	2	305	1
2039 Do Something - Queue	3	3	287	2
2039 Do Something + Mitigation - Queue	2	4	372	2

8.2.127 In the PM peak hour the junction exceeds capacity in the DM scenario with a maximum RFC of 1.52 and a queue of 305 PCUs on the Drayton Lane (South) arm. The junction is shown to be operating significantly over capacity in the future year of 2039. In the DS scenario, the RFC on Drayton Lane increases to 1.56 but with less traffic using A1270, the queue length reduces to 287 PCUs. In the DS+M scenario RFCs increase further to 1.82 with queues of 372 PCUs on the Drayton Lane arm.

8.2.128 This junction exceeds capacity without the Proposed Scheme and is currently being considered for mitigation as part of a separate scheme under development by Norfolk County Council. The emerging scheme proposals for this junction are shown in **Appendix 10** (Document Reference 4.01.10) and updated capacity results with the mitigation scheme included is shown in Chapter 9 of this TA.

Junction 22a - A1270 Broadland Northway / A140 Cromer Road

8.2.129 The A140 Cromer Road junction with A1270 Broadland Northway has recently been modified to include an extra arm on the north east side of the junction to provide access to a recycling centre.

8.2.130 In the future assessment year an additional major employment development referred to as the Broadway Enterprise Park (BEP site) will also take access via the recycling centre arm with modified geometry. The proposed development flows for this site have been agreed with NCC in its role as Local Highway Authority based on a previous Statement of Common Ground agreed between the BEP site developer and NCC at the time of the NDR Development Consent Order (DCO). A manual adjustment has therefore been applied to this junction to match the agreed peak hour flows for the recycling centre/BEP arm for the AM and PM peak hours and the highway geometry in the model has been updated to match the proposed BEP site access arm geometry within the developer's TA. **Table 8-47** shows the 2039 junction capacity results for this junction in the AM peak hour.

Table 8-47 Junction 22A 2039 AM Peak Hour (07:30-08:30)

J22A AM	A140 (North)	BEP site	A140 (South)	A1270 off-slip
2039 Do Minimum - RFC	**1.09**	0.29	0.59	0.77
2039 Do Something - RFC	**1.04**	0.29	0.58	0.73
2039 Do Something + Mitigation - RFC	**1.19**	0.29	0.58	0.81
2039 Do Minimum - Queue	64	1	2	4

J22A AM	A140 (North)	BEP site	A140 (South)	A1270 off-slip
2039 Do Something - Queue	41	1	2	3
2039 Do Something + Mitigation - Queue	122	1	2	4

8.2.131 In the AM peak hour, the junction is predicted to exceed its theoretical capacity in the DM scenario with a maximum RFC of 1.02 on the A140 arm of the junction and queue length of 64 PCUs. The other arms remain within capacity. With the Proposed Scheme in place, the RFCs and queues on A140 are shown to decrease but with the package of mitigation measures added, there is increased queuing on A140 southbound in the AM peak hour. This impact could be avoided if the mitigation scheme is not implemented or only partially delivered. However, it is preferable for strategic traffic to remain on A140, rather than route via Felthorpe.

Table 8-48 Junction 22A 2039 PM Peak Hour (17:00-18:00)

J22A PM	A140 (north)	BEP Site	A140 (south)	A1270 off-slip (east)
2039 Do Minimum - RFC	0.65	0.66	0.72	0.09
2039 Do Something - RFC	0.61	0.64	0.69	0.08
2039 Do Something + Mitigation - RFC	0.71	0.67	0.68	0.08
2039 Do Minimum - Queue	2	2	3	1
2039 Do Something - Queue	2	2	3	1

J22A PM	A140 (north)	BEP Site	A140 (south)	A1270 off-slip (east)
2039 Do Something + Mitigation - Queue	3	2	3	1

8.2.132 **Table 8-48** shows that during the PM peak hour, the junction does not exceed its theoretical capacity in any of the scenarios, with a decrease in queues and delays in the Do Something scenario without mitigation in comparison with the Do Minimum scenario. In the Do Something plus Mitigation scenario there is a very small increase in RFCs in comparison with the Do Minimum scenario. However the operation of A140 remains within capacity and there are minimal queues on the Primary Road network.

8.2.133 In the DS Scenario, there is a reduction in queues and delays at this junction but in the DS+M Scenario, queue lengths would increase on A140 southbound in the AM peak hour. However in the PM peak hour the junction continues to operate within capacity, with minimal queues and delays.

8.2.134 Significant impacts would only occur in the AM peak hour with the full mitigation package in place, which is subject to a monitor and manage regime. It is therefore recommended that this junction should also be monitored. If shown to be required within the monitoring period after the Proposed Scheme opens, minor changes could be implemented to widen the southbound approach of the A140 north arm of the junction.

Junction 22b - A1270 Broadland Northway / A140 Holt Road

8.2.135 **Table 8-49** shows the AM peak 2039 junction capacity results for J22b.

Table 8-49 Junction 22b 2039 AM Peak Hour (07:30-08:30)

J22B AM	Internal link	A1270 off-slip (west)	A140 (south)	Access Road	A1270 on-slip (east)
2039 Do Minimum - RFC	0.72	**1.62**	0.77	0.00	0.00

J22B AM	Internal link	A1270 off-slip (west)	A140 (south)	Access Road	A1270 on-slip (east)
2039 Do Something - RFC	0.71	**1.59**	0.80	0.00	0.00
2039 Do Something + Mitigation - RFC	0.78	**1.83**	0.82	0.00	0.00
2039 Do Minimum - Queue	1	161	3	0	0
2039 Do Something - Queue	1	156	4	0	0
2039 Do Something + Mitigation - Queue	1	195	5	0	0

8.2.136 In the AM peak hour, the junction is predicted to exceed capacity in the DM scenario with a maximum RFC of 1.62 on the A1270 off-slip (west) arm of the junction and queue length of 161 PCUs. This baseline capacity issue is not caused by the Proposed Scheme.

8.2.137 With the DS Scenario in place, the RFC and queue length on the A1270 off-slip (west) is predicted to be slightly lower than in the DM scenario. However, with the DS+M Scenario there is an increase predicted in RFCs and queue lengths as a result of the scheme.

Table 8-50 Junction 22b 2039 PM Peak Hour (17:00-18:00)

J22B PM	Internal Link	A1270 off-slip (west)	A140 (south)	Access Road	A1270 on-slip (east)
2039 Do Minimum - RFC	0.71	**1.13**	**1.15**	0.00	0.00

J22B PM	Internal Link	A1270 off-slip (west)	A140 (south)	Access Road	A1270 on-slip (east)
2039 Do Something - RFC	0.71	**1.08**	**1.12**	0.00	0.00
2039 Do Something + Mitigation - RFC	0.78	**1.26**	**1.16**	0.00	0.00
2039 Do Minimum - Queue	2	39	138	0	0
2039 Do Something - Queue	3	28	114	0	0
2039 Do Something + Mitigation - Queue	4	57	145	0	0

8.2.138 In the PM peak hour, the junction is predicted to exceed capacity in the DM scenario, with a maximum RFC of 1.15 and maximum average queue length of 138 PCUs. In the PM peak hour DS scenario, the RFC slightly reduces to 1.12 on the A140 (S) arm with a decrease in queue length to 114 PCUs. However, there are increases in queues and RFCs shown in the DS+M scenario.

8.2.139 Again, there is expected to be a future baseline capacity issue at J22b which is not caused by the Proposed Scheme and the Proposed Scheme may have a minor positive or negative effect on this junction depending on the extent of mitigation implemented at other locations. As the full extent of mitigation to be delivered across the wider network will be subject to a monitoring regime, this junction should also be monitored. In the event that monitoring shows additional mitigation is required, the A1270 Westbound off slip approach arm could be widened with a longer section of two lane approach to create more queuing capacity.

Junction 23 - Weston Road / Honingham Lane

8.2.140 **Table 8-51** and **Table 8-52** summarise the predicted RFC and queue length results for the 2039 Do Minimum and Do Something scenarios at the Weston Road / Honingham Lane junction for the AM and PM peak hours respectively.

Table 8-51 Junction 23 2039 AM Peak Hour (07:30-08:30)

J23 AM	Weston Road (East)	Honingham Lane	Weston Road (West)
2039 Do Minimum - RFC	Not Applicable	0.55	0.00
2039 Do Something - RFC	Not Applicable	0.00	0.00
2039 Do Something + Mitigation - RFC	Not Applicable	0.00	0.00
2039 Do Minimum - Queue	Not Applicable	2	0
2039 Do Something - Queue	Not Applicable	0	0
2039 Do Something + Mitigation - Queue	Not Applicable	0	0

8.2.141 In the AM peak hour, the DM results show that the RFC on the Honingham Lane is predicted to be 0.55, with corresponding queues of up a maximum of 2 PCUs, meaning that the junction is predicted to operate with ample spare capacity.

8.2.142 With the DS and DS+M Scenarios in place, the RFC and queue length on Honingham Lane is predicted to be substantially lower than in the DM scenario, suggesting that the NWL benefits the operation of the Weston Road / Honingham Lane junction.

8.2.143 **Table 8-52** summarises the predicted junction performance at the Weston Road / Honingham Lane junction in the 2039 PM peak hour.

Table 8-52 Junction 23 2039 PM Peak Hour (17:00-18:00)

J23 PM	Weston Road (East)	Honingham Lane	Weston Road (West)
2039 Do Minimum - RFC	Not Applicable	0.72	0.00
2039 Do Something - RFC	Not Applicable	0.00	0.00
2039 Do Something + Mitigation - RFC	Not Applicable	0.00	0.00
2039 Do Minimum - Queue	Not Applicable	3	0.0
2039 Do Something - Queue	Not Applicable	0.0	0.0
2039 Do Something + Mitigation - Queue	Not Applicable	0.0	0.0

8.2.144 As in the AM peak hour, the PM peak hour predicted a similar trend with the maximum RFC of 0.72, and queue length of 3 PCUs predicted on Honingham Lane.

8.2.145 The DS scenario suggests that the RFC and queue length reduces to zero as a result of Proposed Scheme closing roads that cross the Classified Road, similar to that shown in the AM peak hour. Therefore, the findings from the junction modelling results suggest that the Proposed Scheme would considerably improve the operation of the Weston Road / Honingham Lane junction due to reductions in flows passing through the junction.

Junction 24 - The Street / Field Road / Weston Road

8.2.146 The predicted RFC and queue length results for the 2039 DM and DS scenarios at The Street / Field Road / Weston Road junction for the AM and PM peak hours are shown in **Table 8-53** and **8-54** respectively.

Table 8-53 Junction 24 2039 AM Peak Hour (07:30-08:30)

J24 AM	The Street (East)	Field Road	Weston Road	The Street (North)
2039 Do Minimum - RFC	0.02	0.00	0.00	0.05
2039 Do Something - RFC	0.02	0.00	0.00	0.04
2039 Do Something + Mitigation - RFC	0.02	0.00	0.00	0.04
2039 Do Minimum - Queue	0	0	0	0
2039 Do Something - Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.147 The junction modelling for The Street / Field Road / Weston Road junction in the AM peak hour predicted an RFC of 0.05, with significant spare capacity, and maximum queue length of 1 PCU on The Street (N) for the DM scenario.

8.2.148 In the DS scenario, the RFC on The Street (N) decreases to 0.04 as a result of the Proposed Scheme, with no queues at this junction. The Proposed Scheme will benefit the operation of this junction, due to lower traffic flows passing through it.

8.2.149 Junction performance results for The Street / Field Road / Weston Road junction in the 2039 PM peak hour are shown below.

Table 8-54 Junction 24 2039 PM Peak Hour (17:00-18:00)

J24 PM	The Street (East)	Field Road	Weston Road	The Street (North)
2039 Do Minimum - RFC	0.02	0.00	0.00	0.03
2039 Do Something - RFC	0.02	0.00	0.00	0.03
2039 Do Something + Mitigation - RFC	0.02	0.00	0.00	0.03
2039 Do Minimum - Queue	0	0	0	0
2039 Do Something - Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.150 In the PM peak hour, the results predicted a maximum RFC of 0.02 and queue of 0 PCUs on The Street (E) without the Proposed Scheme in place. In the DS and DS+M scenarios there was no change but with extremely low RFCs and queue lengths the junction would operate significantly below its design capacity with significant spare capacity.

Junction 25 - Berry's Lane / Dereham Lane

8.2.151 The severance of Berry's Lane from the Berry's Lane / Dereham Road junction as part of the NH A47 dualling scheme will result in no flows for that junction, other than adjacent access which is negligible hence there will be no

capacity issues as a result of the Proposed Scheme. No junction mitigation is therefore proposed.

Junction 26 - Honingham Road / Paddy's Lane / Weston Green Road

8.2.152 RFC and queue length results for the 2039 Do Minimum and Do Something scenarios at the Honingham Road / Paddy's Lane / Weston Green Road junction for the AM and PM Peaks respectively are shown in **Tables 8-55 and 8-56.**

Table 8-55 Junction 26 2039 AM Peak (07:30-08:30)

J26 AM	Honingham Road	Weston Green Road (East)	Paddy's Lane	Weston Green Road (West)
2039 Do Minimum - RFC	0.00	0.05	0.00	0.02
2039 Do Something - RFC	0.00	0.00	0.00	0.00
2039 Do Something + Mitigation - RFC	0.00	0.00	0.00	0.00
2039 Do Minimum - Queue	0	0	0	0
2039 Do Something - Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.153 The DM scenario in the AM peak for the Honingham Road / Paddy's Lane / Weston Road junction predicted a maximum RFC of 0.05 on Weston Green Road (E) and no queue lengths on either arm.

8.2.154 In comparison, for the DS and DS+M scenarios, with Proposed Scheme in place, the model predicts a reduction in the stated RFC on Weston Green Road (E) by 0.05 to 0.00. This is a result of lower traffic flows passing through the junction with various roads closed in the local area as part of the Proposed Scheme.

8.2.155 The predicted junction performance at the Honingham Road / Paddy's Lane / Weston Green Road junction in the 2039 PM peak hour are summarised below.

Table 8-56 Junction 26 2039 PM peak hour (17:00-18:00)

J26 PM	Honingham Road	Weston Green Road (East)	Paddy's Lane	Weston Green Road (West)
2039 Do Minimum - RFC	0.00	0.05	0.00	0.00
2039 Do Something - RFC	0.00	0.00	0.00	0.00
2039 Do Something + Mitigation - RFC	0.00	0.00	0.00	0.00
2039 Do Minimum - Queue	0	0	0	0
2039 Do Something - Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.156 The PM peak junction modelling results for the 2039 DM scenario resulted in an RFC of 0.05 on the Weston Green Road (East) and no queues on any arm.

8.2.157 Both of the Do Something scenarios indicate a reduction in RFC in the PM peak hour. This is due to the reduced traffic flow volume through the junction.

Junction 27A- A1067 Fakenham Road / Old Fakenham Road Slip Road

8.2.158 The predicted RFC and queue length results for the 2039 DM and DS scenarios at the A1067 Fakenham Road / Old Fakenham Road Slip Road junction for the AM and PM peak hours are shown in **Table 8-57** and **8-58** respectively.

Table 8-57 Junction 27A 2039 AM peak hour (07:30-08:30)

J27A AM	A1067 Fakenham Road (North)	Old Fakenham Road Slip Road	A1067 Fakenham Road (South)	Access Road
2039 Do Minimum - RFC	0.00	0.46	0.00	0.00
2039 Do Something - RFC	0.00	0.05	0.00	0.00
2039 Do Something + Mitigation - RFC	0.00	0.00	0.00	0.00
2039 Do Minimum - Queue	0	1	0	0
2039 Do Something - Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.159 In the AM Peak, the DM results show that the RFC on Old Fakenham Road Slip Road is predicted to be 0.46, with a corresponding queue of a maximum of 1 PCU meaning that the junction is predicted to operate with ample spare capacity.

8.2.160 With the Proposed Scheme in place (the DS Scenario) the RFCs and queues are predicted to be lower than in the DM scenario, suggesting that the Proposed Scheme offers a slight benefit to the operation of the A1067 Fakenham Road / Old Fakenham Road Slip Road junction.

8.2.161 A summary of the forecast junction performance at the A1067 Fakenham Road / Old Fakenham Road Slip Road junction in the 2039 PM peak hour is shown below.

Table 8-58 Junction 27A 2039 PM peak hour (17:00-18:00)

J27A PM	A1067 Fakenham Road (North)	Old Fakenham Road Slip Road	A1067 Fakenham Road (South)	Access Road
2039 Do Minimum - RFC	0.00	0.14	0.00	0.00
2039 Do Something - RFC	0.00	0.02	0.00	0.00
2039 Do Something + Mitigation - RFC	0.00	0.03	0.00	0.00
2039 Do Minimum - Queue	0	0	0	0
2039 Do Something - Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.162 The PM peak hour results for the A1067 Fakenham Road / Old Fakenham Road Slip Road junction predicted an RFC of 0.14 and maximum average queue length of 0 PCUs on Old Fakenham Road Slip Road. The RFC

identified falls below the junction's design capacity of 0.85, which suggests that it operates with sufficient spare capacity.

8.2.163 With the Proposed Scheme in place (DS scenario), the model predicts a reduction in queue length and ratio of flow-to-capacity of 0 PCU and 0.02 RFC respectively on the Old Fakenham Road Slip Road. This decrease indicates that the Proposed Scheme offers a benefit to the operation of the junction.

Junction 27B - Old Fakenham Road / Old Fakenham Road Slip Road

8.2.164 RFC and queue length results for the 2039 DM and DS scenarios at the Old Fakenham Road / Old Fakenham Road Slip Road junction for the AM and PM peak hours are shown in **Tables 8-59** and **8-60** respectively.

Table 8-59 Junction 27B 2039 AM peak hour (07:30-08:30)

J27B AM	**Old Fakenham Road (South)**	**Old Fakenham Road Slip Road**	**Old Fakenham Road (North)**
2039 Do Minimum - RFC	Not applicable	0.05	0.14
2039 Do Something - RFC	Not applicable	0.02	0.04
2039 Do Something + Mitigation - RFC	Not applicable	0.01	0.01
2039 Do Minimum - Queue	Not applicable	0	0
2039 Do Something - Queue	Not applicable	0	0
2039 Do Something + Mitigation - Queue	Not applicable	0	0

8.2.165 The AM peak hour results for the 2039 DM scenario of the T-junction between Old Fakenham Road and the Old Fakenham Road slip road predicted an RFC of 0.14 and queue length of 0 on Old Fakenham Road (N). In comparison, the 2039 DS scenario predicts a lower RFC of 0.04 on Old Fakenham Road Slip

Road and Old Fakenham Road with no queues. This finding suggests that the Proposed Scheme would offer reduced RFCs.

8.2.166 **Table 8-60** shows the predicted junction performance at the Old Fakenham Road / Old Fakenham Road Slip Road junction in the 2039 PM peak hour.

Table 8-60 Junction 27B 2039 PM peak hour (17:00-18:00)

J27B PM	Old Fakenham Road (South)	Old Fakenham Road Slip Road	Old Fakenham Road (North)
2039 Do Minimum - RFC	Not applicable	0.11	0.06
2039 Do Something - RFC	Not applicable	0.03	0.01
2039 Do Something + Mitigation - RFC	Not applicable	0.00	0.02
2039 Do Minimum - Queue	Not applicable	0	0
2039 Do Something - Queue	Not applicable	0	0
2039 Do Something + Mitigation - Queue	Not applicable	0	0

8.2.167 The maximum predicted RFC of 0.11 in the PM peak for the 2039 DM scenario occurs on the Old Fakenham Road Slip Road arm and is significantly below the junction's design RFC of 0.85. There are no queues at this junction in the DM scenario.

8.2.168 In the 2039 DS and DS+M scenarios, the junction modelling software predicts a maximum RFC of 0.03 on both Old Fakenham Road Slip Road and Old Fakenham Road (N). The Proposed Scheme offers reduced RFCs at the junction.

Junction 27C - Old Fakenham Road / A1067 Fakenham Road

8.2.169 RFC and queue length results for the 2039 DM and DS scenarios at the Old Fakenham Road / A1067 Fakenham Road junction for the AM and PM peak hours are shown in **Table 8-61** and **Table 8-62** respectively.

Table 8-61 Junction 27C 2039 AM Peak Hour (07:30-08:30)

J27C AM	A0167 Fakenham Road (North)	Old Fakenham Road	A1067 Fakenham Road (South)
2039 Do Minimum - RFC	Not Applicable	0.08	0.28
2039 Do Something - RFC	Not Applicable	0.33	0.53
2039 Do Something + Mitigation - RFC	Not Applicable	0.12	0.22
2039 Do Minimum - Queue	Not Applicable	0	1
2039 Do Something - Queue	Not Applicable	1	2
2039 Do Something + Mitigation - Queue	Not Applicable	0	1

8.2.170 The junction modelling findings of the T-junction between Old Fakenham Road and Fakenham Road (A1067) predict a maximum RFC of 0.28, below the design capacity of 0.85, with a corresponding queue length of 1 PCU on Fakenham Road (S) in the AM peak hour for the 2039 Do Minimum scenario.

8.2.171 The DS scenario predicts an RFC of 0.53 and queue of 2 PCUs – noting an increase over the DM scenario, leading to conclusion that the NWL will slightly impact the operation of the junction. However, the RFC and queue length values would remain within capacity and therefore, would not significantly affect its operation or cause a noticeable impact. With the DS+M scenario, there is less increase in RFCs over the DM scenario at Old Fakenham Road and a slight reduction predicted at the A1067 south arm of the junction.

8.2.172 The predicted junction performance at the Old Fakenham Road / A1067 Fakenham Road junction in the 2039 PM peak hour are shown below.

Table 8-62 Junction 27C 2039 PM Peak Hour (17:00-18:00)

J27C PM	A0167 Fakenham Road (North)	Old Fakenham Road	A1067 Fakenham Road (South)
2039 Do Minimum - RFC	Not Applicable	0.10	0.12
2039 Do Something - RFC	Not Applicable	0.16	0.49
2039 Do Something + Mitigation - RFC	Not Applicable	0.12	0.10
2039 Do Minimum - Queue	Not Applicable	0	0
2039 Do Something - Queue	Not Applicable	0	2
2039 Do Something + Mitigation - Queue	Not Applicable	0	0

8.2.173 In the PM peak hour, the maximum RFC and queue in the PM peak for the 2039 DM scenario were predicted to be 0.12 on Fakenham Road (S). Meanwhile, the DS scenario predicts an increase to 0.49 RFC and a queue length of 2 PCUs on Fakenham Road (S).

8.2.174 Despite the increases in RFCs and queues at this junction in the peak hour, the junction remains well within its design capacity and a maximum queue length of 2 PCUs is unlikely to be problematic at this junction.

Junction 28 - A47 / Church Lane / Dereham Road

8.2.175 This junction was not included in the junction modelling assessment due to it being removed after the base year as part of the A47 TUD scheme. Therefore, it does not require an assessment in the future year (2039).

Junction 29 - Mill Lane / The Street / Taverham Road

8.2.176 **Tables 8-63** ad **8-64** show the forecast RFC and queue length results for the 2039 DM and DS scenarios at the Mill Lane / The Street / Taverham Road junction for the AM and PM peak hours respectively.

Table 8-63 Junction 29 2039 AM Peak Hour (07:30-08:30)

J29 AM	The Street (East)	Taverham Road	The Street (West)	Mill Lane
2039 Do Minimum – RFC	0.01	0.30	0.00	0.05
2039 Do Something – RFC	0.01	0.54	0.00	0.06
2039 Do Something + Mitigation - RFC	0.01	0.23	0.00	0.05
2039 Do Minimum – Queue	0	0	0	0
2039 Do Something – Queue	0	1	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.177 In the AM Peak, the DM scenario results show that the RFC on Taverham Road is predicted to be 0.30, with corresponding queues of a maximum of 0 PCUs, meaning that the junction is predicted to operate with sufficient spare capacity.

8.2.178 In the DS scenario, the majority of RFCs and queue lengths are predicted to remain unchanged except the Taverham Road and Mill Lane arm which are shown to experience an increase in RFC to 0.54 and 0.06 respectively. Reductions in RFCs are evident in the DS+M Scenario, although this junction remains well within capacity in all scenarios.

8.2.179 The predicted junction performance at the Mill Lane / The Street / Taverham Road junction in the 2039 PM peak hour are shown below.

Table 8-64 Junction 29 2039 PM Peak Hour (17:00-18:00)

J29 PM	The Street (East)	Taverham Road	The Street (West)	Mill Lane
2039 Do Minimum - RFC	0.00	0.39	0.00	0.03
2039 Do Something - RFC	0.00	**0.91**	0.00	0.03
2039 Do Something + Mitigation - RFC	0.00	0.53	0.00	0.03
2039 Do Minimum - Queue	0	1	0	0
2039 Do Something - Queue	0	7	0	0
2039 Do Something + Mitigation - Queue	0	1	0	0

8.2.180 The junction modelling results in the PM peak hour for the DM scenario predict the junction's maximum RFC of 0.39 and queue of 0 PCUs on Taverham Road.

8.2.181 In the DS Scenario, the predicted RFC increases to 0.91 on Taverham Road but still falls below the junction's absolute theoretical capacity of 1.0, suggesting that the Proposed Scheme will have a marginal impact in PM peak hour. However, the queues only increase from 1 to 7 PCUs, and the junction can be seen to operate without excessive delays so it is expected to be a negligible effect. The issue is also predicted to be resolved if the proposed mitigation package across the wider network is deployed. Hence no mitigation is proposed but this junction should also be included in the monitoring regime.

Junction 30 - Haveringland Road / Shortthorn Road / The Street

8.2.182 A summary of the predicted RFC and queue length results for the 2039 DM and DS scenarios at the Haveringland Road / Shortthorn Road / The Street junction for the AM and PM peak hours is shown in **Table 8-65** and **Table 8-66** respectively.

Table 8-65 Junction 30 2039 AM Peak Hour (07:30-08:30)

J30 AM	Shortthorn Road	Haveringland Road (South)	The Street	Haveringland Road (North)
2039 Do Minimum - RFC	0.00	0.00	0.00	0.02
2039 Do Something - RFC	0.00	0.00	0.00	0.02
2039 Do Something + Mitigation - RFC	0.00	0.00	0.00	0.02
2039 Do Minimum - Queue	0	0	0	0
2039 Do Something - Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.183 The crossroad between Shortthorn Road, Haveringland Road and The Street predicted a maximum RFC of 0.02 on Haveringland Road (N) with no queues on any of the junction's arms in the 2039 DM scenario.

8.2.184 In comparison, the 2039 DS scenario predicts a maximum RFC of 0.02 on Haveringland Road (N), which is equal to the one from the DM scenario. There are no queues predicted at this junction in the DS, so the impact is considered to be non-existent.

8.2.185 **Table 8-66** summarises the predicted junction performance at the Haveringland Road / Shortthorn Road / The Street junction in the 2039 PM peak hour.

Table 8-66 Junction 30 2039 PM Peak Hour (17:00-18:00)

J30 PM	Shortthorn Road	Haveringland Road (South)	The Street	Haveringland Road (North)
2039 Do Minimum - RFC	0.00	0.00	0.00	0.00
2039 Do Something - RFC	0.00	0.00	0.01	0.02
2039 Do Something + Mitigation - RFC	0.00	0.00	0.01	0.00
2039 Do Minimum - Queue	0	0	0	0
2039 Do Something - Queue	0	0	0	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.186 The junction's PM peak hour findings for the DM scenario, without the Proposed Scheme in place, predicted a maximum RFC of 0.00, significantly below its design capacity of 0.85, with no queues throughout the junction.

8.2.187 In the DS scenario, the maximum predicted RFC of 0.02 occurs on Haveringland Road (N). The DS scenario shows slight increases the RFC due to redistribution of traffic but no queuing. Therefore, the junction functions acceptably in both the DM and DS scenarios.

Junction 31 - Cromer Road / Parish Road / Shortthorn Road

8.2.188 RFC and queue length results for the 2039 DM and DS scenarios at the Cromer Road / Parish Road / Shorthorn Road junction for the AM and PM peak hours are shown in **Tables 8-67** and **8-68** respectively.

Table 8-67 Junction 31 2039 AM Peak Hour (07:30-08:30)

J31 AM	A140 Cromer Road (South)	Shortthorn Road	A140 Cromer Road (North)	Parish Road
2039 Do Minimum - RFC	0.10	0.42	0.49	0.23
2039 Do Something - RFC	0.09	0.52	0.63	0.24
2039 Do Something + Mitigation - RFC	0.13	0.28	0.16	0.18
2039 Do Minimum - Queue	0	1	1	0
2039 Do Something - Queue	0	1	2	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.189 The DM results for the AM peak hour show that the RFC on Cromer Road (N) is predicted to be 0.49, with a corresponding queue of up to a maximum of 1 PCU, inferring that the junction is predicted to operate with spare capacity, in comparison to its design RFC of 0.85.

8.2.190 In the DS scenario, the RFCs and queues are predicted to be slightly higher on Shorthorn Road, A140 Cromer Road (N) and Parish Road. However, these reduce in the DS+M scenario due to reductions in through traffic as a result of

proposed restrictions at the B1149 junction with Shortthorn Road which form part of the Proposed Scheme's mitigation package. However, the maximum RFC on Cromer Road (N) is predicted to increase from 0.51 in the DM scenario to 0.63 in the DS Scenario. Overall, there is considered to be a slight impact at this junction.

8.2.191 Predicted junction performance at the Cromer Road / Parish Road / Shorthorn Road junction in the 2039 PM peak hour are shown below.

Table 8-68 Junction 31 2039 PM Peak Hour (17:00-18:00)

J31 PM	A140 Cromer Road (South)	Shortthorn Road	A140 Cromer Road (North)	Parish Road
2039 Do Minimum - RFC	0.15	0.48	0.18	0.16
2039 Do Something - RFC	0.14	0.62	0.39	0.14
2039 Do Something + Mitigation - RFC	0.21	0.29	0.08	0.19
2039 Do Minimum - Queue	0	1	0	0
2039 Do Something - Queue	0	2	1	0
2039 Do Something + Mitigation - Queue	0	0	0	0

8.2.192 The PM peak hour results for the 2039 DM scenario predict a maximum RFC of 0.48 along Shorthorn Road, with a corresponding queue length of 1 PCU.

8.2.193 The 2039 DS scenario in the PM peak hour predicts a higher RFC and queue length on Shorthorn Road at 0.62 and equivalent 2 PCU queue length

respectively. Similar to the AM peak hour, with the proposed mitigation scheme in place, the findings suggest that the junction would see improved operation, with turning restrictions at the onward junction of B1149/Shortthorn Road.

8.3 Summary

8.3.1 Worst-case predicted RFC and queue length results are shown in Table 8-69 for the 2039 DM and DS scenarios at each of the assessed Proposed Scheme junctions for the AM peak hour.

Table 8-69 NWL Junction 2039 AM Peak Hour (07:30-08:30) Summary

Junction	2039 Do Minimum - RFC	2039 Do Something - RFC	2039 Do Something + Mitigation - RFC	2039 Do Minimum - Queue	2039 Do Something - Queue	2039 Do Something + Mitigation - Queue
J1	Not Applicable	0.62	0.62	Not Applicable	2	2
J2	Not Applicable	0.18	Not Applicable	Not Applicable	2	Not Applicable
J3	0.54	0.08	0.09	1	0	0
J4	**1.10**	0.16	0.06	17	1	0
J5	0.19	0.02	0.02	0	0	0
J6	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
J7	0.11	0.17	0.09	0	0	0
J8	0.16	0.17	0.16	0	0	0
J9a	Not Applicable	0.69	Not Applicable	Not Applicable	3	Not Applicable
J9b	Not Applicable	0.57	Not Applicable	Not Applicable	2	Not Applicable
J10	0.07	0.10	0.11	0	0	0
J11a	0.09	0.11	0.06	0	0	0
J11b	0.00	0.00	0.00	0	0	0
J12a	**1.11**	**0.99**	**0.99**	95	22	25
J12b	**0.92**	0.81	0.80	8	4	4
J13	**1.16**	**1.09**	**1.09**	80	57	57

Junction	2039 Do Minimum - RFC	2039 Do Something - RFC	2039 Do Something + Mitigation - RFC	2039 Do Minimum - Queue	2039 Do Something - Queue	2039 Do Something + Mitigation - Queue
J14	0.40	0.04	0.02	1	0	0
J15	0.34	0.69	0.71	1	2	3
J16	0.80	0.73	0.74	13	11	11
J17	0.48	0.73	0.77	1	3	43
J18	0.53	0.32	0.31	1	1	0
J19	0.51	0.58	0.64	1	1	2
J20	**2.02**	**1.25**	**1.33**	239	84	98
J21	0.74	0.83	**0.88**	3	5	7
J22a	**1.09**	**1.04**	**1.19**	64	41	122
J22b	**1.62**	**1.59**	**1.83**	160	157	196
J23	0.55	0.00	0.0	2	0	0
J24	0.05	0.04	0.04	0	0	0
J25	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
J26	0.05	0.00	0.00	0	0	0
J27a	0.46	0.05	0.00	1	0	0
J27b	0.14	0.04	0.01	0	0	0
J27c	0.28	0.53	0.22	1	2	1
J28	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
J29	0.30	0.54	0.23	0	1	0

Junction	2039 Do Minimum - RFC	2039 Do Something - RFC	2039 Do Something + Mitigation - RFC	2039 Do Minimum - Queue	2039 Do Something - Queue	2039 Do Something + Mitigation - Queue
J30	0.02	0.02	0.02	0	0	0
J31	0.49	0.63	0.28	1	2	0

8.3.2 Table 8-70 summarises the worst-case predicted RFC and queue length results for the 2039 DM and DS scenarios at each of the assessed Proposed Scheme junctions for the PM peak hour.

Table 8-70 NWL Junction 2039 PM Peak Hour (17:00-18:00) Summary

Junction	2039 Do Minimum - RFC	2039 Do Something - RFC	2039 Do Something + Mitigation - RFC	2039 Do Minimum - Queue	2039 Do Something - Queue	2039 Do Something + Mitigation - Queue
J1	Not Applicable	0.49	0.53	Not Applicable	1	1
J2	Not Applicable	0.23	Not Applicable	Not Applicable	0.3	Not Applicable
J3	0.49	0.16	0.16	1	0	0
J4	**0.94**	0.07	0.07	7	0	0
J5	0.23	0.06	0.05	0	0	0
J6	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
J7	0.08	0.10	0.08	0	0	0
J8	0.11	0.12	0.11	0	0	0
J9a	Not Applicable	0.65	Not Applicable	Not Applicable	2	Not Applicable
J9b	Not Applicable	0.54	Not Applicable	Not Applicable	2	Not Applicable
J10	0.05	0.07	0.07	0	0	0
J11a	0.04	0.06	0.03	0	0	0
J11b	0.00	0.00	0.00	0	0	0
J12a	**0.88**	0.80	0.80	7	4	4

Junction	2039 Do Minimum - RFC	2039 Do Something - RFC	2039 Do Something + Mitigation - RFC	2039 Do Minimum - Queue	2039 Do Something - Queue	2039 Do Something + Mitigation - Queue
J12b	0.72	0.66	0.66	3	2	2
J13	**1.12**	**1.09**	**1.10**	63	56	56
J14	0.54	0.04	0.01	1	0	0
J15	0.33	0.60	0.61	1	2	2
J16	**0.89**	0.82	0.82	16	13	13
J17	0.49	0.63	0.65	1	2	2
J18	0.41	0.34	0.33	1	1	1
J19	0.51	0.58	0.64	1	1	2
J20	**1.27**	**1.11**	**1.14**	122	81	92
J21	0.66	0.71	0.76	2	3	3
J22a	**0.72**	**0.69**	**0.68**	3	3	94
J22b	**1.15**	**1.12**	**1.16**	138	114	145
J23	0.72	0.00	0.00	3	0	0
J24	0.03	0.03	0.03	0	0	0
J25	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
J26	0.05	0.00	0.00	0	0	0
J27a	0.14	0.02	0.03	0	0	0
J27b	0.11	0.03	0.02	0	0	0
J27c	0.12	0.49	0.10	0	2	0

Junction	2039 Do Minimum - RFC	2039 Do Something - RFC	2039 Do Something + Mitigation - RFC	2039 Do Minimum - Queue	2039 Do Something - Queue	2039 Do Something + Mitigation - Queue
J28	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
J29	0.39	**0.91**	0.53	1	7	1
J30	0.00	0.02	0.01	0	0	0
J31	0.48	0.62	0.29	1	2	0

9 Mitigation Measures

9.1 NMU Provision

9.1.1 In order to mitigate severance issues caused by the Classified Road where it crosses existing roads and public rights of way, and to enhance opportunities for active travel, an NMU (Non-Motorised User) strategy was first developed with input from stakeholders including the Local Liaison Group and Sustainable Transport workshops. A local access consultation also informed the final selection of measures to be included in the NMU Provision for the Proposed Scheme. The NMU Provision plan is shown in **Appendix 1** (Document Reference 4.01.01).

9.1.2 A joined up NMU network has been designed to enable walkers, cyclists and horse riders to cross the Classified Road safely via grade separated crossings and connect with onward Public Rights of Way (PROW). Further detail is set out within the **Sustainable Transport Strategy** (Document Reference 4.02.00)

9.1.3 The A47 TUD scheme for which the DCO was approved in August 2022, includes three grade separated crossings which can be used by NMUs to cross the proposed A47 dual carriageway. This also presents an opportunity to divert and upgrade RB1 to the east of the Classified Road and create a much-improved and surfaced PROW route with onward connectivity to The Broadway green bridge, leading to Weston Green.

9.1.4 The NMU Provision includes two new green bridges (referred to as GB1 and GB4) which will be accessible by NMUs – GB1 is located at The Broadway and GB4 is to be positioned further north between Weston Road and Ringland Lane (to be known as the Morton Green Bridge). These two bridges offer clear priority to NMUs over vehicles as existing roads crossing the NWL connecting to these will be closed to motorised vehicles (other than access). Their alignments are designed to suit ecological mitigation requirements as they are also intended to mitigate impacts on protected species.

9.1.5 Ringland Lane will be kept open to all motorised and non-motorised users to maintain connectivity between the villages of Ringland and Weston Longville and avoid the need for agricultural vehicles to use the A1067 and A47 for movements between land parcels in the vicinity of the Proposed Scheme). A small number of vehicles are likely to re-route to Ringland Lane, with the closure of Church Hill Lane (Weston Road), Breck Lane (Breck Lane (Breck Road)) and The Broadway in place. However, following the dualling of the A47 TUD scheme, it is expected that the amount of motorised traffic on Ringland Lane would be less than 1,000 vehicles per day. Traffic reduction will improve conditions for walking, cycling and equestrian use. LTN1/20 identifies that roads with traffic flows of 1000 vehicles (AADT) per day could be suitable for designation as 'Quiet Lanes' which indicates the 1000 vehicle threshold is not likely to be significant.

9.2 Cycle Friendly Routes

9.2.1 Following the COVID-19 pandemic and long periods of lockdown, active mode networks at the local level have become increasingly valued and help to encourage walking and cycling for commuting and leisure purposes alike. To support this, the **Sustainable Transport Strategy** (Document Reference 4.02.00) aims to embrace policies such as Gear Change and the decarbonisation agenda with the identification of a local network of Cycle Friendly Routes that can be further developed and implemented once the Proposed Scheme is in place.

9.2.2 With the Proposed Scheme also forming part of the wider Transport for Norwich (TfN) Strategy, the opportunity arises for making better use of the existing roads within the study area, where traffic volumes are already low or reduced due to the introduction of the Classified Road. As set out within the TfN Strategy, the Proposed Scheme will facilitate delivery of enhanced sustainable transport measures to support public transport and active travel.

9.2.3 The STS and TA is aligned with the TfN Strategy which places a requirement upon NCC to "Carry out strategic assessments of the traffic impacts as a

consequence of completing the committed strategic schemes (including improvements to the A47, the committed transforming cities programme and the Norwich Western Link) to identify the opportunities to deliver enhanced sustainable transport measures to support public transport and active travel." For this reason the CSTM were developed.

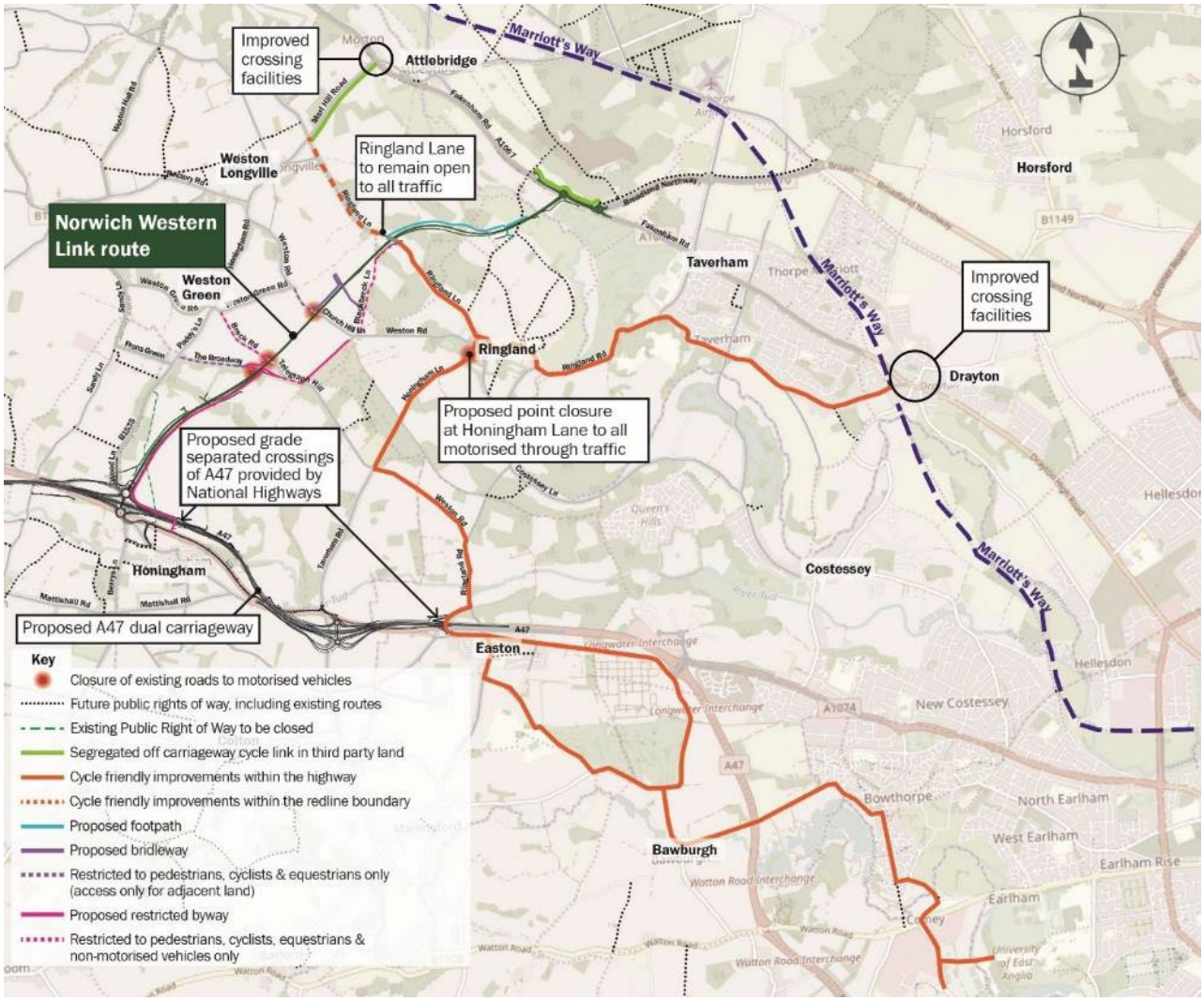
9.2.4 With future predicted low traffic flows of less than 2,500 vehicles per day once the Proposed Scheme is in place, and vehicle speeds of 35mph or less (or can be reduced to this level) many of the existing highway routes in the west of Norwich can then be re-prioritised as 'Cycle Friendly Routes' with increased signage and branding to raise awareness amongst drivers and potential users. This re-branding of rural lanes to the west of Norwich would improve priority for NMUs by highlighting to vehicle drivers that they are to be treated as a guest on routes as they can expect to encounter vulnerable users on their journey. In accordance with the Highway Code, drivers should respond by adapting their behaviour to be suitable for the conditions of the road.

9.2.5 The Cycle Friendly Route measures are set out within the STS. However, an overview plan is shown below in **Figure 9-1** incorporating the future NMU network around the Proposed Scheme.

9.2.6 These Complementary Sustainable Transport Measures (CSTM) are additional measures that would be available for implementation by the Applicant, once the Proposed Scheme is in place, with the proposed works delivered within the existing public highway boundary extents.

9.2.7 The Cycle Friendly Route network which is able to be delivered within the public highway extents, would connect Ringland, Drayton, Easton, Costessey Park and Ride, Bawburgh, Three Score, Bowthorpe, University of East Anglia (UEA) and Norwich & Norfolk University Hospital (NNUH). It crosses the A47 near Easton via the new NMU bridge proposed by National Highways as part of their A47 TUD scheme.

Figure 9-1 Proposed Cycle Friendly Routes and Marl Hill Road Link



9.3 Marl Hill Road Cycleway

9.3.1 To improve NMU connectivity on a route that runs broadly parallel with the NWL viaduct, a new off-road pedestrian and cycle link will be provided alongside Marl Hill Road as part of the Proposed Scheme Non Motorised User Provision, shown in **Appendix 1** (Document Reference 4.01.01). The route would be an attractive shared surface suitable for rural low frequency use by NMUs. The design of the route is consistent with those included in the National Highways approved DCO proposals for the A47 TUD scheme.

9.3.2 The proposed link will connect the villages of Attlebridge and Weston Longville, with onward routes through Attlebridge connecting to the Marriott's

Way. The route and wider context of the Cycle Friendly Routes with the NMU Provision also in place is shown in green in **Figure 9-1**. This route offers a direct route connecting villages which share local facilities and also enables local residents to access bus stops on A1067 where frequent services serve the main radial route into central Norwich and to Fakenham.

9.3.3 Where the proposed new cycle/pedestrian link meets the A1067 close to the Marl Hill Road junction, a new crossing facility would be installed to assist users crossing A1067 which is expected to have an increase in traffic volume as a result of NWL. The crossing would therefore assist with limiting severance issues once the new Marl Hill Road link is in place. It would also offer enhanced connectivity to the Marriott's Way NCN1. Linked to this a 40mph speed limit is also proposed for this section of A1067 through Morton on the Hill, in the interests of highway safety at the crossing.

9.4 Public Transport Strategy

9.4.1 As set out within the STS, a 'Western Arc' bus strategy was developed so that all relevant modes of travel have been considered within the Proposed Scheme and opportunities for maximising non-car travel, have been taken into account. This is not a mitigation requirement caused by the Proposed Scheme but would offer enhancement for non-car travel opportunities in the western urban fringe of Norwich.

9.4.2 Due to the requirement for buses to operate on a sustainable commercial basis, achieving a suitable bus catchment is a fundamental aspect of the proposals and engagement with bus operators indicated that providing buses through the rural road network between the A1067 and A47 would not be a viable option as the catchments are too limited and previous services have been withdrawn on similar routes due to lack of uptake.

9.4.3 The study therefore focussed on the western urban fringe of Norwich which is more densely populated and earlier studies had suggested there would be an opportunity to connect key housing areas in the west of Norwich with key employment sites in the west, without the need to travel into central Norwich

to change buses. On examination of the catchments, it was noted that there would potentially be demand for connecting Taverham, Drayton and Queen's Hills with the NNUH, Norwich Research Park and UEA.

9.4.4 This was considered within the Local Access consultation (July 2020). The western part of the loop was well supported and a new service is now in place on the eastern part of the loop connecting Hellesdon, to NNUH, NRP and UEA via the Outer Ring Road as a commercial venture operated by Konectbus (Service 521)

9.4.5 The Applicant is currently working with bus operators and developers in the west of Norwich seeking a way forward for the western part of the service (referred to as Option A in **Figure 9-2** below). For example, planned development growth at Marriott's Park, Taverham would potentially increase patronage on this route and there is an opportunity to use the Queens Hills bus only link to enable buses to connect through the western fringe to avoid congestion at existing junctions on the A1074. This is currently in the final stages of the adoption process as part of a recent development scheme and is expected to be open by the time the Proposed Scheme opens to traffic in 2029.

Figure 9-2 Western Arc Bus Strategy

9.5 Link Flow Traffic Mitigation

9.5.1 The majority of transport mitigation proposals are already included within the Proposed Scheme and have been included in the modelling for the DS+M scenario. The development of transport mitigation proposals has followed an iterative process of traffic modelling using the strategic NATS model and working with local community representatives in stakeholder consultation meetings. The traffic mitigation proposals were also consulted upon publicly in summer 2022 and have been the subject of discussions with affected Parish Councils.

9.6 Scope of Mitigation

9.6.1 In order to scope the extent of mitigation proposed to an appropriate and proportionate scale of works for the Proposed Scheme, a threshold of 1,000 vehicle increase per day as a result of the Proposed Scheme prior to mitigation was set as a criteria for considering links for intervention. As noted within LTN1/20, roads with less than 1000 vehicles per day on average could be suitable for designation as 'Quiet Lanes'.

9.6.2 It is therefore considered that impacts of less than 1,000 vehicles per day could be tolerated on the majority of the surrounding road network without adversely affecting the quality of life for local residents. This also equates to the DMRB criteria for scoping of links for Air Quality assessment as specified within LA105. The National Highways POPE methodology also refers to 1,000 vehicle thresholds for noise and air quality indicators in sections 4.3 and 4.4 of the note pope-methodology-note-jan-2022.pdf (nationalhighways.co.uk).

9.6.3 On review of the traffic modelling results in the opening year of 2029 in relation to this criteria (based on a comparison of DM and DS AADT flows), the following locations were identified as requiring consideration for intervention:

- A1067 Fakenham Road, Drayton;
- A1067 Fakenham Road, Attlebridge;
- A1270 Broadland Northway ;
- A47 west of Honingham;
- A140 north of A1270;
- Shortthorn Road, Felthorpe;
- Station Road, Attlebridge; and
- Bell Road, Barnham Broom.

9.6.4 The A-Roads listed above are considered to be suitable for tolerating the forecast magnitude of increase in traffic and applying mitigation to these routes would most likely result in unsustainable re-routing through less suitable side roads. Hence no traffic mitigation is proposed for link flows on A47, A1270, A1067 or A140. Mitigation is therefore proposed for Shortthorn Road, Felthorpe, Station Road, Attlebridge and Bell Road, Barnham Broom.

9.7 Developing a Package of Mitigation Measures

9.7.1 Once the scope of mitigation was determined, scenario testing was carried out in the strategic model to identify potential measures for inclusion in the traffic mitigation strategy. Initial testing was carried out in summer 2021 and ideas were discussed with affected Parish Councils. Where necessary, secondary mitigation was proposed to ameliorate further effects of localised re-routing in response to the mitigation measures. A variety of options were considered in developing the proposals, with a preferred package selected based on creating a balanced effect on surrounding communities, so as not to simply displace impacts to other villages.

9.7.2 The mitigation measures considered within this TA take into account public feedback on the Proposed Scheme as presented in August-October 2022. Changes to the proposed mitigation measures have been made and these are reflected in the strategic modelling which has informed the TA.

9.7.3 A follow up consultation was held with residents of Attlebridge and adjacent parishes with a revised proposal. The proposal to impose an access restriction through Carleton Forehoe has also been amended, so that speed management proposals are proposed instead. This will remove the need for road closure.

9.7.4 A monitor and manage approach is proposed to identify appropriate points for the implementation of mitigation measures, so that the more restrictive mitigation measures can be drawn upon when they are needed, rather than from day 1 of Proposed Scheme opening. This approach has been explained

to local communities in parish discussions held following the 2022 public consultation.

9.7.5 The revised proposals are explained in the following sections and revised traffic impacts are illustrated with and without the mitigation.

9.8 Proposals North of A1067

9.8.1 The link flow traffic mitigation proposals north of A1067 and their corresponding traffic impacts are shown in **Figure 9-3** below.

9.8.2 In the vicinity of Felthorpe, a turning restriction at the staggered crossroads junction of Shorthorn Road and B1149 Holt Road was found to offer a reduction in through traffic travelling through the village from the A140 to access the Proposed Scheme. This junction also has a relatively poor accident record and would benefit from changes to enhance user safety. However, speed limit reductions were also found to be needed in the villages of Horsford and Felthorpe to support this proposal to minimise secondary re-routing. The applicant proposes a monitor and manage approach to implementation of this measure as set out in section 9.11 below.

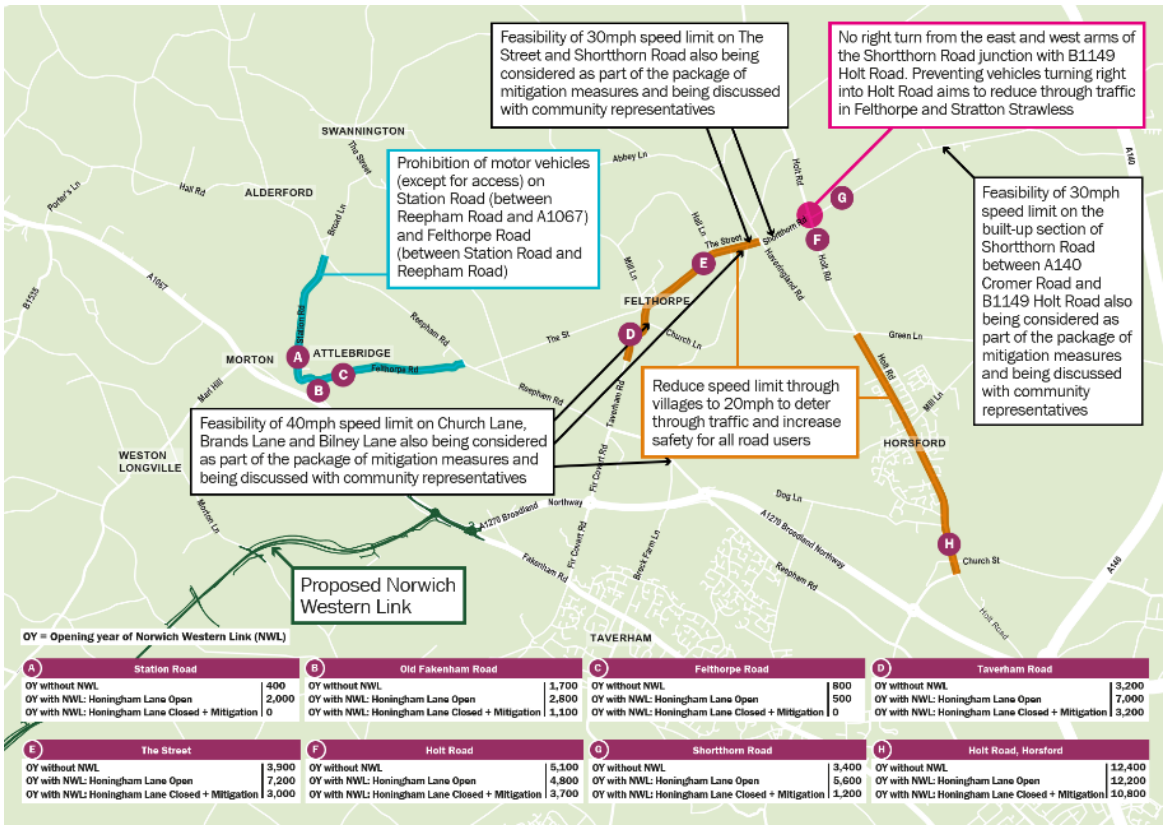
9.8.3 At Station Road and Felthorpe Road, Attlebridge, an access only restriction is now proposed from Reepham Road to prevent increases in traffic travelling through the village. In response to feedback from the pre-application consultation in 2022, the previous right turning ban was reconsidered and a follow up consultation was held with residents of Attlebridge and adjacent parishes regarding the revised proposal. The applicant proposes a monitor and manage approach to implementation of this measure as set out in section 9.11 below.

9.8.4 Reduced speed limits are also proposed through the villages of Felthorpe and Horsford.

9.8.5 **Figure 9-3** below also shows some additional speed management measures which are emerging proposals subject to ongoing discussions with local parishes. These additional measures have not been included in the strategic

traffic modelling that informed this TA but may be drawn upon if traffic monitoring shows they are required.

Figure 9-3 Proposals North of the A1067



9.9 Proposals South of the A47

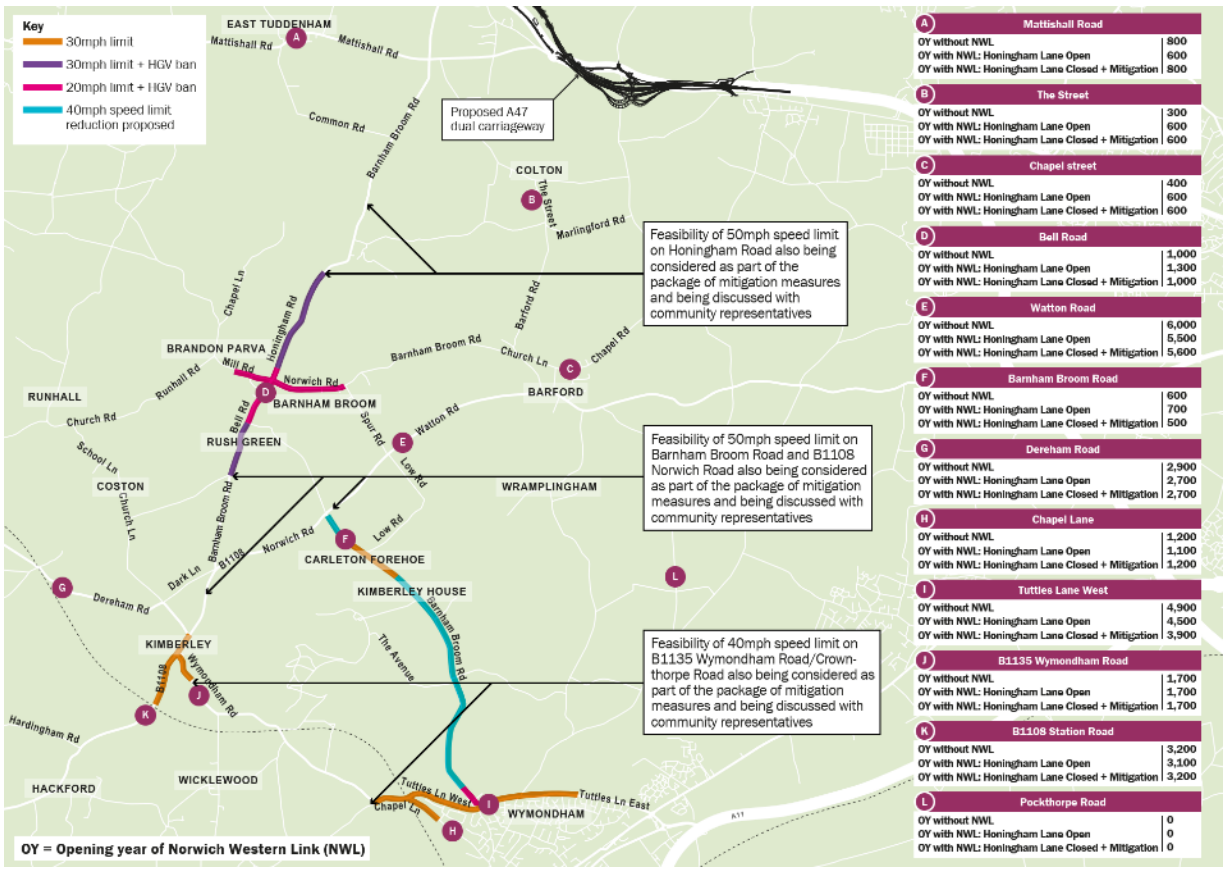
9.9.1 The link flow traffic mitigation proposals north of A1067 and their corresponding traffic impacts are shown in Figure 9-4 below.

9.9.2 South of the A47, speed limit reductions through the village of Barnham Broom were identified for inclusion in the mitigation package, with secondary mitigation proposed in the form of speed management measures in Kimberley, Carleton Forehoe and the north of Wymondham.

9.9.3 Where revised speed limits are proposed, the exact extents of speed limit boundaries will be discussed with representatives of the local communities affected. Other stakeholders including Norfolk Constabulary will also need to be consulted on the proposals prior to implementation.

9.9.4 In response to feedback from the pre-application public consultation held in 2022, the proposal to impose an access restriction through Carleton Forehoe has also been amended, so that speed management proposals are now proposed instead.

Figure 9-4 Proposals South of A47



9.9.5 **Figure 9-4** also shows some additional speed management measures which are emerging proposals subject to ongoing discussions with local parishes. These additional measures have not been included in the strategic traffic modelling that informed this TA but may be drawn upon if traffic monitoring shows they are required.

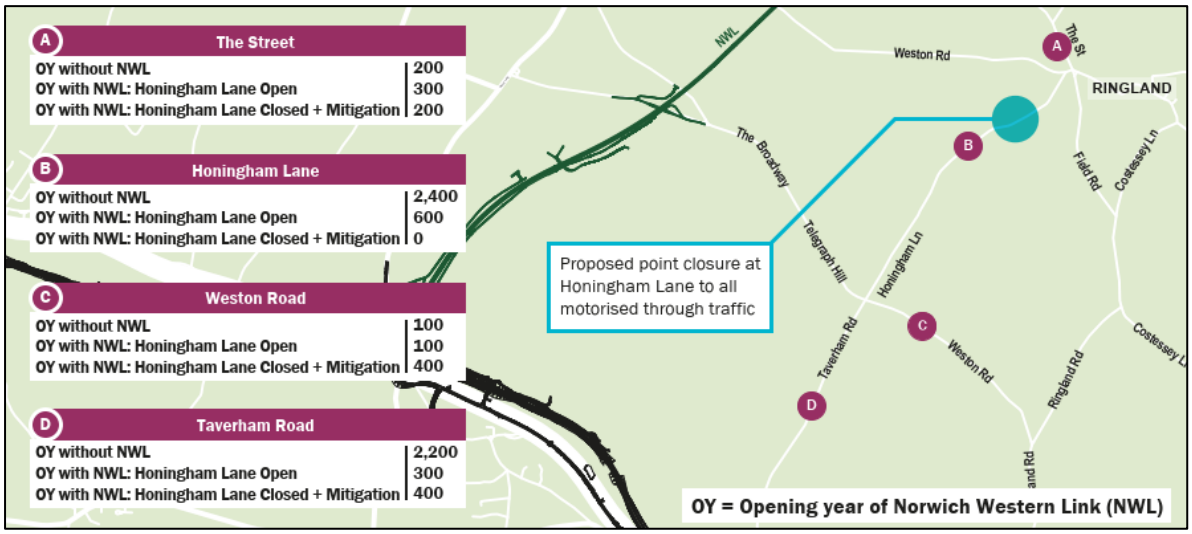
9.10 Honingham Lane Closure

9.10.1 Additionally, Honingham Lane is due to be closed temporarily as part of the A47 TUD scheme. This is intended to mitigate interim effects on Ringland

village between the opening of the A47 TUD scheme and the opening of the Proposed Scheme.

9.10.2 Following the temporary closure, a permanent point closure at Honingham Lane is also considered as an optional intervention within the mitigation package to prevent through access for motorised traffic. This is intended to provide priority to Non-Motorised Users as part of the Cycle Friendly Routes. Monitoring of traffic patterns will be carried out as a follow up measure once the Proposed Scheme opens to traffic to determine whether it is appropriate to retain this closure on a permanent basis. Monitoring within Weston Longville and Ringland will help to determine the effectiveness of this measure.

Figure 9-5 Honingham Lane Closure



9.11 Emerging Junction Improvements – J21

9.11.1 A separate scheme and feasibility study is currently being developed for Junction 21 by NCC in their role as Local Highway Authority to address a future baseline capacity issue which is expected to worsen without the Proposed Scheme in place. As shown in Section 8, without intervention, the junction is predicted to be significantly over capacity in the future DM scenario in 2039. The proposed mitigation for this junction involves widening the northern and southern arm of the junction to accommodate an increased

queueing capacity. A three-lane entry is proposed on Brewery Lane and Drayton Lane arms of the junction with extended sections of two-lane approaches for over 50m.

9.11.2 **Table 9-1** below shows the junction capacity results for the AM peak hour with the updated geometry as shown in **Appendix 10** (Document Reference 4.01.10)

Table 9-1 Junction 21 2039 AM Peak Hour (07:30-08:30)

J21 with LHA Junction mitigation scheme AM	**Brewery Lane (North)**	**Broadland Northway (East)**	**Drayton Lane (South)**	**Broadland Northway (West)**
2039 Do Minimum - RFC	0.67	0.49	0.47	0.70
2039 Do Something - RFC	0.75	0.54	0.44	0.83
2039 Do Something + Mitigation - RFC	**0.88**	0.57	0.48	**0.89**
2039 Do Minimum - Queue	2	1	1	2
2039 Do Something - Queue	3	1	1	5
2039 Do Something + Mitigation - Queue	5	1	1	8

9.11.3 The junction modelling for the A1270 Broadland Northway / B1149 Drayton Lane junction in the AM peak hour predicts an RFC of 0.70, which is below the design capacity of 0.85, and a queue length of 2 PCUs on Broadland Northway (W) for the DM scenario. The proposed layout is shown in **Appendix 10** (Document Reference 4.01.10).

9.11.4 In the DS scenario, the RFC on Broadland Northway (W) increases to 0.83 in the AM peak hour with an additional minor queuing less than 5 PCUs as a result of the Proposed Scheme. However, the junction would remain within its design capacity with RFCs below 0.85, so no further mitigation is proposed specifically in relation to the Proposed Scheme.

9.11.5 With the link flow mitigation in the wider network also in place for the DS+M Scenario, there would be additional impact on this junction as traffic is re-routed away from Felthorpe and instead stays on A1270. The RFC on the A1270 west arm would start to approach capacity with an RFC of 0.89 but would not exceed the RFC 1.0 absolute capacity threshold.

9.11.6 This level of operation is much better than without any intervention as set out in Chapter 8 above and despite the uplift in RFCs, queue lengths remain tolerable with only around 8 vehicles.

9.11.7 **Table 9-2** below summarises the predicted junction performance at the Broadland Northway / Drayton Lane junction in the 2039 PM peak hour.

Table 9-2 Junction 21 2039 PM Peak Hour (17:00-18:00)

J21 with LHA Junction mitigation scheme PM	Brewery Lane (North)	Broadland Northway (East)	Drayton Lane (South)	Broadland Northway (West)
2039 Do Minimum - RFC	0.27	0.66	0.51	0.46
2039 Do Something - RFC	0.29	0.71	0.49	0.58
2039 Do Something + Mitigation - RFC	0.26	0.77	0.53	0.66
2039 Do Minimum - Queue	0	2	1	1

J21 with LHA Junction mitigation scheme PM	Brewery Lane (North)	Broadland Northway (East)	Drayton Lane (South)	Broadland Northway (West)
2039 Do Something - Queue	0	3	1	1
2039 Do Something + Mitigation - Queue	0	3	1	2

9.11.8 In the PM peak hour, the model results predict a maximum RFC of 0.66 and queue of 2 PCUs on the A1270 Broadland Northway (E) arm without the Proposed Scheme in place.

9.11.9 In the DS scenario with the Proposed Scheme, the RFC on Broadland Northway (E) increases to 0.71 with a queue of 3 vehicles. This indicates that the junction would operate within its design capacity of 0.85 RFC in the PM peak hour. For the DS+M scenario, there is a slight increase in queue lengths and RFCs here, but the impacts of the Proposed Scheme are expected to be acceptable. Hence no additional mitigation is proposed in this location as part of the Proposed Scheme.

9.11.10 With the NCC LHA intervention scheme in place, this junction will operate with similar performance to existing junctions on A1270, with only one arm of the junction over 0.85 RFC which only arises in the DS+M scenario in the AM peak hour for a short duration with low levels of queuing, so no further mitigation is proposed to accompany the Proposed Scheme. However, the junction should be monitored once the Proposed Scheme opens to traffic.

9.12 Monitor and Manage Approach to Implementation of Mitigation

9.12.1 Several affected Parish Councils responded to the pre-application public consultation and changes have been made to the traffic mitigation proposals where appropriate to address local resident and stakeholder concerns. However, The Applicant will commit to the monitoring of traffic on a number of roads to determine the impact of actual traffic volumes following opening of

the Proposed Scheme. The Applicant will produce a monitoring plan ahead of the opening of the Proposed Scheme which details the locations and timescales for monitoring.

9.12.2 The outcome of the monitoring together with consultation with communities will inform the decision whether to proceed with the implementation of the prohibited right turns at the Holt Road/Shortthorn Road junction and access restrictions through Attlebridge. This 'monitor and manage' approach would not preclude the Applicant bringing forward elements of the traffic mitigation proposals before the opening of the Proposed Scheme if conditions on the network indicate they are needed.

9.12.3 Locations proposed for a monitor and manage approach to mitigation include:

- Station Road and Felthorpe Road, Attlebridge;
- Shortthorn Road, Felthorpe; and
- Other villages north of A1067 and south of A47 (indicative locations are traffic data points as shown in **Figures 9-3, 9-4** and **9-5** of this TA).

9.12.4 In some locations, traffic modelling shows differing junction capacity results depending on the extent to which the link flow traffic mitigation set out in **Figure 9-3** to **9-5** above is delivered. As set out in Section 8 of this TA, it is proposed that the following junctions would also be subject to a monitor and manage regime post opening of the Classified Road.

- J20 – A1067/Costessey Lane/School Road
- J21 Broadland Northway / Drayton Lane (further details provided in section 9.12 below); and
- J22a and J22b (A140/A1270 interchange).
- J29 - Junction 29 - Mill Lane / The Street / Taverham Road

9.12.5 The outcome of the monitoring and further requirements for mitigation at these junctions will be discussed and agreed with the Local Highway Authority in accordance with the Monitoring Plan.

10 Construction Traffic Impact

10.1 Introduction

10.1.1 The Principal Contractor will manage the logistics and construction effects during the construction period. This chapter provides an overview of the construction plans and assumptions on HGV and LGV/staff movements to site during the construction period as currently envisaged. Further work will be carried out to develop the construction details beyond the submission of the planning application.

10.1.2 At this stage an Outline Construction Environmental Management Plan (OCEMP) has been prepared as set out within **Appendix 3.1 of the ES** (Document Reference 3.03.01). The OCEMP provides the framework at this for developing the construction proposals and appropriate mitigation measures in more detail.

10.1.3 This TA has considered a most reasonable worst-case scenario for construction, based on a feasible methodology specified by the Principal Contractor at the time of preparing the planning application. This may be subject to some changes going forward. However, at this stage the likely construction effects have been considered and a mitigation strategy has been defined which can be developed further with more detail to be supplied within the Construction Traffic Management Plan which would form part of the full Construction Environmental Management Plan.

10.2 Construction Phasing

10.2.1 Construction of the Proposed Scheme is planned to take about 3 years from commencement, which is currently planned to start with enabling works in late 2025, main works in early 2026, so it is envisaged that the road would open to traffic in 2029.

10.2.2 The works will be carried out in phases, with appropriate traffic management measures in place to facilitate safe construction access. Measures and restrictions will also be put in place on the surrounding network to protect

members of the public from highway safety issues where there is increased risk of conflict with construction vehicles.

10.2.3 Public rights of way and roads crossing the scheme will be subject to temporary closures at times during construction in the interests of highway and public safety. Traffic management measures will be installed on the A1067 and locations close to the construction site accesses for the Proposed Scheme.

10.2.4 However, access will be retained where possible for those with land in the immediate vicinity of the site.

10.2.5 The construction works are split into four distinct sections, as shown in **Figure 10-1**, with the following main areas of work:

- A1067 Section;
- Viaduct;
- Mainline North; and
- Mainline South.

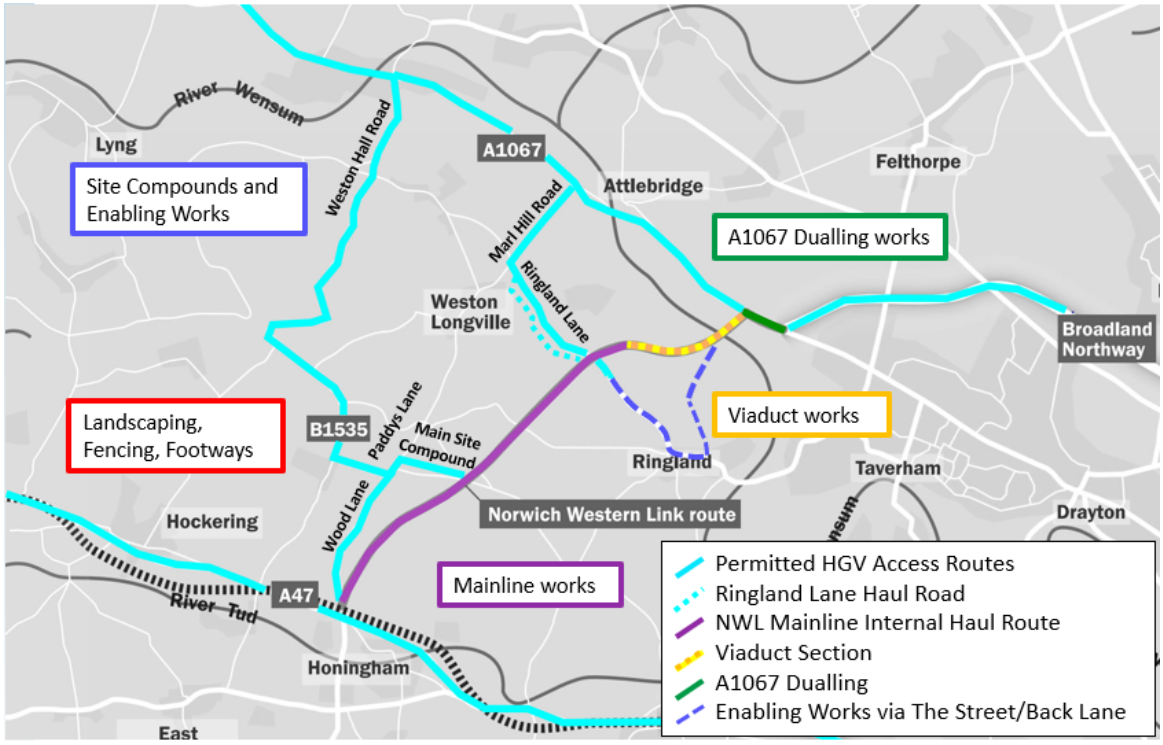
Figure 10-1 General Layout Sections

10.3 Permitted Access Routes During Construction

10.3.1 The main internal haul road will occupy the footprint of the Proposed Scheme main carriageway south of Ringland Lane. This will connect from the A47 Wood Lane junction to Ringland Lane, allowing materials to be delivered and moved, with minimal impact on the minor roads within the surrounding highway network. A temporary haul road will also be installed parallel with Ringland Lane to the south of the existing road.

10.3.2 The permitted construction traffic access routes are shown turquoise in **Figure 10-2**. The route shown are A47, A1067, A1270, B1535, Wood Lane, Paddy's Lane, Marl Hill Road and Ringland Lane.

Figure 10-2 Proposed Construction Access Routes



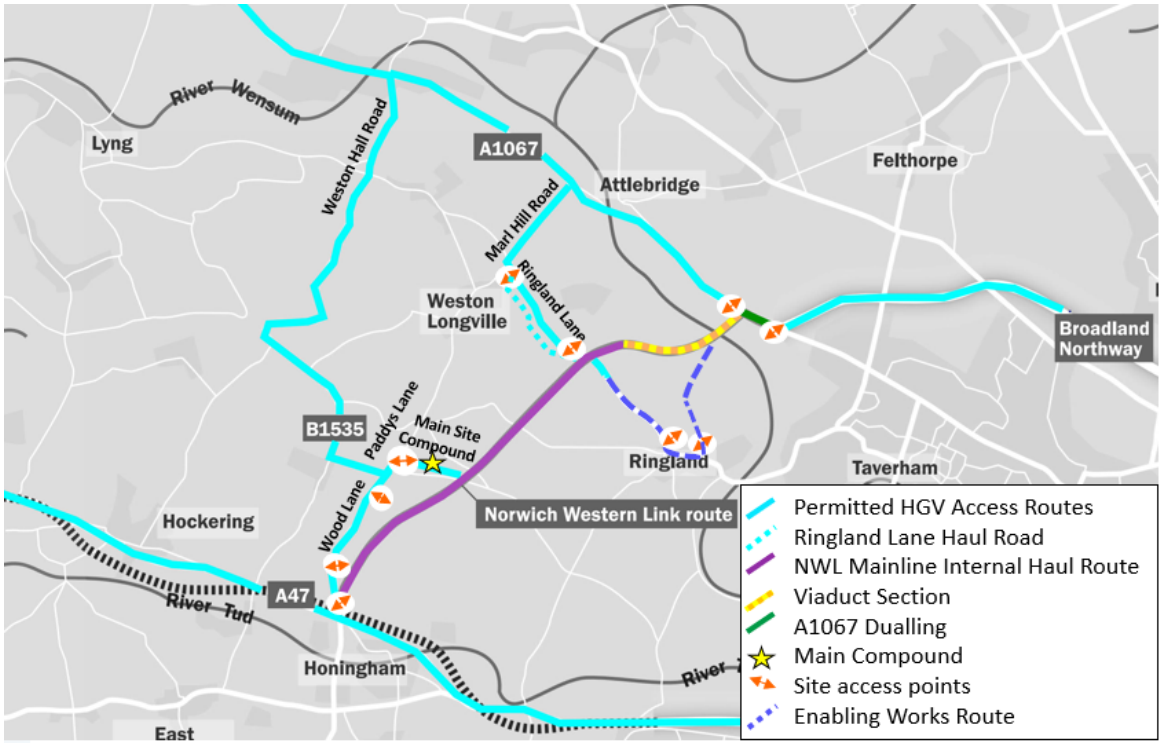
10.3.3 Enabling works will be carried out prior to the installation of the mainline internal haul roads and include activities in the floodplain between November 2025 and March 2027. This additionally requires temporary intermittent access via Back Lane. The enabling works activities include the following categories:

- Ecology Mitigation Measures
- Environmental Mitigation Measures
- Archaeology Mitigation Measures
- Installation of culverts and watercourse crossings
- Ground Investigation
- Site Trials
- Site Surveys

10.3.4 There are several site access points proposed for access to the main compound, satellite welfare facilities, and Ringland Lane haul road, these are listed below and shown in **Figure 10-3**;

- Direct access from A1067 close to the proposed new roundabout;
- Ringland Lane west of the Proposed Scheme (avoiding Ringland Village);
- Paddy's Lane between Breck Lane and The Broadway (main site compound);
- Directly from B1535 Wood Lane; and,
- Direct access from the new A47 TUD northern roundabout with B1535 Wood Lane.

Figure 10-3 Proposed Site Access Points



10.3.5 In the interests of highway safety, site access junctions may be controlled by traffic management measures such as temporary signals on approach to the site compounds. A Construction Traffic Management Plan will be developed containing further details of traffic management measures prior to construction.

10.4 Defining the Peak (Busy) Construction Period

10.4.1 For traffic impact purposes, the peak periods of construction (referred to below as the 'busy' periods to avoid confusion with the highway peak hours) are expected to occur for approximately six months during the construction of the temporary elevated works platform in the northern part of the route and a further six-month period for removal of the platform.

10.4.2 At other times, the construction site traffic is expected to be at a considerably lower magnitude; around 50% of the busy period traffic volumes. An assessment of construction traffic impacts is set out within this chapter based on the busy period scenario.

10.4.3 The busy periods are when the elevated works platform material and main carriageway earthworks materials are being imported to site and excavated arisings which cannot be re-used on site are transported to external sites for disposal. Re-use of arisings on site will be carried out wherever possible to achieve a balance of cut and fill. This will minimise the volume of material exported off-site.

10.4.4 An indicative high-level programme indicates that the busy period of construction would occur between March 2027 and October 2027 in the second year of works for installation of the platform and again between Quarter 1 and Quarter 2 the following year for removal.

10.4.5 An elevated works platform for construction of the viaduct will be installed temporarily during the first busy period in 2027 and removed on completion of the viaduct in the later peak period in 2029. The platform will consist of imported fill material suitable for heavy vehicle loadings as it will need to support heavy lifting operations for viaduct components throughout the construction of the northern section. Importing and exporting fill for this structure will represent the most intensive period of vehicle movement on the local highway network during construction. The associated vehicle movements related to this activity has informed the magnitude of traffic impacts assessed below. This is expected to offer a robust assessment.

10.4.6 Access to the northern embankment of the viaduct section will be from the A1067, and along a haul road at Ringland Lane created for construction; early works will be delivered via Ringland Lane with subsequent works from the A1067 through the construction works. During the south abutment construction elevated platform works, access to the viaduct south embankment will be through Marl Hill Road and Ringland Lane.

10.4.7 This assessment assumes all construction traffic associated with the temporary elevated works platform uses Marl Hill Road and Ringland Lane as a worst-case scenario. However, where possible the internal haul road will be used once available.

10.4.8 To minimise vehicle conflicts on Ringland Lane a haul road is proposed to the south of Ringland Lane. The proposed Ringland Lane haul road is proposed to be located coincident with the haul route proposed by Orsted Hornsea 3 project (known as HOW3). This is within the red line boundary of the Proposed Scheme extents.

10.4.9 Temporary localised widening of Marl Hill Road junction with A1067 is also being considered to safely accommodate two-way movement of large HGVs. This localised widening is expected to be achieved within the Proposed Scheme red line boundary which extends to the east of Marl Hill Road encompassing the Marl Hill Road cycleway works which form part of the NMU Provision shown in **Appendix 1** (Document Reference 4.01.01). Further south, construction vehicle movements could either be accommodated via a temporary haul road alongside Marl Hill Road or via additional passing bays.

10.5 Co-ordination of Works with Other Schemes

10.5.1 The mitigation of construction related activities has been considered during the planning stages of the project, involving discussions with NCC as Local Highway Authority and various local stakeholders including regular meetings with the other major project representatives which may be under construction in the area around the Proposed Scheme.

10.5.2 The Orsted Hornsea 3 (HOW3) and Equinor's Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and the Dudgeon Offshore Wind Farm Extension Project (DEP) are planned to be at various stages of construction at the same time as the Proposed Scheme. Co-operation agreements with the other major projects will be put in place to control overlap of construction traffic impact and specify project information sharing requirements amongst the various parties. Timings can be managed to minimise disruptions to other parties and local communities. It is noted that the wind farm projects are not anticipated to have any significant operational traffic, only traffic associated with construction. In combination effects during construction are considered

in more detail within the **ES Chapter 20 – Cumulative Effects** (Document Reference 3.20.00).

10.5.3 The Hornsea 3 Project (HOW3) is assumed to have an overall construction phase covering up to a five year timeframe from 2023 to 2028. However, the wind farm cable route traverses much of East Anglia, so the specific location around the Proposed (NWL) Scheme (between A47 and A1067) would be affected for a much shorter duration within this period. At the time of writing this TA, the HOW3 construction works have already commenced and are under construction crossing beneath the Proposed Scheme line of route in early 2024 with Horizontal Directional Drilling to be undertaken to install ducting below the Classified Road alignment. These works are likely to be substantially complete by Q2 2025 prior to commencement of the Proposed Scheme enabling works and main construction works.

10.5.4 Based on this programme, there is unlikely to be an overlapping period of construction. However, in the unlikely event of overlap in early 2026 (for example for cable pulling through the HDD ducts installed beneath the Proposed Scheme), construction traffic on the local network associated with the HOW3 project works is expected to be at least 50% lower than their assessed peak traffic volumes. In early 2026, the Proposed (NWL) Scheme would also have low levels of traffic movement during the mobilisation stage of the project, also with less than 50% of predicted peak NWL construction traffic volumes affecting the surrounding road network, so the combined effects would be no greater than those for the busiest earthworks period for the Proposed Scheme alone.

10.5.5 Regarding geographic scope of construction traffic access routes, for the HOW3 scheme this would be confined to A47, A1067, Marl Hill Road and Ringland Lane. The HOW3 project is unlikely to use B1535 Wood Lane as a construction access route, with HOW3 vehicles also approaching from the south via Taverham Road, whilst the Proposed (NWL) Scheme does not rely on Taverham Road for construction HGV access.

10.5.6 The HOW3 traffic flows on Ringland Lane are to be mitigated by a temporary Haul Road to the south. The total number of HOW3 vehicle movements predicted at Marl Hill Road during the Proposed Scheme works is shown below in Table 10-1 (these are based on 50% of the maximum flows set out in the HOW3 Construction Traffic Management Plan dated March 2023). The HOW3 data is listed in **Appendix 14** (Document Reference 4.01.14).

Table 10-1 HOW3 Maximum Daily Construction Flows, March 2023

Link ID	Link Description	Total	HGVs
110	A1067 through Great Witchingham and Attlebridge	134	45
111	A1067 from Attlebridge to outskirts of Norwich/Beech Avenue	190	52
119	Marl Hill Road and Ringland Lane from A1067 to cable route	0	49
121	Weston Road from Honingham Road to Cable Route	0	12
124	Honingham Lane from cable route to Taverham Road	0	5
125	Taverham Road from Honingham Lane to A47	70	34
126	Weston Road/Ringland Road from Honingham Lane to Church Lane	0	0
127	Church Lane to A47	0	22
128	A47 west of B1535 Wood Lane	168	88
129	A47 between B1535 and Taverham Road	168	88
130	A47 between Taverham Road and Church Lane/Dereham Road roundabout	0	5
131	A47 between Church Lane/Dereham Road roundabout and A1074 junction	0	53
137	A47 east from Norwich	219	19

10.5.7 A DCO application for the Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects (SEP and DEP) was submitted in September 2022 and is currently awaiting a decision which is scheduled for April 2024. The SEP and DEP schemes are expected to have an earliest start date in 2025. Depending upon whether SEP and DEP are delivered concurrently or

sequentially could have an overall construction duration of three to eight years (respectively).

10.5.8 Under some construction scenarios for SEP and DEP there may be an overlap with the Proposed Scheme's construction programme. It is therefore not possible to rule out overlapping effects. Hence for the purposes of a robust assessment, it is assumed within the cumulative assessment in **Chapter 19 of the ES** (Document Reference 3.19.00) that the worst case traffic demand associated with the peak construction phase for SEP and DEP would overlap during 2027 (second year) of the Proposed NWL Scheme peak construction works.

10.5.9 However, based on the time taken for the similar Orsted HOW3 scheme to commence following DCO approval in 2020 to construction in 2024, the SEP and DEP scheme is more likely to overlap with the Proposed Scheme in 2028 (assuming DCO approval in April 2024). It is therefore unlikely that the busiest construction period of both schemes will coincide.

10.5.10 Despite this, the 2027 scenario has been taken as the most realistic worst case scenario, with both SEP and DEP assumed to be delivered simultaneously, during the Proposed (NWL) Scheme busy period. The combined SEP and DEP scenario is also taken which involves higher magnitude traffic impacts than if SEP and DEP are each delivered in isolation. Maximum daily traffic movements for SEP and DEP have been taken from Annex A of the SEP and DEP Outline Construction Traffic Management Plan (Revision D) published in June 2023. These numbers are reproduced in the table below. An extract of the CTMP is shown in **Appendix 14** (Document Reference 4.01.14).

10.5.11 Regarding geographic scope of construction traffic access routes, for the SEP and DEP concurrent scenario, overlapping construction traffic with the Proposed Scheme would be confined to A47, A1067, A1270, Marl Hill Road and Ringland Lane. The SEP and DEP projects may also use Taverham

Road and Weston Road as a construction access route. Taverham Road would not be used by the Proposed Scheme for HGV construction access.

10.5.12 The Proposed Scheme construction traffic flows on Ringland Lane are to be mitigated by a temporary haul road to the south of the existing road, whilst the total number of peak vehicle movements predicted at Marl Hill Road would be mitigated by temporary localised widening close to the junction with A1067 and either a section of haul road on the east side or passing bays to create more space for HGVs to pass each other safely.

10.5.13 Ringland Lane would be closed temporarily to through traffic during construction as part of the Proposed NWL Scheme works for approximately one year. During this time, (if works coincide) The Principal Contractor would maintain access for the SEP and DEP works on the west side of the Proposed Scheme alignment. Access via the Broadway or Weston Road to the east of the Proposed Scheme would also be made available.

10.5.14 Measures are proposed by Equinor New Energy Ltd ("Equinor"), as lead developer of SEP and DEP, to mitigate the impact of construction traffic on narrow roads (typically less than 5.5m wide) where appropriate. This principle is set out within the Outline Construction Traffic Management Plan submitted as part of the DCO application Revision D, dated June 2023.

10.5.15 The final form of construction traffic mitigation measures would be agreed with the Local Highway Authority prior to the commencement of construction. At this stage, it is understood that measures could include localised road widening or provision of passing places or alternatively the use of temporary traffic management, such as the use of escort vehicles or 15 minute closures.

10.5.16 A summary of maximum daily flows affecting key links within the vicinity of the Proposed Scheme where construction movements may overlap is provided in Table 10-1 below for the combined SEP&DEP scenario.

Table 10-2 SEP & DEP Maximum Daily Construction Flows, June 2023

ID	Link Description	All Vehicles	HGVs
89	A47 from Wood Lane to Taverham Road	830	472
94	A47 from Blind Lane to Dereham Road	774	472
95	A47 from Dereham Road to A1074	925	417
90	Taverham Road	281	137
84	The Broadway / Unnamed Road	52	23
147	Breck Lane (Breck Road) / Weston Green Road	39	20
148	Weston Road	178	79
149	Unnamed Road	20	20
83	Church Street, Church Farm Close, Woodforde Close, Honingham Road, Paddy's Lane	192	0
82	Ringland Lane / Morton Lane	153	62
81	Marl Hill Road	243	62
143	Old Fakenham Road	285	77
79	A1067 from Marl Hill Road to A1270	419	129
78	A1270 from A1067 to Fir Covert Road	340	81

10.6 Co-ordination with A47 Works

10.6.1 The Applicant has worked closely with National Highways throughout the development of their DCO for the A47 TUD scheme which was approved by the Secretary of State for Transport in August 2022 and a Statement of Common Ground was prepared in relation to the Proposed Scheme.

10.6.2 Following a legal challenge to the DCO, a revised delivery programme is currently being developed by National Highways (NH) which takes into account a delay to the start of works in comparison with the published timescales following DCO approval. With the revised NH programme in place, some enabling works and utilities diversions have been completed in late 2023, with the main A47 offline highway works now expected to be delayed by a year due to additional Court of Appeal hearings which were held in the January 2024. For the purposes of this assessment, an early 2025 start date is now assumed for the NH A47 TUD Scheme.

10.6.3 NH have made an undertaking in their Outline Traffic Management Plan (DCO Document Reference TR010038/APP/7.5) to minimise disruption during construction and minimise the number of and duration of full closures.

10.6.4 The Proposed Scheme works are planned to commence in early 2026, by which time a revised temporary B1535 Wood Lane connection to A47 is expected to have been constructed by NH and open to traffic. The temporary B1535/A47 Wood Lane junction proposed by National Highways would offer an all movements layout approximately 820m west of the existing B1535 junction with A47 that is safer than the current staggered crossroads layout. It would also be separated from Berrys Lane south of A47.

10.6.5 Berrys Lane is assumed to be closed from spring 2025 to facilitate construction of the new Wood Lane junction. Diversion of the high pressure gas main which crosses the existing A47 at Berrys Lane has already been completed. The temporary Wood Lane junction is expected to provide a safe and suitable layout to be available for construction vehicles to adequately access the Paddy's Lane main construction compound and the temporary Proposed Scheme secondary construction access from Wood Lane south of its junction with Paddy's Lane.

10.6.6 Once the A47 TUD northern roundabout at Wood Lane is open to traffic, construction vehicles accessing the Proposed Scheme would be diverted to

use the main haul route within the Red Line Boundary, which will substantially reduce the number of vehicles accessing the site via Wood Lane.

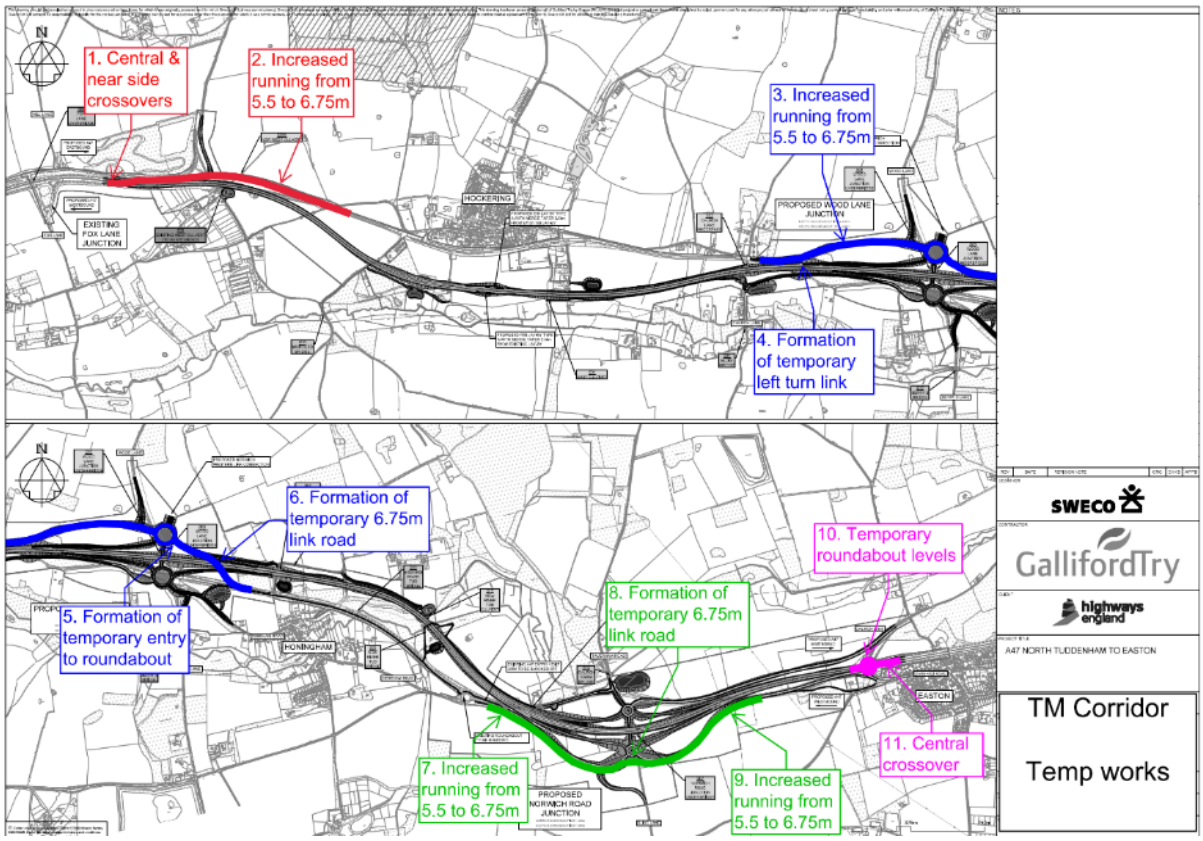
10.6.7 It is likely that the A47 mainline and Wood Lane grade separated northern roundabout junction would be open to traffic by spring 2027 in time for the Proposed Scheme busiest construction period (March 2027-October 2027).

10.6.8 As discussed with local parishes, Church Lane Easton will be closed by NH in the later stages of the A47 TUD construction about 16 months after the A47 main works commence. The timing of closure is intended to minimise the duration of traffic impacts on the village of Weston Longville between the opening of A47 TUD and opening of the Proposed Scheme.

10.6.9 The Applicant will continue to work closely and co-operate with NH to minimise disruption to the surrounding road network during the construction of the two schemes.

10.6.10 Regular coordination meetings have been held with the A47 project team as part of the design development process, and information sharing agreements have been signed. Further coordination meetings will continue to maximise co-operation between the two teams and to manage and communicate regarding deliveries to site.

Figure 10-4 A47 North Tuddenham to Easton Improvements Junction Phasing



10.7 Construction Traffic Impact

10.7.1 Construction related traffic has the potential to impact on local residents and the local environment surrounding the Proposed Scheme. Careful consideration of this has therefore been undertaken by the Contractor in developing its proposed construction methodology so that disruptions are minimised during the construction period.

10.7.2 Construction traffic for the Proposed Scheme is separated into contractor vehicles (personal vehicles for travelling to site, bringing tools and box vans) which fall under the Light Goods Vehicle (LGV) category, and Heavy Goods Vehicles (HGV) which are generally used for transporting materials and heavy machinery to and from site.

10.7.3 Construction routing has been discussed with NCC as the Local Highway Authority and avoids minor roads through residential areas, for both contractor vehicles and HGVs to minimise the disruption to local residents and local

environment throughout the construction period. These routes are outlined in **Figure 10-2** above.

10.7.4 Based on a review of likely construction material sources and discussions with the Contractor it has been assumed that for the majority of construction that the following split of construction vehicle movements will occur due to the location of internal haul roads and access to materials and construction activities. This is referred to as the Typical Day scenario;

- All traffic associated with the temporary elevated works platform will be routed via A1067, Marl Hill Road and Ringland Lane as a worst case scenario;
- 50% of all other construction vehicle arrival and departures will access the Proposed Scheme via the A47, of which 50% are assumed to approach from the east, and 50% would approach from the west; and
- 50% of all other construction vehicles will access the Proposed Scheme via the A1067 in the north, of which 66% will be from the east via A1270, and 33% would approach from the west via A1067 and B1535.

10.7.5 Two additional sensitivity tests have also been considered. Firstly a scenario which offers a worse case for Marl Hill Road, in the event that the A47 junction at Wood Lane is not available for HGVs temporarily. Secondly a sensitivity test with all earthwork movements for the northern section loaded onto Wood Lane (excluding the temporary works platform).

10.7.6 Enabling works within the floodplain will be routed via A1067, Marl Hill Road, Ringland Lane, The Street and Back Lane. The enabling works movements are expected to include very low numbers of HGV movements c5-6 per day on average in the peak enabling period of March 2026-October 2026 as shown in **Appendix 12** (Document Reference 4.01.12). This level of use is anticipated to be similar to typical farming activity during the harvest period. It

is also comparable to the levels of activity during previous Geotech intrusive site investigation.

Non-Motorised User impacts

10.7.7 In November 2021, a nine-day survey of non-motorised users was conducted where the Classified Road would cross existing roads and Public Rights of Way. Surveys were carried out at five locations, capturing existing movements of pedestrians, dog walkers, cyclists and equestrian users. The results of the survey are summarised in **Table 10-31**.

Table 10-3 NMU Survey – November 2021

Location	Pedestrians	Dog Walkers	Cyclists	Equestrian	Total (AM/PM Peak) 9-days	Average Daily Peak Hour users
Honingham RB1	0	0	0	0	0	0
The Broadway / Breck Lane (Breck Road)	4	1	1	0	6	1
Weston Road	14	6	6	0	26	3
Blackbreck Lane / Ringland Lane	11	9	21	1	42	5
Attlebridge FP5	2	0	32	0	34	4

10.7.8 Due to the rural nature of existing routes, it is anticipated that the majority of the above trips are recreational users and some may have been completing a circular walk at the time of the survey so the data may include some double counting. Based on the above NMU usage survey, it is evident that the existing NMU routes, especially Honingham RB1 and Ringland FP1 are infrequently used for non-essential trips such as recreational walking with no fixed destination and dog walking that can be diverted to other routes. In the interests of public safety it is anticipated that the impact of the construction on these users is of low severity and can be tolerated for a temporary period without a significant severance effect.

10.7.9 Alternative options for re-routing RB1 and FP1 have been considered and discussed with the NCC Public Rights of Way officer and it was found that no reasonably practicable and safe alternative routes could be readily offered during construction for RB1 and it would be unsafe to have members of the public travelling through a live construction site. The section of Ringland FP1 crossing the River Wensum would need to be closed temporarily during the construction of the viaduct. However, FP1 is in low usage and circular walks can still be completed in the area around Ringland via various other footpaths, so the impact is expected to be tolerable. The FP1 route would reopen on completion of the viaduct when it is safe to do so.

10.7.10 Traffic Management and appropriate mitigation measures such as reduced speed limits to minimise HGV impacts on Non-Motorised Users and conflicts with oncoming vehicles on the approach routes to construction site accesses will be agreed with the Local Highway Authority and specified within the CTMP.

Vehicular traffic impacts

10.7.11 The proposed construction traffic effects, based on the above assumptions are considered in comparison with the 2019 base year which is sooner than the peak period of construction in 2026 but offers a lower base flow against which to assess impact magnitude. basis for assessment . The total peak

hour vehicle flows during the busy period of construction have been added to the 2019 base year flows.

10.7.12 A flow diagram showing the average daily and peak daily construction traffic is enclosed in **Appendix 12** (Document Reference 4.01.12).

10.7.13 The projected busy period construction related vehicle movements have been assigned to the local network based on proposed construction routing and likely site access points.

10.7.14 The links that have been considered for analysis are shown in **Figure 10-3**. Construction traffic is assumed to use the Strategic Road Network on its journey to site via the A47, A1270 or A1067 which function as part of the primary route network and are suitable for HGV movements. The assessment focusses on the links in close proximity which offer access to the construction site in the immediate vicinity of the Proposed Scheme.

10.7.15 The peak hour construction traffic flows for both AM and PM peak periods are shown in Table 10-4. This shows that Ringland Lane and the Paddy's Lane Site Access points are expected to experience high percentage increases in HGV and LGV movements but these are the proposed locations of the main site accesses for construction traffic, so cannot be avoided. However, these locations are not immediately adjacent to residential properties and other sensitive land uses such as schools or residential care homes, so are not considered to be sensitive links.

Table 10-4 Construction Traffic – Busy Period Maximum Daily Vehicle Movements (two-way) – Typical Day Scenario

Busy Period Daily Movements	LGV	HGV	Total per day
A1067 (West of Marl Hill Road)	28	184	212
A1067 (East of Marl Hill Road)	54	366	420
A1067 (site access)	40	184	224

Marl Hill Road	40	366	406
Ringland Lane main carriageway (site access)	20	183	203
Ringland Lane (Haul Road)(site access)	20	183	203
Wood Lane>Paddy's Lane (site access)	82	88	170
A47 roundabout (site access)	40	44	84
A47 (West of Wood Lane)	60	66	126
A47 (East of Wood Lane)	60	66	126

10.7.16 The 2-way busy period total daily flows for HGVs, LGVs and total vehicles on a typical day during the platform construction and earthworks phase, as a result of construction of the Proposed Scheme, is provided in **Table 10-4** above.

10.7.17 A 10-hour working day is assumed, with an equal hourly split of HGV movements throughout the day. However, LGV and workforce arrivals and departures are more likely to occur in a two hour period at the start and end of the day, with 50% assumed to arrive or depart in each of the AM and PM peak highway hours.

10.7.18 To understand the relative impacts of the construction traffic increases, the additional construction traffic volumes have been added to and compared with the base year 2019 modelled traffic flows.

10.7.19 Based on this analysis it is evident that the effects of the construction traffic movements on the strategic 'A' roads would be similar to typical daily variation of traffic (+/- 10%), so would be a tolerable temporary impact that is unlikely to cause concern or create significant operational effects on the network.

10.7.20 Wood Lane B1535 is forecast to experience an increase of about 28% in traffic during construction in the peak hours. This road is the current designated HGV route in the west of Norwich prior to the opening of the Proposed Scheme and there are very few residential properties close to this route so it is capable of tolerating the anticipated level of additional HGV movement during construction at the busiest times. The effects of construction are expected to be managed adequately with the appropriate traffic management, scheduling and monitoring, in accordance with the measures contained in the Outline Construction Environmental Management Plan which would be developed in detail post planning approval via a planning condition.

10.7.21 Despite a high percentage increase at Ringland Lane over the 2019 baseline, there is a low base flow, so it is more meaningful to consider the link flow totals in absolute terms in the context of likely theoretical link capacity. Traffic Advisory Leaflet TAL 2/04 published by DfT indicates that a single lane with passing places can be considered to have a theoretical link capacity of about 300 vehicles per hour. With the proposed increase in construction traffic added to the 2019 observed flows, this route remains below the 300 vehicles per hour threshold, so is not expected to exceed capacity. The proposed haul road will also minimise HGV conflicts.

10.7.22 Paddy's Lane is the access to the main site compound, so naturally sees a projected increase that is significant in percentage terms when compared to the 2019 base year flow. Again, this link has relatively low base flows and no sensitive residential receptors adjacent to the road south of the compound access and the road has no footways which makes it unattractive to NMUs, so is not likely to cause disturbance to local residents or present a risk to members of the public. Hence a review of the absolute increases in traffic suggests that the hourly flows would be less than 300 two way movements in a peak hour. This road is wider than Ringland Lane with availability of two way movement, so is expected to operate acceptably. The effects on these routes would be relatively short term and temporary during construction.

Table 10-5 AM Peak Hour Construction Traffic Impact (Two-Way all vehicles – HGV, LGV, Staff) – Typical Day

Link	2019 Observed AM Peak	AM Construction Flow	2019 AM Total	% Increase compared to 2019 AM flow
A1067 (East of Marl Hill Road)	1,367	54	1,421	4%
A1067 (West of Marl Hill Road)	1,200	27	1,227	2%
Marl Hill Road	301	50	351	17%
Ringland lane	62	30	92	48%
Ringland lane (Haul Road)	N/A	20	N/A	N/A
Paddy's Lane	205	31	236	15%
Wood Lane	347	31	378	9%
A47 (East of Wood Lane)	2,047	23	2,070	1%
A47 (West of Wood Lane)	1,940	23	1,963	1%

Table 10-6 PM Peak Hour Construction Traffic Impact (Two-Way all vehicles – HGV, LGV, Staff) – Typical Day

Link	2019 Observed PM Peak	PM Construction Flow	2019 PM Total	% increase on 2019 flow
A1067 (East of Marl Hill Road)	1,367	64	1,431	5%
A1067 (West of Marl Hill Road)	1,200	31	1,231	3%
Marl Hill Road	301	60	361	20%
Ringland lane	62	25	87	40%
Ringland lane (Haul Road)	N/A	35	N/A	N/A
Paddy's Lane	205	21	226	10%
Wood Lane	347	21	368	6%
A47 (East of Wood Lane)	2,047	15	2,062	1%

Table 10-7 AM Peak Hour Construction Traffic Impact (Two-Way all vehicles – HGV, LGV, Staff) – Marl Hill Sensitivity

Link	2019 Observed AM Peak	AM Construction Flow	2019 AM Total	% Increase compared to 2019 AM flow
A1067 (East of Marl Hill Road)	1,367	64	1,431	5%
A1067 (West of Marl Hill Road)	1,200	31	1,231	3%
Marl Hill Road	301	60	361	20%
Ringland lane	62	35	97	56%
Ringland lane (Haul Road)	N/A	25	N/A	N/A
Paddy's Lane	205	21	226	10%
Wood Lane	347	21	368	6%
A47 (East of Wood Lane)	2,047	15	2,062	1%
A47 (West of Wood Lane)	1,940	15	1,955	1%

Table 10-8 PM Peak Hour Construction Traffic Impact (Two-Way all vehicles – HGV, LGV, Staff) – Marl Hill Sensitivity

Link	2019 Observed PM Peak	PM Construction Flow	2019 PM Total	% increase on 2019 flow
A1067 (East of Marl Hill Road)	1,367	64	1,431	5%
A1067 (West of Marl Hill Road)	1,200	31	1,231	3%
Marl Hill Road	301	60	361	20%
Ringland lane	62	25	87	40%
Ringland lane (Haul Road)	N/A	35	N/A	N/A
Paddy's Lane	205	21	226	10%
Wood Lane	347	21	368	6%
A47 (East of Wood Lane)	2,047	15	2,062	1%

Table 10-9 AM Peak Hour Construction Traffic Impact (Two-Way all vehicles – HGV, LGV, Staff) – Wood Lane Sensitivity

Link	2019 Observed AM Peak	AM Construction Flow	2019 AM Total	% Increase compared to 2019 AM flow
A1067 (East of Marl Hill Road)	1,367	44	1,411	3%
A1067 (West of Marl Hill Road)	1,200	21	1,221	2%
Marl Hill Road	301	40	341	13%
Ringland lane	62	25	87	40%
Ringland lane (Haul Road)	N/A	15	N/A	N/A
Paddy's Lane	205	39	244	19%
Wood Lane	347	39	386	11%
A47 (East of Wood Lane)	2,047	29	2,076	1%
A47 (West of Wood Lane)	1,940	29	1,969	1%

Table 10-10 PM Peak Hour Construction Traffic Impact (Two-Way all vehicles – HGV, LGV, Staff) – Wood Lane Sensitivity

Link	2019 Observed PM Peak	PM Construction Flow	2019 PM Total	% increase on 2019 flow
A1067 (East of Marl Hill Road)	1,367	44	1,411	3%
A1067 (West of Marl Hill Road)	1,200	21	1,221	2%
Marl Hill Road	301	40	341	13%
Ringland lane	62	15	77	24%
Ringland lane (Haul Road)	N/A	25	N/A	N/A
Paddy's Lane	205	39	244	19%
Wood Lane	347	39	386	11%
A47 (East of Wood Lane)	2,047	29	2,076	1%

10.8 Road Safety Impact during construction

10.8.1 A review of Personal Injury Accidents in the last five years has been carried out for the construction access routes set out above. Existing safety issues at the A47 Wood Lane junction are assumed to have been adequately addressed by the A47 TUD scheme prior to the Proposed Scheme construction works commencing.

10.8.2 The Wood Lane junction would either be replaced by a grade separated dumbbell roundabout junction which would be greatly safer than the existing crossroads layout, or a revised temporary at grade layout would be in place, with increased distance from Berrys Lane about 800m west of the existing junction.

10.8.3 Several accident clusters were identified across the network in the review of existing conditions as highlighted in Chapter 5 of this TA. Potential impacts on accident cluster sites during construction are set out below. It should be noted that all of these sites were classified based on the frequency of accidents only. However, all of the accidents recorded were of slight severity and no serious or fatal accidents occurred in these locations over the five years considered in the review.

Table 10-11 Construction Traffic Impacts on Accident Clusters

Accident Cluster Location	Total Accidents recorded in most recent five year period	Commentary on Potential Construction Effects and Mitigation
1 - A47/Church Lane/Sandy Lane	5	This junction will be removed as part of the A47 TUD National Highways works
2 - A47/Church Lane/Dereham Road	12	This junction will be removed as part of the A47 TUD National Highways works

Accident Cluster Location	Total Accidents recorded in most recent five year period	Commentary on Potential Construction Effects and Mitigation
3 - A47/William Frost Way/A1074 Dereham Road	9	This junction will be under control of National Highways during construction. Proposed Scheme traffic is not assumed to be routed through the roundabouts at this junction.
4 - William Frost Way/Alex Moorhouse Way/Ernest Gage Avenue	5	Proposed Scheme construction traffic would not be routed via this junction.
5 - A1270 Broadland Northway/Drayton Lane/Brewery Lane	7	NCC are progressing a separate improvement scheme for this junction.
6 - Shortthorn Road / B1149 Holt Road	6	Proposed Scheme construction traffic would not be routed via this junction.

10.8.4 Traffic management measures will be imposed on A1067 during construction of the Proposed Scheme – this is likely to include signal control at junctions and a temporary reduced speed limit will be put in place. These measures should minimise safety risks for users and construction workers on A1067.

10.8.5 There have been Personal Injury Collisions on A1067 between Marl Hill Road and Lenwade in the last five year period, including at the junctions of Marl Hill Road and A1067 plus the B1535 junction with Porter's Lane and A1067. These two junctions may experience increased turning movements during construction. It is anticipated that a temporary reduced speed limit restrictions would be introduced on A1067 from Attlebridge to A1270 with enforcement cameras in the interests of highway safety. Temporary traffic signals may also be required at Marl Hill Road and B1535 junctions with A1067 and the Marl

Hill Road approach to the junction may need widening to prevent HGV vehicles blocking back into A1067.

10.9 Construction Traffic Impacts and Mitigation

Mainline North Section

10.9.1 The northern section of the route has a relatively low population catchment and existing routes are in low usage. The key highway safety risk is that Ringland Lane and Marl Hill Road have existing width constraints that may lead to conflicts between HGVs. However, a haul road is proposed parallel with Ringland Lane to mitigate this. Localised widening of Marl Hill Road junction with A1067 and passing bays or an adjacent haul road are also proposed to prevent HGV conflicts.

10.9.2 A reduced speed limit would also be required. This is possible to achieve within the extents of the Proposed Scheme boundary. Pinch points with give way features would also be introduced so that HGVs do not attempt to pass each other at unsafe locations.

Mainline South Section

10.9.3 Construction traffic will take access initially via a temporary revised Wood Lane junction to be installed by National Highways and later the proposed A47 grade separated junction with B1535 once available. These routes are already suitable for HGV traffic and the Wood Lane junction would have a revised layout in either the temporary or permanent situation which would mitigate safety risks for access to the site.

10.9.4 Traffic management measures such as temporary signals will be considered for other site access points at Wood Lane and Paddy's Lane in the interests of highway safety. The main internal haul road within the site will assist with containing movement of personnel and materials within the controlled compound areas which are not publicly accessible and located away from residential properties.

10.9.5 Advanced warning signs in Ringland and Weston Longville would be installed on the public highway to advise of temporary closures to inform drivers when Ringland Lane is closed. VMS signs on the wider highway network on approach routes via the A47 and A1067 and A1270 would also provide advanced warning or changes to local access during the works.

10.10 Construction Environmental Management Plan

10.10.1 To mitigate the traffic and transport effects of the construction of the proposed development, the full CEMP will include a Construction Traffic Management Plan (CTMP). As set out within the **OCEMP Appendix 3.1 of the ES** (Document Reference 3.03.01) the full CEMP and associated CTMP will be secured by planning condition. The full CTMP will set out measures that the contractor will be required to comply with, including:

- Construction Traffic Routing Restrictions;
- Finalised maximum daily vehicle flows for HGVs and LGV movements
- Details of abnormal loads planned
- Hours of operation;
- Site Clearance;
- Vehicle Cleaning Facilities;
- Site Access and Amenities plan;
- Contractor parking;
- Construction Period, Phasing and Hours of Site Operation;
- Laydown areas;
- Scheduling; and
- Monitoring and Review.

10.11 Diversion of Local Highway Users During Construction

10.11.1 The Proposed Scheme crosses several existing roads (The Broadway, Breck Road, Weston Road and Ringland Lane) so at times during construction it will be necessary to close off some of those routes to vehicles and Non Motorised Users in the interests of public safety. These routes are in low usage currently, with less than 1,000 users per day crossing the Classified Road observed in previous surveys in total across all of the existing routes. Hence, the diversion of existing east-west traffic movements to alternative routes should not have a significant impact. The majority of vehicle users would divert to either A1067 or A47 which are capable of carrying this level of additional traffic on a parallel alignment.

10.11.2 The Broadway, Breck Road and Weston Road are proposed to be closed to public vehicle users permanently as part of the Side Road Orders, although will need to be closed temporarily to all users during construction prior to the alternative Non-Motorised User routes and permanent diversion routes being constructed.

10.11.3 Ringland Lane, will be closed for about one year during construction. The Broadway will offer an alternative route during this time for NMUs only and a small number of authorised vehicles.

10.11.4 Public Rights of Way closures for FP1 and RB1 will also be required throughout the construction phase in the interests of public safety.

10.11.5 The detail of arrangements to be made for diversions and temporary closures of Public highways and Rights of Way crossing the scheme at the appropriate time will be taken forward via the Temporary Traffic Regulation Order (TTRO) process.

10.12 A1067 Traffic Management Measures

10.12.1 In relation to the A1067 works, traffic management (TM) and a temporary speed limit reduction will be in place, whilst the dualling works are being

carried out and access to the construction site is taken from A1067 at the location of the proposed new roundabout.

10.12.2 Whilst the proposed online dualling works are undertaken, users of the A1067 will be provided with a localised diversion via a temporary re-alignment of the road from A1270 junction, passing Hall Farm on a parallel alignment to avoid the need to fully close the road.

10.13 Abnormal and Indivisible Loads

10.13.1 Abnormal and Indivisible Loads, for example viaduct sections and crane installation equipment, would need to arrive and depart from site at times of day when the local highway network is otherwise uncongested and specifically avoiding busier highway periods of 7am-10am and 3pm-7pm on weekdays and 10am-4pm on Saturdays. Overnight or weekend delivery of abnormal loads will be carried out where possible to minimise conflicts with other road users from a highway capacity and safety point of view.

10.13.2 Any such abnormal loads would need to be routed via the SRN (Strategic Road Network) and the internal haul road south of Ringland Lane or via A1270 and A1067. Ringland Lane, Marl Hill Road and B1535 south of Paddy's Lane will be considered for abnormal load deliveries. However, a specialist abnormal loads contractor assessment would need to be carried out on the suitability of the routes prior to finalising any applications for abnormal loads.

10.13.3 Where possible the number and category of abnormal loads would be minimised by dividing loads into smaller components and assembly on site will also be considered.

10.13.4 The movement of large (abnormal) loads is regulated by National Highways and will be subject to separate agreement with the relevant highway authorities and police through the Electronic Service Delivery for Abnormal Loads (ESDAL) system.

10.13.5 The contractor will be required to comply with regulations and consult with the relevant highway authority, bridge owners, and the police as required by those regulations.

10.13.6 The contractor must give sufficient advance warning to obtain the necessary clearances from the police, highway, and bridge authorities. Those abnormal loads applications falling under the Special Order category must be completed ten weeks before the scheduled date of the move.

10.13.7 The notification requirements differ depending on the weight, length, and width of the abnormal loads which will be determined prior to making an application.

10.13.8 Prior to notification, the contractor will carry out topographical surveys, swept path analysis and condition surveys as required to plan and inform the application process.

10.13.9 The delivery of abnormal loads would typically be undertaken in convoy and under escort. Where abnormal loads require the full width of the carriageway or for unusual manoeuvres at junctions, appropriate temporary road closures and traffic management will be put in place as appropriate to maintain the safety of other road users and minimise delay.

10.13.10 Where abnormal loads movements to the Proposed Scheme are planned to occur outside of core working hours, and in areas of high sensitivity (i.e. through residential areas or in close proximity to residential properties), the need for additional specific management measures, their nature, locations and timings will be discussed and agreed with the Highway Authority and the relevant planning authority environmental health officer.

10.14 Sustainable construction and re-use of materials on site

10.14.1 In the interests of sustainable construction, there is a need to re-use excavated earthwork material on site, where it is suitable for re-use. The design and constructability of the Proposed Scheme has been considered seeking to minimise the need to import or export material. Excavated material

will be stockpiled on site and moved within the site using the internal haul road where possible. Sustainable waste management practices will also be employed on site to minimise the off-site movements required to dispose of materials.

10.15 Minimising Construction Staff Travel to Site

10.15.1 A Construction Worker Travel Plan would be developed in order to manage staff travel to site. The Contractor will consider options such as the provision of a shuttle bus or initiatives to promote car sharing as reasonably practicable. The suitability of this as a solution depends on worker home locations. Where possible staff will car share to minimise the number of LGV vehicles travelling to and from site and optimise the space on site needed for vehicle parking. This will also help minimise traffic impacts of worker travel to site. Due to the site operating hours and shift patterns, peak hours for staff travel to site are likely to occur outside of the AM and PM highway peak hours on the surrounding road network so would be unlikely to adversely impact the network peaks.

11 Summary and Conclusions

11.1 Summary

11.1.1 A Transport Assessment (TA) has been prepared for the Proposed Scheme to consider the traffic and transport implication of the Proposed Scheme on the surrounding highway and multi-modal transport network. The scope of the Transport Assessment was discussed with the Local Highway Authority and National Highways.

11.1.2 The approach is aligned with DfT Circular 01/22. The scheme was found to accord well with the aims of the Safe, Sustainable Development Guidance 2022 as summarised below in **Table 11-1**.

Table 11-1 Alignment with NCC Safe Sustainable Development Guidance

Number	Aim	Scheme Fit
1	**Climate change & Net Zero** - New development and its travel impacts need to contribute to the county council's commitment to decarbonisation.	The Proposed Scheme supports the decarbonisation agenda by including Non-Motorised User provision and additional Complementary Sustainable Transport Measures are identified within the Sustainable Transport Strategy (Document Reference **4.02.00**)
2	**Transport Sustainability** - Minimising travel to ensure people can access facilities they need by appropriate transport modes, encouraging walking, cycling and public transport use and reducing the use of private cars especially for shorter journeys	Methods to encourage walking, cycling and public transport use are outlined within the Sustainable Transport Strategy (Document Reference **4.02.00**).
3	**Transport Sustainability** - To encourage residents to explore active and healthier ways to travel.	The Proposed Scheme includes a comprehensive Non-Motorised User Provision which enhances opportunities for walking, cycling and active travel as shown in **Appendix 1** (Document Reference **4.01.01**).
4	**Rural Diversification** - To support agricultural enterprises and the rural economy, by encouraging other appropriate forms of development.	By providing a more suitable highway alignment for large vehicle movement, access to rural farms will be enhanced. The retention of Ringland Lane for all users enables rural access to be maintained. Green bridges provided within the Proposed Scheme also enable agricultural access.

Number	Aim	Scheme Fit
5	To support national targets relating to the percentage of electricity that should be provided by renewable energy	Not applicable
6	To keep commercial vehicles away from areas where their presence would result in danger/unacceptable disruption to the highway/or cause irreparable damage.	The Proposed Scheme provides a more suitable alternative for large commercial vehicles to access destinations across Norwich and better access to the north of Norwich from the west – enabling more efficient supply chain for businesses on the North Norfolk Coast. A more direct route between A47 and A1270 on the west side of the city will also reduce travel distances for HGVs and improve journey times, reducing traffic on the southern A47 bypass and making more use of A1270 whilst minimising travel through minor rural routes.
7	Development needs to be serviced in a safe manner which does not result in any detriment to the free flow of traffic or public safety. In accordance with the NPPF, it also needs to allow for the efficient delivery of goods.	The Proposed Scheme will improve the efficiency of commercial deliveries in the west of Norwich by providing enhanced capacity between the Major Road Network and Strategic Road Network.
8	To ensure development conforms to parking policies and standards which take into account strategic and local objectives.	Not applicable

Number	Aim	Scheme Fit
9	To ensure the Major Road Network and Principal Road Network (PRN) can safely cater for sustainable development, which, if not suitably addressed, would otherwise cause fundamental road safety and accessibility concerns.	The Proposed Scheme supports the Transport for Norwich Strategy, the GNLP and LTP which have been developed to sustainably accommodate growth across Norwich. Providing additional highway capacity on the west side of Norwich enhances emergency access, especially in close proximity to NNUH and Fire and Rescue headquarters. It also offers improved resilience of the network and alternative route options in the event of emergencies such as flooding and collisions.
10	New development within Norfolk of regional/national importance shall promote the use of rail and water.	The proposed scheme is remote from the railway but provides opportunities for improved and more direct access to the Norfolk Coast.

11.1.3 Applicable local and national transport and sustainable development policies have been reviewed and taken into account within the assessment. These include NPPF 2023 and recently published DfT guidance such as Decarbonisation of Transport and Gear Change as well as local policies such as the Transport for Norwich Strategy, LCWIP and BSIP which are enshrined within the **Sustainable Transport Strategy** for the scheme (Document Reference 4.02.00).

11.1.4 There are a number of existing transport problems that the Proposed Scheme has been developed to address. These can be summarised as follows:

- There is no existing direct Major Road Network link between A47 and A1270 on the west side of Norwich that is suitable and efficient for the forecast levels of strategic traffic and HGV movement.

- There are a limited number of existing bridges crossing the River Wensum on the west side of Norwich and the majority of these are physically and geometrically constrained and unsuitable for HGVs or high volumes of traffic. Hence a more suitable crossing is required.
- Existing minor rural roads through communities such as Weston Longville and Ringland would continue to be used by through traffic and commercial vehicles seeking to move between the A47 and A1270 on the west side of Norwich. This makes the minor roads less attractive for non-motorised modes for local journeys.
- With the A47 North Tuddenham to Easton dualling scheme in place, impacts on local communities will be exacerbated as the number of available routes will be reduced, so impacts will be more focussed on the remaining routes. This effect is not expected to be able to be mitigated sustainably in the longer term, with a new strategic road such as the Proposed Scheme.
- Journeys between the A47 and A1270 would continue to use the less direct and inefficient via the B1535 route from A47 to A1270.
- Existing priority junctions on A1067 will reach capacity in the future.
- There will be increased pressure on the A47 southern bypass and it will become more difficult for traffic from central Norwich to access junctions on the Strategic Road Network along the southern bypass.
- Constrained routes with residential frontages and school accesses through the urban fringe of Norwich for example via Costessey, and Taverham will receive additional orbital traffic, which could be more appropriately accommodated on a purpose-built route.
- Collision risks are expected to increase as drivers are enticed to travel on routes through rural minor roads with constrained highway geometry in response to congestion on other longer routes. Conflicts with

opposing flows on narrow routes will increase and gaps in traffic at key junctions will reduce without additional strategic highway capacity.

11.1.5 A Traffic Impact Assessment has been carried out to understand the more widespread effects of the scheme in terms of traffic redistribution across Norwich, strategic modelling has been used to inform the TA. A strategic transport model has assessed the potential rerouting of traffic in response to the scheme and this has been used to identify whether any measures are necessary to mitigate the traffic impacts of the scheme.

11.1.6 The Norwich Area Transport Strategy (NATS) SATURN Model was updated to a 2019 base year with comprehensive surveys across Norwich carried out in October 2019. The NATS model shows how traffic will be likely to re-route and alter existing journey patterns to access the Classified Road. The model is validated to achieve the required DfT TAG compliance standard.

11.1.7 Turning movement data has been extracted and reviewed for each of the junctions within the TA scope and individual junction models have been prepared for the 2039 future year to understand how the highway network performs with and without the Proposed Scheme in place.

11.1.8 The Do Something (DS) scenario has been developed which includes the Proposed Scheme only. Off-site transport mitigation proposals are added to Do Something +Mitigation (DS+M) Scenario, further details are included in Appendix 10 (Document Reference: 4:01.10). The mitigation measures considered within this TA take into account public feedback on the Proposed Scheme as presented in August-October 2022 has been taken into account and addressed within the strategic modelling. A follow up consultation was held with residents of Attlebridge and adjacent parishes with a revised proposal. The proposal to impose an access restriction through Carleton Forehoe has also been amended, so that speed management proposals are proposed instead. This will remove the need for road closure. A monitor and manage approach is proposed to identify appropriate points for the implementation of mitigation measures, so that mitigation measures can be

drawn upon when they are needed, rather from day 1 of Proposed Scheme opening. This approach was discussed with local communities following the 2022 public consultation.

11.1.9 The DS scenario with and without mitigation has been compared with a Do Minimum (DM) scenario that is based on the most likely future situation expected for the surrounding highway network without the Proposed Scheme in place.

11.1.10 The DM baseline forecast includes committed developments that are near certain or more than likely and the traffic modelling has been updated to take into account relevant growth locations identified within the Greater Norwich Local Plan (GNLP) for housing and employment within the latest DfT dataset known as NTEM 8.0. To understand the status of planned developments an Uncertainty Log was developed in consultation with the local planning authorities.

11.1.11 The baseline DM highway network considered within the assessment include the National Highways proposals for the A47 TUD scheme, A11 Thickthorn Junction Improvements and A47 North Burlingham to Blofield Improvement scheme, all of which have a DCO approval in place. Delays to the construction of these schemes of one year are assumed due to legal challenges that have been encountered. At the time of writing this TA a revised programme has yet to be published by NH. However, for operational modelling purposes all of these nearby schemes are expected to be in place and open to traffic by 2029 when the Proposed Scheme opens to traffic.

11.1.12 The TA considers a design year of 2039 which is 10 years after opening for consistency with the Local Transport Plan 4 which was recently adopted by NCC and has a horizon year of 2036. The GNLP also has a similar horizon date of 2038. Therefore, the majority of committed growth planned that is near certain or more than likely is anticipated to be under development or completed by 2039.

11.1.13 Junction capacity testing has been carried out for both the DS and DS+M scenario. The DS+M includes an additional package of measures north of A1067 and south of A47, plus permanent closure of Honingham Lane. These measures help to reduce the effects on local communities of re-routing traffic in response to the Norwich Western Link. However, in case the mitigation measures are unable to proceed, the Do Something without Mitigation (DS Scenario) is also considered in this TA.

11.2 Key findings

11.2.1 The detailed junction assessments demonstrate that the vast majority of junctions within the TA scope are found to operate within capacity in the 2039 future year 10 years after opening of the Proposed Scheme, with at least 18 junctions receiving traffic reduction as a result of the Proposed Scheme. These include Marl Hill Road junction with A1067, B1535 Weston Hall Road junction with A1067 and Longwater Lane junction with Dereham Road.

11.2.2 Strategic traffic modelling also shows that several of the junctions on the A47 southern bypass around Norwich will have improved capacity performance with the Proposed Scheme in place, as traffic is more easily able to divert via A1270 Broadland Northway, with improved access from the west via the new Classified Road link.

11.2.3 There are a small number of junctions where there are slight increases in traffic, queues and delays as a result of the Proposed Scheme, but queue lengths remain acceptable, so no further junction capacity mitigation is proposed.

11.2.4 Junction 21 (B1149/A1270 junction) is shown to operate significantly over capacity in the DM situation. However, a mitigation scheme has been identified by the LHA to tackle this future year issue which is unrelated to the Proposed Scheme. With the mitigation scheme in place, the junction is shown to operate with vastly improved capacity results with RFCs below 0.85 in the DM scenario and only a marginal increase with the Proposed Scheme in place with acceptable queues.

11.2.5 Junction 22a northern roundabout (A140 junction with A1270) is shown to require mitigation, albeit the changes in queue lengths predicted in 2039 are relatively modest. Improved operation is shown in the DS scenario but there are increased queues and delays in the DS+M scenario. However, the mitigation measures are proposed in the interests of preventing rat running. The monitor and manage regime is proposed to include this junction.

11.2.6 An Outline Construction Environmental Management Plan (OCEMP) is appended to **Chapter 3** of the Environmental Statement (Document Reference 3.03.01). Construction effects have been considered and a mitigation strategy has been defined which can be developed further with more detail to be supplied within the Construction Traffic Management Plan which would form part of the full Construction Environmental Management Plan.

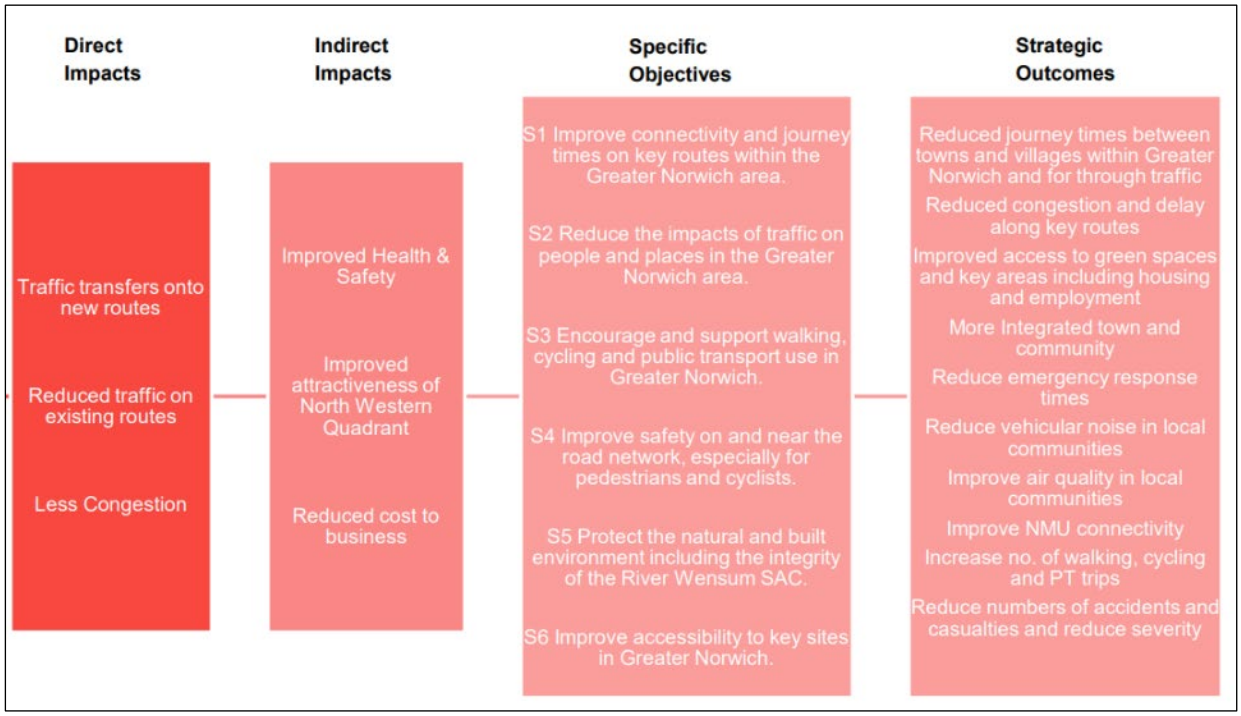
11.2.7 The programme for construction (which is due to start in early 2026 and end in early 2029) is expected to commence when a temporary new A47 junction at wood Lane is provided by NH as part of their A47 TUD scheme. The proposed layout would cater for all movements but the north arm would be relocated about 800m west, separating the junction from Berrys Lane, so that it is no longer configured as a crossroads layout. This means that a safer junction and suitable alternative route will be available whilst the works to the A1067 are carried out to create a new section of dual carriageway. Appropriate traffic management measures will also be provided to protect villages from rat-running during construction.

11.2.8 The suitability of approach routes to the site compounds have been considered and options for mitigation have been identified, including temporary localised widening of Marl Hill Road close to the junction with A1067 and either passing bays or a parallel haul road on Marl Hill Road. At Ringland Lane a section of temporary haul road parallel with the existing road on the south side. Land required to carry out these works is included within the red line boundary for the Proposed Scheme.

11.3 Meeting Scheme Objectives

11.3.1 The following flow chart shown in **Figure 11-1** demonstrates how the Proposed Scheme meets its own objectives and creates the strategic outcomes needed to tackle the key traffic and transport problems identified in the study area.

Figure 11-1 Meeting the Scheme Objectives and Strategic Outcomes



11.3.2 Key benefits of the Proposed Scheme include:

- The Proposed Scheme offers a direct link between A47 and A1270 on the west side of Norwich which is suitable for strategic traffic and HGVs.
- Through-traffic in rural communities such as Weston Longville and Ringland is forecast to reduce by 88-95% with the Proposed Scheme in place.
- Journey distances are reduced by about 4.6km per journey for those using B1535 route from A47 to A1270 with the Proposed Scheme in place.

- Journey times are quicker and more reliable for those using B1535 route from A47 to A1270 (a saving of about 6 minutes per vehicle).
- The Proposed Scheme alleviates future junction capacity and safety issues on A1067 at junctions with Marl Hill Road and B1535.
- With through-traffic removed from local villages in the west of Norwich, there are less barriers to walking and cycling and the local network is more conducive to active travel.
- Personal injury collisions are expected to reduce with the Proposed Scheme in place.
- There is forecast traffic reduction on A47 southern bypass east of A11 and south western radial routes into central Norwich (A1174 and B1108) as traffic switches to use available capacity on the A1270 with the Proposed Scheme in place.
- Traffic flows at A47 junctions on the southern bypass east of A11 are predicted to reduce.
- The Proposed Scheme is expected to be in the medium Value for Mony Category with an indicative Benefit Cost Ratio (BCR) of 1.5 to 2 so every £1 spent would return approximately £1.50-£2 of economic benefit to the area.

11.3.3 There are over 30,000 journeys per day with desire lines (straight line route from origin to destination) cutting through the area to the west of Norwich. The Proposed Scheme will offer a shorter distance route to the west end of A1270 Broadland Northway from A47 at Honingham and to the A140 for trips towards the North Norfolk coast than via existing minor rural routes and also in comparison with alternative routes around the east side of Norwich.

11.4 Conclusions

11.4.1 This TA has demonstrated that the implementation of the Proposed Scheme in combination with the proposed mitigation measures will help to create a

more sustainable and resilient transport network for the future which will adequately support forecast traffic levels to 2039 and beyond.

11.4.2 Overall, the TA finds that the Proposed Scheme is likely to provide operational and capacity benefits to the wider highway network and a Sustainable Transport Strategy has been prepared to assist with the delivery of the intended scheme objectives. Appropriate mitigation scheme has been considered with a monitor and manage regime proposed to control the roll out of mitigation measures. This can be secured via planning condition, so that appropriate traffic mitigation is delivered when shown to be needed.

11.4.3 Therefore, in the context of the NPPF 2023 planning policy requirements, there should be no reason in highways and transport terms for the scheme not to proceed.

11.4.4 Taking into account the above, the TA concludes that the Proposed Scheme should be considered acceptable in terms of highways and transport impact and would offer a substantial enhancement in connectivity for journeys to and from the west of Norwich.